Pyrogeography in Context:
Encountering Wildland Fire in Canadian National Parks

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Abstract

The management of wildland fire in North America is premised on fire suppression, as has been the case for much of the last century. As the roles of wildland fire in ecosystem functions are better understood and the adverse impacts of fire suppression are made clear, wildland fire suppression approaches are being re-evaluated. In protected areas such as Canadian national parks, this realization has led to the reintroduction of fire to park landscapes to achieve ecological and risk reduction goals. Through a multi-sited institutional analysis of Parks Canada, this research explores the complex relationship between conservation, fire management, and the maintenance of value in Canadian national parks. In this study I position Parks Canada within the context of Canadian settler colonialism and Canadian national parks as an ongoing component of the relationship between settlers and Canadian territory. I analyze how fire management has developed and is enacted in Canadian national parks and pay particular attention to the practice of prescribed burning as an alternative to full suppression. I argue that the political-economic context of national parks along with the logics of species conservation and so-called 'ecological integrity' narrate contemporary fire management practices in Canada's national parks. I also show how a set of more-than-human actors, and the process of fire itself, are enlisted to carry out these mandates while also functioning as important companions in identifying the limits of these contemporary policies. I argue that Parks Canada's dominion over fire and landscapes that burn is not absolute and that this is a productive context to think-with in the so-called Anthropocene.

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Chapter One: Introduction

It's September 13, 2017 and I'm sitting on the outskirts of Glenwood Alberta on the 505, a stretch of highway between the Kainai Nation (Blood Indian Reserve no.148) and Waterton Lakes National Park in the southwestern corner of Alberta, Treaty 7 Territory. Known as the place where the mountains meet the prairies, the enormous prairie skies are tinted red by wildfire smoke, making the mountains barely visible from the road. On August 30th, prior to my arrival in the field, a small fire just across the border in British Columbia was detected, and by September 17th the fire had firmly established itself in Waterton Lakes. By now, a team of Parks Canada fire management and communications staff from across the country have descended on the park and are joined by structural fire fighters from neighbouring municipalities as they attempt to keep the wildfire in check. They use a suite of strategies to prevent the burn from moving beyond the park borders and onto neighbouring ranch land and the close by reserves.[1] By the time the fire is contained and extinguished it will have consumed 35,000 hectares, including 19,303 hectares in the park itself. This wildfire, ignited by lightning beyond park borders, accomplished a great deal in a relatively short period of time: it consumed forest, destroyed park infrastructure, instigated evacuation orders (for both human and more-than-humans alike),[2] incited partnership, mortally wounded animals,[3] and created the conditions for many more-than-humans to flourish in its wake.

[1] Three reserves are of note. The Kainai Reserve (reserve 148) and the Blood Timber Limit (148A), the Piikani Reserve (reserve 147) and Peigan Timber Limit (147B), and, though not a concern for this particular fire, the Blackfeet Indian Reservation in Montana lies just across the US border.
[2] Before the fire arrived, the few bison present in the park and who reside in a paddock for public viewing, were evacuated to another park site.
[3] Parks Canada employees euthanized a number of animals, including two black bears, who were impacted by the Kenow wildfire.

The Kenow fire, though newsworthy, was by no means an exceptional event and arrived on the landscape among many other fires during the 2017 fire season in western North America. Such an attempt to extinguish, or suppress, the fire, represents one articulation of contemporary wildland fire management. Wildland fire management or, simply, fire management, is a form of resource management that has existed in the national park system in some form for over a century and has changed as park priorities have shifted (Stewart, 2005; Pyne, 2011). Wildland fire is a catch-all term for non-structure fires that unfold on vegetation and natural fuels (such as dead plant material) and includes both prescribed fires[4] and unplanned wildfires. These unplanned wildfires can result from lightning (or other natural causes), accidental human causes, arson, and escaped prescribed fires. Today, the challenges of fire management are being accentuated as land managers, such as those at Parks Canada, make sense of a century of fire suppression and the trials of global climate change.

This dissertation offers a multi-sited institutional analysis of the policy and practice of fire management in Canadian national parks. By focusing on the work conducted by Parks Canada, Canada's national park agency, I offer a glimpse into how the agency conceptualizes this form of resource management and insight into how this management is enacted by fire management staff. In a word, it offers an analysis of Canada's pyrogeography, a spatial articulation of how an institution practices fire management. As an agency encountering both kinds of wildland fire, prescribed fire and *wild*fire, this study provides a timely discussion of the challenges and possibilities of contemporary approaches to an ecological process present in many jurisdictions around the world. By following fire management policy and practitioners across Parks Canada's *national* system, it offers a glimpse into the operationalization of national conservation and fire management policy in *local* park contexts. While many Canadian fire

[4] These are also often referred to as prescribed burns.

management agencies recognize the role of fire as an ecological process, Parks Canada stands apart with its rather unique mandate, guaranteed in legislation, to maintain a so-called state of *ecological integrity* within the agency's many sites. The Canada National Parks Act (2000) describes ecological integrity within national park contexts as "a condition that is determined to be characteristic of [a park's] natural region […]". As such, fire as an ecological process is, in some park contexts, a key ingredient required to maintain a state of ecological integrity (Parks Canada, 2017). As an essential element to this environmental state, the Canada National Parks Act and supporting agency directives authorize the *use* of fire on the landscape through different methods including the use of prescribed burns.[5]

Figure 1: A sign in Waterton Lakes National Park informs visitors of a prescribed burn

[5] This also includes tactics that might lead active fires in new directions, back burning, and in some rare cases, random ignition.

In contrast to the approach used by Parks Canada, North American forest, planning, and fire management policy commonly ignores or brackets the ecological possibilities of fire-adapted ecosystems, a move environmental historian Stephen Pyne attributes to the adoption of European norms around fire by settler states like Canada (Pyne, 1997; 2011; Sandilands, 2016). Fire is positioned as out-of-place and at times even alien to an environment, rather than a cyclic and necessary ecological process. Most fire management in Canada is narrated by a fire suppression approach, whereby wildfires are extinguished, contained, or, in areas with fewer values at risk, allowed to 'let-burn' (Pyne, 2011; Zahara, *forthcoming;* Parks Canada, 2017). Fire suppression is embodied by a set of practices including varying firefighting tactics (which can include burning), landscape manipulation, and efforts to 'mop-up' following a wildfire event.[6] Over the last century the technologies and techniques that inform fire suppression have steadily evolved, becoming almost *too* successful in the eyes of some fire management staff.[7] This state of affairs has provoked some fire scientists to become more vocal about the inadequacies of current wildland fire policy (*see* Jensen & McPherson, 2008) and to make calls for more scientifically-informed action by governments tasked with land management. For these experts, wildland fire is inevitable—if not essential—to the very spaces they seek to protect, as fire is a process many species depend on and a process that, when authorized, reduces the chance of larger, more unwieldy fires. As other scholars have noted, there is a tension between how fire is understood by practitioners and how it is conceptualized by policy and legislation relevant to land management (*See* Neale et al., 2016; Rothman, 2007). This study offers a peek into how such contradictions play out in the context of Canadian national parks.

[6] Suppression tactics can include the use of fire. In these instances, fire managers may employ fire as a means of creating 'back burns', burns made ahead of the main fire to create fire breaks or to reduce the amount of fuel. These can vary in size and can be done by hand with drip torches or even from a helicopter using Delayed Aerial Ignition Devices.
[7] Interviews: October 2017

Fires trouble, or perhaps queer, the distinction between nature and culture (Pyne, 2012; Sandilands, 2016). These 'fiery entanglements' (Edwards & Gill, 2016) are complex phenomena that transcend such binary categories as they pull in and burn-up diverse actors. They are what Donna Haraway would call a natureculture, phenomena produced by inseparable actors normally relegated to competing camps of 'nature' and 'culture' (2003). These fires also trouble human-centred temporal distinctions through their cyclical and indefinite presence (Ogden, 2011). As such, they burn and extend into a kind of 'deep time', beating to a rhythm that can extend beyond institutional budgets and human lifetimes (Myers, 2017; Ogden 2011; Neale, Zahara & Smith, 2019). Anna Tsing urges us to think about processes like fires as happenings rather than singular events, a process fuelled by past human-environment histories, entangled with human and more-than-human actors, and embedded in the creation of *new* socio-natural histories (Tsing, 2015:168-169; Myers, 2017).

While a great deal of attention is paid to the behaviour of plants and animals in the face of fire, less could be said for the analysis of human encounters with these more-than-humans and the process that consumes them (Machlis et al*.,* 2002; Pyne, 2009; Christianson, 2015). As Pyne suggests, humans have played an intimate role in this multi-species dance for millennia, going so far as to suggest that we humans are a fire species, a global community entangled with all kinds of combustion (1997; 2011; 2012). Given the rich pyro-heritage across the planet (*See* Pyne,1997; Kull, 2002; Clark, 2011; Ogden, 2011), to encounter fire and landscapes that burn is to encounter ourselves. By *following the burn* this project interrogates what fire can teach us about ecology, fire practitioners, and the institutional contexts they work within. In doing so it offers insight into how Canada, as a settler colonial nation, figures and encounters these more-than-human happenings that are becoming an increasingly familiar presence on diverse Canadian landscapes.

The first step in this process is to understand that our relationships with fire and landscapes that burn are plural. Prior to the expulsion and relocation of Indigenous peoples in Canada, a myriad of traditional knowledges ignited and encountered fire (Pyne, 2011). Contemporary practices in North America are relatively young when compared with these knowledge systems that are in many cases embedded in and live-on in landscapes that burn. A new mosaic of jurisdictions and the complementing knowledge systems prompted by settler colonialism have undermined and replaced traditional forms of knowing, managing, governing, and thus relating to fire on Canadian territory (Pyne, 2011; Pasternak, 2014; Pasternak & Dafnos, 2018). This transformation was forged by the expansion of new economic regimes among other life-changing systems. Today, new settler stakeholders govern contemporary forest, field, and flame and these players are embedded in this historical and ecological trajectory often premised on fire's expulsion. This approach to fire, also known as fire suppression, is dedicated to snuffing-out fire, containing the threat combustion poses to the production and circulation of capital in resource landscapes (Roberts, 2013; Clark & Yusoff, 2014; Simon, 2017; Sandilands, 2016) and containing the threat fire poses to communities and public safety.

This said, suppression-era wildland fire policies and practices have been and continue to be exposed for their inadequate understanding of the role played by combustion and disturbance more broadly (Botkin, 1990; Rothman 2007). In the context of a growing appreciation for the complexity of landscapes, but also fuelled by changes in environmental activism (Botkin, 1990; Braun, 2002), 'Ecology' is being positioned as *the* answer to current woes by some wildfire experts and conservationists who attempt to push fire institutions beyond a full-suppression model (Jensen & McPherson, 2008), a movement that has been in the making since the 1950s in the United States (Rothman, 2007). Parks Canada is often cited for their 'ecologically' framed approach to wildland fire in protected area and offers a rare, but increasingly relevant,

opportunity to analyze how an institution deploys (what appears to be) a distinctly ecological model of fire management.

My research seeks to improve our understanding of how wildland fire experts, making use of a particularly 'ecological' paradigm, come to know, govern, and encounter fire through the nexus of science, policy and the practice of wildfire management. It answers calls for more research into the 'human' dimensions of wildfire (Machlis et al., 2002; Pyne, 2009; Coughlan & Petty, 2012), and calls for a qualitative focus on fire practice and expertise in particular (Neale, 2018). By focusing on practitioners and the policy they navigate, there is an opportunity to gain intimate insight into the institutional architecture that supports and hinders fire management. A focus on practitioners also makes space for the analysis of knowledge and practice that escapes official documentation or fails to fit neatly into policy and planning documents.

This research is also timely given the growing concern for contemporary environmental management in the age of global environmental change (Flannigan et al., 2006) where continued landscape manipulation and climate change are altering wildfire dynamics (Wotton et al., 2017). Under these changing conditions, contemporary practices and policy are being pushed to their limits, prompting a renewed interest in other ways of encountering wildland fire (Canadian Council for Forest Ministers, 2016). As major wildfire events spill over into the 2020s, and fire seasons continue to lengthen, the stakes only seem to rise in this era some refer to as the Anthropocene (Sullivan, 2020), an epoch dominated by the human-led re-arrangement of the planet's many more-than-human systems (Haraway, 2015; Moore, 2017).

The development of new technologies to track and measure wildland fire events, a growing interest in the value of Traditional Ecological Knowledge (TEK) to land-use planning and fire management, and the expanding use of fire as a management tool (Canadian Council of Forest Ministers, 2016) echo the slow realization around the globe that humans cannot contain

fires forever. Conservation actors, municipalities, Indigenous communities, and even the resource extraction industry (*ibid*) are all speculating on the role this form of land management can play. Developing a more robust understanding of how contemporary fire management unfolds within Parks Canada will be key to those hoping to emulate their approach and to those hoping to move beyond full-suppression practices.

In this dissertation I examine how Parks Canada enacts their fire management program, a scheme composed of legislation, policy, knowledge systems, and practices that contribute to nested encounters with landscapes that burn. In order to make sense of this practice of fire management this dissertation asks the following questions:

- How do Parks Canada staff come to know wildland fire and landscapes that burn within park borders?
- How is fire management, suppression, and fire-use authorized in Canadian national parks? How is it governed?
- Given these articulations, what are the registers through which wildland fire managers come to encounter combustion and landscapes that burn?

Answers to these questions help paint a vivid picture of the practice of wildland fire management and what makes it possible (or impossible). To carry out this research, I rely on a conceptual approach informed by literature in political ecology, political geography, and those scholars taking more-than-human subjects seriously. I develop this conceptual approach in detail in Chapter 2 as well as within each individual chapter.

Research Context

Parks Canada[8] is Canada's national park agency and one of the federal government's most decentralized institutions. It is comprised of a multi-sited bureaucracy of park staff with a headquarters in Gatineau, Quebec, a network of supporting regional offices in major cities and larger parks, and offices in each administrative unit across the country, known as 'field units.' This network of civil servants maintains the agency's 38 national parks, nine national park reserves, one national urban park, 171 national historic sites, and three national marine conservation areas.[9] With sites in each province and territory, Parks Canada sites share their borders with a plethora of stakeholders and governments, including: provincial, municipal, and Indigenous governments, along with private landholders and businesses.

Canadian national parks embody the bulk of Canada's federal land holdings and are relatively unique spaces in a national context where natural resource policy and practice is carried out by provincial actors. In the context of fire management, with its 450,000 km^2 of park land, Parks Canada governs a relatively small (though still immense) portion of the Canadian land base when compared with their provincial counterparts, who govern most land use in Canada. These tracts of federal land (and water) sit in contrast to the vast tracts of provincial crown land and the dense networks of private land governed by provincial governments. For this reason, provincial bodies such as Alberta Wildfire and the Ontario Ministry of Natural Resources carry out the bulk of so-called 'fire management' in Canada. Despite these differences, and as I'll discuss in Chapters 2 & 3, Parks Canada has played a key role in the trajectory of fire management in Canada. Today, as a member of the Canadian Interagency Forest Fire Centre (CIFFC), Parks Canada is often looked to by provincial and territorial governments for their fire

[8] Parks Canada refers to itself as Parks Canada and Parcs Canada (Français), and officially as the Parks Canada Agency (PCA) and l'Agence Parcs Canada.
[9] This is not to mention the national parks and marine conservation areas in the process of being established.

management expertise, particularly in the area of fire ignition, a skill necessary for carrying out planned burns.

This expertise aside, Parks Canada fire management policy, much like that of its provincial counterparts, is narrated not by ignition activities but by fire suppression.[10] The protection of infrastructure, environmental resources, and public safety are the pillars of most contemporary fire management policy and practice across the board and the same can be said for Parks Canada (Parks Canada, 2017). This said, national park fire management is distinguished from provincial agencies by the distinct authority of *federal* policy on national park sites and the diversity of ecosystems in the park system's portfolio. Further, unlike most provincial fire management agencies, Parks Canada has a unique mandate to ensure the 'ecological integrity' of park sites. Returning fire to landscapes and allowing some wildfires to burn is one articulation of ensuring such 'ecological integrity' in Canadian parks. This distinct agency mandate allows Parks Canada to reintroduce fire in regions where it has been suppressed, authorizing Parks Canada staff to apply fire on a scale distinguishable from its provincial partners.[11] Parks Canada differs from its provincial counterparts in that it both responds to fire and has jurisdiction over land management decisions, whereas in most provincial governments, fire management is housed in a separate location in the bureaucracy than where land management decisions are made. (Pyne, 2011). Put bluntly, in many provincial contexts fire management agencies are structured to *respond* to fires, not to *govern* them.

Given recent wildfire events, particularly in Western Canada, Canadian governments at all scales are more aware than ever of the ecological realities of their local fire-adapted

[10] As I will discuss, each park has a Park Management Plan and, often, a Fire Management Plan. These plans described how fire is meant to be governed and encountered in parks. In Canada's 'southern' parks these plans focus on suppression. As such, there are some northern parks where wildfires are permitted to burn on, a policy not typical in parks south of the 60th parallel.

[11] Provincial fire agencies and park systems also conduct prescribed burns but on a much smaller scale. Prescribed burning is also conducted by contemporary Indigenous communities on reserve and in neighbouring areas.

ecosystems, along with the inherent contradictions of contemporary policy responses to such phenomena (Canadian Council for Forest Ministers, 2016). Many ecosystems across Canada have evolved with, and may even depend on, fire. In a country where fire suppression has been the mainstay of fire management policy, some have argued that conditions have only been made worse as land managers struggle to extinguish and contain fires made worse by the interruption of local fire cycles. In the words of one fire manager, "you can't put fire out, you can only put it off".[12] The present and future impacts of global climate change have raised the stakes even further. With each fire season, Canadians, much like their American and Australian counterparts, are realizing that wildland fires are refusing to be contained. Further, they are coming to terms with the fact that returning fire to landscapes that burn will be an essential tool in preventing larger more uncontrollable fires and promoting ecological health. Parks Canada, with its nearly forty years of fire-use expertise, continues to be an important reference point for fire and forest institutions across Canada and beyond.

Legislation and policy provide a window into the institutional articulation of this approach to fire management. The National Parks Act (2000), and various policies such as the Parks Canada Wildland Fire Management Directive (2017), narrate all fire management activities for Parks Canada. These documents dictate what sort of objectives should be met and outline how they are to be achieved. Local national park management plans, fire management plans, and vegetation management plans further embody such legislation and policy at the scale of the park. Here, national legislation is translated through local park history, local political-economic context, and local ecosystem needs and challenges. Other federal legislation such as the Migratory Birds Convention Act (1994), the Species at Risk Act (2002), and the Canadian Environmental Assessment Act (2012), also constrain and embolden fire management practices.

[12] Interviews, 2017

This network of legislation, policies and planning documents are complemented by the human and more-than-human actors that enact this fire management bureaucracy. A collective of firefighters, fire technicians, fire managers, public safety personnel, and fire & vegetation ecologists are all entangled with this work of fire management and park management more broadly. As we will see later in this dissertation, these staff do not carry this work out in a vacuum of human actors, but do so in relation to, and in partnership with, many more-than-human actors such as pine trees, grasses, caribou, bison, and the relatively unruly process of combustion itself.

An institutional analysis of Parks Canada's fire bureau offers a glimpse into this world of so-called 'fire management'. This study shows how encounters with fire are conceptualized in park policy and how they are practiced by those tasked with carrying out these institutional approaches. Though specific to Parks Canada's institutional context as a national park agency, this study identifies common challenges faced by other fire organizations across the planet. These challenges include: reckoning with the ecological and institutional impacts of fire suppression, managing for continued development in and around protected areas (and in fire-adapted ecosystem more broadly), and the challenges of enacting alternative ways of living-with fire-adapted ecosystems (Canadian Council for Forest Ministers, 2016). This study also contributes to ongoing analyses of conservation organizations, and protected areas in particular (Nadasdy, 2003; Brockington et al., 2012; Igoe & Brockington, 2006; Corson, 2016).

A Political Ecology of Fire

I position this research within the scholarly tradition of political ecology, a topically diverse field punctuated by its common commitment to the critical analysis of nature, society and power. At this intersection, political ecologists are well placed to analyze environmental 'crises' not as

purely natural phenomena or unexpected acts of god, but as a kind of "social problem" (Blaikie and Brookfield, 1987:1). These moments of crisis that arise in the wake of the interruption of ecological processes are key points of departure rather than conclusions. As Blaikie and Brookfield describe in their influential text *Land Degradation and Society*, "Degradation is […] best viewed not as a one-way street, but as a result of forces, or the product of an equation, in which both human and natural forces find a place" (Blaikie and Brookfield, 1987:7).

Following a Marxist tradition, political ecology considers how economic systems, namely capitalism, reorder environments and human relationships (Blaikie & Brookfield, 1987; Cronon, 1996; Kull, 2004). The transformation of natural environments and more-than-humans into commodities and sites of resource extraction are just some of the empirical contexts wherein scholars deploy a political-economic analysis to discuss the likes of environmental destruction, uneven access to natural resources, and other ongoing issues of social justice (Braun 2002; Kosek, 2006; Brockington, Duffy & Igoe, 2012; Prudham, 2012). As such, the political economy of fire management has received increased attention by political ecologists and others. These critics remark on the often-contradictory roles played by the state and private firms in further entrenching human vulnerability to this ecological process (Roberts, 2013; Simon, 2017). As these critics suggest, fire's management is best described as a project in containing the threat wildland fire poses to the production and circulation of capital (Simon, 2017). This research echoes studies concerned with how capitalism transforms environments and how capitalism attends to forces that interrupt its success and expansion (Clark, 2011; Tsing, 2015).

Though political ecology could be characterized by its focus on the *intersection* of so-called nature and society, this literature could also be characterized by how it resists these distinctions from the start. As Blaikie and Brookfield explain in the context of land degradation,

> "[the] social relations of production do not offer a complete explanation of degradation, nor does the role of the state, but nor do the natural conditions of enticement and environmental variability" (1987:121).

Instead, we must consider these issues together as intimately entangled (Haraway, 2013; Van Dooren, 2014), hybridized (Whatmore, 2002), coproduced (Jasonoff, 2004), and/or rooted within networks that are not purely human nor natural (Rocheleau & Roth, 2007). This literature informs my work with fire and shows how the economic currents that underscore decision making, the actors enlisted to suppress or ignite such encounters, the knowledge that informs those decisions, and the vegetation that burns, all become key actors and nodes in a political ecology of fire (*See* Kull, 2002).

For political ecology, the 'environment' is not just a stage on which social processes unfold but is rather an assemblage of active components entangled in state craft. Particularly relevant to this dissertation is the wealth of political ecology literature on conservation, protected areas and resource management (Cronon, 1996; Neumann, 1998, 2002; Goldman et al., 2011). This literature explores how the state, among other actors, enlists the environment to facilitate and maintain power (Neumann, 2004; Sandlos, 2011a; Nadasdy, 2007; Lunstrum, 2009). The ontological turn in political ecology has prompted a heightened attentiveness to the agency of more-than-humans and their role in the coproduction of space and place, leading to a wealth of literature exploring how animals (Shukin, 2009; Loo, 2010), insects (Mitchell, 2002; Kosek, 2010), plants (Robbins, 2007; Ogden, 2013; Beirmann, 2015; Fleming, 2017; Marguilies et al., 2019) and forests (Prudham, 2012; Mathews, 2011; Sundberg, 2011; Vandergeest and Peluso, 2011) come into conversation with these processes. Much of this literature emerges out of colonial settings, highlighting a theme of uneven political-economic relations imposed on colonized peoples and landscapes, a theme consistent with this dissertation's focus (*See* Braun, 2002; Peluso, 1992).

My study contributes to the field of political ecology in three ways. First, it echoes research that has taken the political-economic dimensions of wildland fire management seriously (Kull, 2004; Roberts 2013; Simon, 2017). It explores how both value and risk orient the relationship between humans and things that burn. In doing so, it argues that even the most well-intentioned and relatively radical forms of contemporary fire management remain embedded in the capitalist logics and spaces that bore early manifestations of wildland fire management. Second, it places this process of fire management, and national park management more broadly, within an institutional setting of federal bureaucracy and more specifically, within the context of Canada as a settler-colonial state (Braun, 2002; Sandlos, 2002, 2008, 2011a; Sandilands, 2009). It contributes to ongoing discussions within the field that highlight the capitalism-colonialism nexus, whereby capitalist expansion, protected areas, and the settler state cannot be understood without starting with the premise of dispossession (Harvey, 2004; Coulthard, 2014; Büscher, & Fletcher, 2015; Massé & Lunstrum, 2016). To be specific, it adds to a growing literature on the relationship between conservation and the settler colonial state by discussing how so-called ecologically informed management practices unfold at the expense of other ways of relating to fire and landscapes that burn (Nadasdy, 2007) and how such conservation areas are intimately embedded in the maintenance of value (Bella, 1987; Youdelis, 2018, 2019) and the notion of Canada as a nation (Sandilands, 2013; Loo 2011; Sandlos, 2011a, 2011b). Finally, my research contributes to ongoing discussions concerning the role of more-than-humans in so-called social analysis. My empirics show not only how more-than-humans become enlisted in state efforts to govern and contain wildland fire, but also how these same creatures and processes can interrupt or undermine their success. As such, I offer an institutional analysis that considers how more-than-humans figure into the practice of fire management as a set of ongoing encounters with landscapes that burn. While political ecology provides the foundational framework for this study,

I also engage with a series of conceptual tools from other literatures that share a critical gaze on the nature of governance and the governance of nature. These conceptual tools are considered in greater detail in Chapter 2.

Challenges and Motivations

Fire practitioners and the broader 'social fire' literature share the sentiment that fire is not a solely natural or social phenomenon (Pyne, 1995; Verran, 2002; Kull, 2004; Pyne, 2011; Neale, 2016; Neale et al., 2019). For those carrying out fire management in the context of global environmental change, these entanglements are becoming more volatile, and there is a shared sentiment that contemporary practices are not sustainable (Jensen & McPherson, 2008). For these practitioners the message is simple, though perhaps difficult for governments, firms, and the public to digest: some landscapes *must* burn. As fire practitioners see it, wildfires will happen whether we like it or not, and the window to have some say in *how* they will burn is slowly closing (*See* Struzik, 2017). This is not to insinuate that work has not been done to address the contradictions of contemporary fire management but to suggest that Canadian jurisdictions are in the midst of an important period of reflexivity, one that needs to be pushed forward and accelerated (*ibid*). Across Canada, projects such as the Fire Smart program encourage communities to live differently with fire, encouraging home-owners to tailor their houses, yards, and common infrastructure to the ecological realities of their local landscapes. At the national scale, forest ministers have discussed the future of wildfire in Canada and set common guidelines for future research and infrastructure needs (Canadian Council for Forest Ministers, 2016). As such, a growing number of actors including land managers, municipal officials, academics and government researchers are making an effort to communicate to the Canadian public that fire is a

process that we will have to learn to live-with, whether or not we like it (Parsons 2019; CBC Radio, 2019; Struzik, 2017).

Living with fire is easier said than done though, and Canada's reluctance to embrace fire is understandable. Fire has been a process kept at bay, a character in stories of colonial cities, harsh wilderness, and 'freak' natural disasters (Pyne, 2011). For decades, Smokey Bear informed Canadians and Americans alike that fire was a threat to both the forest and the nation (Kosek, 2006). The implications of fire's exclusion from the landscape, and the complex impact of a changing climate, is being felt by other fire regions such as California, Australia, Brazil and Portugal (Struzik, 2017). In these diverse contexts, uncontrolled fires have exposed our vulnerability to this ecological process, a vulnerability crafted over time through our ability to bracket combustion from the places we live in and the places we profit from (Simon, 2017). Yet, times and landscapes are changing and so too are the fires. Their increased presence and our growing vulnerability invite us (or force us) to encounter fire differently.

This project hinges on a hypothesis that in the face of global environmental change and the realization that fire is a process firmly in-place in ecosystems across Canada, Canadians will have to learn to live-with fire. In other words, rather than a set of encounters that attempt to restrict and ignore wildland fire, Canadians are invited to think about how we could orient ourselves and live differently in landscapes that burn. In the context of the Anthropocene, fire serves as a litmus test of our ability to navigate our more-than-human relationships and come to terms with the destruction and change we have put into motion (Neale, et al., 2019). The work of living-with fire, whether for conservation or for survival, will have to take stock of the socio-natural context through which this process burns. Even capitalism will have to reckon with a country on fire; though I'm sure it will be up for the challenge and may even thrive in its wake (Klein & Peet, 2008; Moore, 2017).

Encountering Fire Differently

The last century of fire management in Canada and the United States has narrated fire as a threat to the success of industries such as logging and tourism (Pyne, 2011; Pyne 2017). Coming to know and govern fire in this way has happened at the expense of Indigenous ways of living-with fire and alongside broader efforts to extinguish Indigenous relations to land and territory (Pyne, 2012; Sandilands, 2016). While human-induced fire was not a phenomenon evenly practiced across contemporary Canada, the interruption of diverse land practices has prompted important challenges in places where fire's absence has increased the hazard of larger fires and contributed to declines in biodiversity (Pyne, 2011). The diversity of fire knowledge has been replaced with Western settler sciences and policy (Sandilands, 2016; Pyne 2011, 2012).

Ironically, biological and ecological sciences have confirmed what Indigenous knowledge holders already knew: that fire plays an important role in many Canadian landscapes. Though biological and ecological knowledge have allowed fire managers to know fire differently, practices and policies overwhelmingly focus on maintaining the status quo of fire's suppression. I argue that, rather than subvert suppression logics, ecological knowledge has been put to work in the maintenance of a continued suppression approach. Indigenous knowledge, on the other hand, remains at the sidelines in most fire management institutions, often playing the part of a novel footnote in management plans that simultaneously celebrate Indigenous ways of living with fire, while they bracket the inconsistencies this knowledge identifies in contemporary practices.

Unlike Indigenous knowledge systems, ecological thinking seems to lock into capitalism quite well. Fire management, though informed by biological and ecological research, remains focused on extinguishing the ecological process it seeks to know. There are only limited research and management tools that function to critique contemporary practices and enact change. These

voids in management and research (and the stakes they carry) are not unnoticed by fire management practitioners. Consequently, practitioners find they must work within the confines of the institutional architecture of fire agencies in order to *return* fire to the landscape (Neale, 2016).

Burning for Whom?

Given the significant budgets allocated to protecting valuable timber, while fires in northern Saskatchewan, for example, burn at the expense of fly-in Indigenous communities (See Zahara *forthcoming* for more on this important topic), it is important to ask who the current beneficiaries of fire management, policy, and practice are and if our current ways of understanding fire and landscapes that burn are sufficient. Thus, I enter this research with a focus on how certain knowledges are operationalized to serve specific purposes. For Haraway, analyzing the means through which we articulate problems is sometimes as important as the problems themselves, "It matters which stories tell stories, which concepts think concepts. Mathematically, visually, and narratively, it matters which figures figure figures, which systems systematize systems" (2015: 160).

I position fire management and the contemporary challenges it faces within the settler colonial context that has fostered its development; not as an apolitical response to a spontaneous and unexpected environmental disaster. Most fire organizations in Canada have grown out of early Canadian administrations, organizations that were simultaneously dealing with the dispossession of land, violence against Indigenous people, and the extraction of resources. These institutions are born out of administrations that understood fire as exceptional and out-of-place according to European experiences and knowledge of this process (Pyne, 1997, 2011, 2017). In the context of an analysis of the Canadian national park system's response, this means attending

to an institution where park wardens who eliminated predators, fires, and poachers, were also active in expelling Indigenous people (Clapperton, 2013; Burns, 2000; Rutherford, 2011; Loo, 2011; White, 1985). As I discuss in Chapter 3, these past management practices continue to spill over into contemporary park management and relationships with Indigenous people. Given Parks Canada's growing public commitment to Indigenous people, remembering this history is an important place to start when imagining how to conduct fire management differently.

An analysis of how settler colonial state institutions view fire can paint a picture of how Indigenous knowledge can complement park initiatives or show us how they may be incompatible. As my respondents pointed out, there is enthusiasm around Indigenous engagement on this topic of fire-use but uneven action on the ground. While in the field I was often asked if I was focusing on this Indigenous piece of Canada's collective pyro-heritage. My project moved forward on the premise that more work needs to be done on the institutions who have claimed authority and expertise so as to see where opportunities for partnership may or may not exist (See Neale et al., 2019a; Neale et al., 2019 b). Without this step, there is a risk of repeating earlier failures that assume current practices as 'common' sense and the only path forward. As such, there is a danger of positioning ecological knowledge and park management in general, as apolitical and ahistorical. This dissertation endeavours to challenge such assumptions.

A Responsibility to Study-Up

My research questions focus on those who carry out contemporary fire management, and as such is a study of those who have the authority and expertise to do so. My aim is not to naturalize this position of power but to trace its genesis. This research is an exercise in 'studying up' (Nadar, 1972) and is an attempt to trouble the assumed authority granted to institutions that govern multi-species processes. Settler relationships to 'natural resources' and land have been and continue to

be key obstacles to any form of reconciliation (Sandlos, 2011a; Simpson, 2011; Cameron, 2015; Pasternak, 2017). As contemporary blockades led by Indigenous communities show, this tension is part of our past, present and future (Estes, 2019). These actions are meant to remind settler Canadians that Canada is a nation born out of treaty, a relationship with responsibility (Regan, 2010). I enter this discussion as a settler, a beneficiary of this uneven relationship.

As Indigenous scholars and others have rightly identified, settler scholars have a role in returning a sense of responsibility to this relationship (Maracle, 1996; Fanon, 2005:106; Snelgrove et al., 2014). In my work this translates as a responsibility to document and understand how this relationship with fire is unfolding at the hands of settler institutions. Natural resource policy and jurisdiction is perhaps the most important node of Canadian settler colonialism and a site worthy of reflection and critique (Cameron, 2015; Pasternak, 2017; Pasternak & Dafnos, 2018). A quest to encounter not only fire, but also Canada, differently, motivates this dissertation, as with each fire there is an opportunity to make a new future (Neale, 2018; Neale et al., 2019).

Organization of Dissertation:

Each chapter of this dissertation speaks to the different ways Parks Canada staff come to encounter combustion and landscapes that burn. I have prepared chapters as manuscripts. With this in mind, the reader will note each chapter has its own methods section and relevant literature reviews. Chapter 2 discusses questions of methodology and method relevant to all chapters. In that chapter I discuss conceptual currents that inform my research project and the corresponding methods employed. The chapter will also further discuss the organization at the centre of my empirical analysis: The Parks Canada Agency and its network of fire management professionals.

This dissertation is not an exhaustive reflection of the fire bureau's work, rather it focuses on a specific tactic of fire management: prescribed burning. This is the work that sets Parks Canada apart from other fire institutions in Canada, such as the BC Wildfire Service, Alberta Wildfire, or the Ontario Ministry of Natural Resources and Forestry. Both the literature and my discussions with fire practitioners in Canada position prescribed burning as a process that will become a more widespread management tool for fire practitioners in Canada and beyond. This is not to mention the growing interest in the practice from the likes of land managers in jurisdictions as diverse as municipalities, resource extraction sites, and even cities. In this chapter I position the *burn* as a method, a means of identifying the architecture and tensions within an organization. In *following the burn* through an institution and on a landscape, this method exposes relationships, networks, and frictions. For this geographer, the phrase "you've got to burn to learn" takes on new meaning.

The next four chapters focus on three pronounced articulations of human-fire encounters within the context of Parks Canada. Chapter 3 invites the reader to consider how human encounters with fire and landscapes that burn have changed in Canadian parks. Leaning on scholarly accounts of the history of fire management in Canadian national parks and analysis of early fire management documents, I trace the saturation of a fire suppression logic within Parks Canada. I explore how the entrance of ecological thought and ecologically informed legislation in the 1980s and the following decades, interrupts this logic. This chapter is more than a normative timeline of events; it is an account of changing institutional logics, policies and corresponding actions. It contends that while ecological thinking has become central to park management, it is but a piece of an extended trajectory of management practices. I show how rather than interrupting suppression logics, ecological thinking is absorbed by the status quo in order to maintain the production and circulation of capital.

Chapter 4 looks closely at how ecological understandings of fire management have altered contemporary fire management practices in Canadian national parks, this time with a contemporary focus. I explain that suppression as an institutional approach to fire management has not disappeared, even with the entrance of the mandate for achieving and maintaining so-called 'ecological integrity'. In this chapter I explore how risk, fuels, combustion and hazard mediate fire suppression and ignition. This chapter describes how ecological thinking has changed the articulation of these modes of knowing, governing, and encountering combustion and landscapes that burn but also how some facets remain unchanged. I argue that most tools remain focused on responding to fire events rather than preparing for them. This said, I consider how some tools have allowed an alternative to fire suppression to emerge, namely the application of prescribed burns.

Chapter 5, previously published in *Environment and Planning E* (Sutherland, 2019), takes on a different tone and focuses squarely on this new encounter that is made possible by policy changes that take fire, among other disturbance events, seriously: prescribed burns. I work with Mary Louise Pratt's concept of the contact zone to appreciate the prescribed burn as an *encounter* between fire practitioners and landscapes that burn (Pratt, 1991; Isaacs, 2019; Isaacs & Ortuba, 2019). This chapter describes how Parks Canada staff practice the prescribed burn as a management tool and considers how burning is a process that depends on actors that are both human and more-than-human. This chapter complements Chapters 4 and 6 in their attempt to articulate the different political-economic, and particularly colonial, projects at work, while making space for more affective forms of encounter that take place on the fire-line.

The emergence of ecological integrity as a legislated mandate, and the contingent federal policies that emerged in its wake, has prompted a new form of governmentality in fire management. In Chapter 6, I explore how the Species at Risk Act and the National Parks Act

overlap and contest each other in the context of fire management, prompting what Fletcher would refer to as a set of environmentalities (2010; 2017). Based on a review of prescribed burn plans and environmental assessments from burns conducted in the Canadian Mountain Parks,[13] this chapter considers what happens when biopolitical projects become entangled with one another. By focusing on how prescribed burns and species at risk interact institutionally through policy, planning, and the enactment of specific conservation initiatives (prescribed burns), I consider how fire challenges and reinforces multiple biopolitical projects.

In sum, these chapters present an account of fire management policy and practice as conceptualized and enacted by Parks Canada. I use policy, planning documents, and interviews from across the national park system as a means of making sense of this form of contemporary conservation while also making note of the tensions and contradictions entangled within. In doing so, this dissertation illustrates what comes to matter and what might escape our attention in articulations of nature in Canadian national parks.

[13] Banff National Park, Kootenay National Park, Yoho National Park, Glacier National Park, Revelstoke National Park, Waterton Lakes National Park and Jasper National Park.

Chapter Two: Conceptual Framework and Methodology

Introduction

My goal in this dissertation is to understand how federal government natural resource managers come to know, govern, and encounter fire and landscapes that burn. Given the authority federal and provincial actors have over the field of wildland fire management, this research is an exercise in making state knowledge unfamiliar (Van Maanen, 1995:20). In making such knowledge and practices 'strange' this research traces Canadian fire management practices as though they are not common sense or apolitical. Rather, fire management is positioned as a form of human and more-than-human encounter that is (co)produced and practiced in order to meet certain ends (Jasonoff, 2004). This is not an attempt to question 'if' fire managers know anything, but to consider 'how' they know, govern, and encounter what they understand as an ecological process.

State-led approaches to fire management in Canada are diverse but are overwhelmingly dominated by fire suppression as a common policy narrative. Where diversity exists, it is sparked by differences in local fire regimes, the uneven prevalence of 'let it burn' policies, different authority over state and privately held land, distinctive institutional compositions, varying budgets, and nested institutional mandates.[14] Parks Canada is often set apart from its provincial counterparts in a number of ways, including: their mandate to maintain 'ecological integrity', the incredible diversity of landscapes it is tasked with governing, its authority over the management of such land, and its history of using prescribed burns as a management tool (Parks Canada,

[14] Interviews, 2016, 2018.

2017). I position their approach as *one of many* possible ways of engaging with landscapes that burn, but one worthy of attention because of its novel interventions on the part of active fire-use (prescribed burning and the like) and the agency's role in developing nation-wide fire knowledge through its mobile and trans-local workforce.[15] Their first-hand experience with diverse Canadian landscapes, their commitment to developing ignition capabilities, and their nation-wide presence makes them an important resource for both their immediate neighbours and their many provincial partners.[16]

The fire management staff I interviewed for this research use the word landscape as a means of framing the ecological settings they are tasked to work with, but their use of the term also acknowledges the human history embedded in such spaces. 'Landscapes' as places with human and more-than-human components challenge a normative distinction between nature and culture. As such, the landscape concept has received a great deal of attention in the geographic literature and beyond (*See* Ingold, 1993; Rose, 1993 & 2002; Wylie, 2005). Here, I position landscapes as "…assemblages constituted by humans and nonhumans, material and semiotic processes, histories both real and partially remembered" (Ogden, 2011: 35). Rather than backdrops or a stage, landscapes are places in the making (*ibid.*). In this dissertation, I refer to 'landscapes that burn' as an attempt to acknowledge the many beings and processes at work in places that *can* go up in flames, while also endeavouring to avoid the fetishization of combustion, of flame, as the sole component of wildland fire. In referring to 'landscapes that burn' I encourage the reader to see landscapes, whether they be in parks or beyond, as places that are in the making by both human and more-than-human actors. As such, rather than re-inscribe

[15] The majority of fire management staff work for the agency's 'national office' but are typically stationed in parks across the country. During a wildfire or prescribed fire, fire management staff, including fire crews (fire fighters), ignition specialists, fire technicians, and other managers, are deployed to fires outside of their home field unit.
[16] For example, staff in Grasslands National Park could find themselves managing fires within park borders, helping out with a fire on neighbouring land, deployed to fight a wildfire or conduct a prescribed burn in another national park. Interviews, November 2018.

visions of what national park landscapes *should be*, I use 'landscapes that burn' as a shorthand for these assemblages of beings that have the potential to burn in ways *beyond* human articulations of what these spaces *should* look like.

My intention with this project is to appreciate how specific federal government actors, and the institution these actors work for, have engaged this volatile process and the landscapes on which they erupt, smoulder, and lay dormant. As such, this chapter outlines the conceptual and methodological approach of my research on Parks Canada's fire management policy and their wildland fire practices. I begin by reviewing some of the key conceptual approaches that inform what I frame as an institutional analysis of Parks Canada's national wildland fire management program. As discussed in Chapter 1, this research takes its inspiration from the field of political ecology, where natural resource management is analyzed with a careful attention to nature, society, and power. While political ecology provides the foundational framework for this dissertation, I engage with additional conceptual tools as a means of making sense of this institution tasked with encountering fire. This conceptual section meditates on four themes that are not endemic to the political ecology literature. These themes are: how others have studied bureaucracies and bureaucrats, the ways in which such actors come to *know* and thus *produce* natures, how conservation is a form of governance over the life and death of species, and how an attention to encounters with unwieldy more-than-human actors adds important nuance to accounts of environmental management. In these sub-sections I also signal to what these conceptual points mean for the methods I employ.

Next, I discuss how *following the burn* is used as a means of identifying the institutional architecture of Parks Canada's fire management bureau, the actors that become enrolled in its management, and the respective sites where this process unfolds. Wildland fire, as a form of environmental disturbance and source of institutional interruption, exposes the limits of

institutional responses and the unwieldiness of more-than-human processes. It is also a productive place from which to identify how national approaches are articulated in local settings.

I then move on to discuss the methods used in this multi-sited institutional analysis. I review the sites I visited between 2016 and 2018, describe the kinds of documents, policy and legislation that come to bear on fire management and this study, and describe how interviews with fire management staff in Parks Canada (and neighbouring jurisdictions) painted a vivid picture of contemporary fire management in Canadian national parks. Chapters 4, 5, and 6 are prepared as manuscripts and have their own methods sections.

Conceptual Approach: Studying 'Institutions of Nature'

In Chapter 1, I described how political ecology is characterized by its common commitment to the critical analysis of nature, society and power. As such, this field has paid particular attention to the realm of environmental governance, and conservation in particular, as a significant point of friction between people and resources. In my research the commitment to the critical analysis of nature, society, and power is expressed by the examination of Parks Canada's practice of fire management, an ongoing exercise in maintaining control over an unwieldy and volatile 'natural' process that threatens other park management goals. In this institutional context, I provide an empirical focus on Parks Canada's fire management program and consider how actors navigate landscapes that burn and enact policy and legislation. In the chapters that follow, I explore how fire management is translated through nested institutional norms, policies, and knowledge surrounding what fire puts at risk and how actors confront processes that are coproduced by past and present human encounters *with* landscapes that burn.

Contemporary responses to wildland fire are entangled with how 'nature' has been articulated and coproduced by the national park agency. Wildland fire has not always been

positioned as ‘natural’ within Canadian national parks, let alone an integral element of a coproduced and common natureculture. As I discuss in Chapter 3, the understanding of fire as a threat to natural resources inspired a century of fire suppression, bracketing wildfire from Canadian landscapes (Pyne, 2011). This approach altered the composition of contemporary national park landscapes and has resulted in a set of complex challenges for those attempting to understand fire’s historical presence on the landscape and for those tracing how best to reintroduce or guide fire in our contemporary moment. The intervention of ecological thought into park management and conservation in the late 1900s has rearticulated fire as an important disturbance event in many ecosystems across Canada (Parks Canada, 2017). As such, fire has become both friend and foe in parks where it is positioned as a threat to values at risk and to public safety, an essential ecological process, and even a key tool, in achieving park mandates. Though certainly a challenge to those hoping to contain disastrous events, like the Kenow fire cited in the introduction, fire is being repositioned as a key conservation tool to aid in the maintenance of vegetation communities, the reintroduction of species, and in some cases the destruction of so-called invasive species. In many ways, wildland fire offers a tangible and spectacular display of how ‘nature’ is coproduced and how managers must make sense of how this process has unfolded through time. Situating the Parks Canada Agency and its fire bureau as an institution tasked with the maintenance of an agency-mandated ‘nature’ invites us to trouble the ‘nature’ that is produced or curated and how it is entangled with other ordering projects (Haraway, 1991; Cronon, 1996; Neumann, 1998; Sandilands, 2009). To be specific, scholars critical of Canadian conservation reflect on how the governance of the environment, natural resources, and species are entwined with the legacies of ongoing settler colonialism (Binnema & Niemi, 2006; Sandlos, 2009; Youdelis 2016) and capitalism more broadly (Bella, 1987; Youdelis, 2018 & 2019). For these authors, preservation, conservation, and natural resource

management are about facilitating the dispossession of land for the production and maintenance of a capitalist system, made possible by settler colonialism. For others, conservation initiatives such as protected areas and attempts to 'rewild' landscapes are part of grander attempts to *make live* whereby parks, species, and bureaucrats become enlisted in the biopolitical project of maintaining and improving global biodiversity (*See* Youatt, 2008; Biermann & Anderson, 2014; Biermann, 2016).

Bureaucracies & Bureaucrats

Laura Nadar's 1972 invitation to 'study-up' called attention to the lack of anthropological literature on those in power. Rather than focus exclusively on those who were the subject of injustice, scholars were invited to refocus their gaze on those who hold more power and who often escape anthropological critique. This invitation has since inspired empirical work on Wall Street banks (Ho, 2009), EU diplomatic circles (Kuus, 2013b), immigration agencies (Mountz, 2010) and global environmental aid organizations (Corson, 2016). These attempts to 'study-up' are embodied by forms of ethnography and institutional analysis, methodological approaches that apply qualitative methods in order to document the way elites, experts, and other power-wielding actors know and practice the world (Kuus, 2013a). These empirical settings are positioned as both appropriate sites of anthropological and geographic inquiry, and politically vital ventures for troubling institutional authority and how these expert practitioners exercise their power over others (Mountz, 2010). A focus on those in power, and on institutions with authority over natural resources in particular, have been a mainstay of political ecology research (Peluso, 1992; Neumann, 1998; Sandlos, 2011a; Pulido, 2017).

Bureaucracies are one institutional arrangement of particular concern for those hoping to study-up. A rich literature that speaks across empirical sub-fields has shown bureaucracies are

more than static monoliths of the state; they are dynamic social settings in their own right. As Mountz explains:

> The bureaucracy is a key site where information and power circulate, representations are crafted, and identities scripted. As such, it is a key organizational node through which to understand the shifting spatiality of governance, and through which to question the ontological underpinnings of "the state" by exploring the work of civil servants" (2010: 90)

For Mountz, the bureaucracy is both a 'structuring structure' (2010; Bennett, 2003; Kuus, 2013) and an institutional body composed by the practice of governance by bureaucrats. My institutional focus on Parks Canada uses the work of civil servants, here mostly fire managers and ecologists, along with the documents that support or record their work, as sites from which to understand the practice of the state, albeit a small piece of it. This 'organization node' of fire management, while specific to the topic and trouble of 'fire', is an opportunity to understand how the state knows and practices nature (Scott, 1998). Such a study invites discussions of how institutional norms, policies, and legislation impact the kind of world staff are encouraged to foster.

As dynamic empirical settings, Mountz invites us to distinguish between the state, bureaucracies, and bureaucrats. Reflecting on her work on Canadian immigration governance, she reminds us that:

> "When investigated as an everyday enterprise, "the state" emerges as a rather haphazard constellation of actors sharing information and strategies, while operating largely in the dark. As a result, civil servants traffic in information, whether at international airports abroad or via email between regional ports of entry and national headquarters. These dynamic networks prove essential to understanding the shifting spatialities of border governance" (Mountz, 2010: 88-89)

Her understanding of the state contrasts with an articulation of the state as an overarching, all-powerful, and suffocating force. Instead, Mountz's version of the state invites those studying-up to consider how a constellation of actors operating in social, and sometimes chaotic contexts, come to carry out the work of, in her case, border governance. Such an approach demands a kind of multi-sitedness, encouraging an empirical focus that is attuned to the many spaces and places where fire management takes place (Hannerz, 2003). It also invites a reflection on how the composition of bureaucratic structures, and the techniques operationalized, may teach us about *how* the bureaucracy understands the world and the challenges it faces. Fire management, like border governance, is an attempt to contain that which troubles state authority, in this case the authority over a nature that has been assumed to be passive and exploitable.

At the core of this genre of institutional analysis is the bureaucrat. Fanon, Foucault, Agamben, and even Latour show that the bureaucrat plays an important and dynamic role in the ordering of others. These figures are said to play particular roles in governance (Foucault, 1990), the maintenance of modernity (Latour, 1993), the maintenance of colonial relationships (Fanon, 2005), and the creation and maintenance of spaces of exception (Agamben, 1998). For such scholars, bureaucrats are the managers of violence and the embodiment of the state's grip.

Looking closely at specific government institutions, bureaucrats are not exclusively pawns of the state, but are actors practicing, performing, and navigating the state as well (Kuus, 2013; Mountz, 2010:90-91; Mathews, 2011). As Kuus comments, "Once these professionals are no longer cast as minions of the state, they become analytically more interesting" (Kuus, 2013: 35). Their enactment of policy is entangled with local contexts and encounters with those outside the confines of the bureaucracy. As Mountz explains, "Bureaucrats make powerful decisions that have permanent effects on people's daily lives" (Mountz, 2010: 91) and as such are necessary subjects in discussions of the state. Like those maintaining the border, those working with fire

make decisions on matters that may not have a clear answer and that may not be theirs to make alone (Mountz, 2010). Fire managers, as a kind of bureaucrat enacting and developing a set of knowledges and intimate more-than-human encounters, respond to events where decisions can lead to diverse conclusions and futures (Neale, 2018).

What can be taken from the above discussions is that, in practice, studying the bureaucracy of fire management within national parks means remaining attuned to the networks that make bureaucracy possible (Rocheleau & Roth, 2007), tracing the ways in which bureaucracies and bureaucrats are granted authority (Blomley, 2003; Pasternak, 2017), and treating bureaucrats not as puppets but semi-autonomous actors who are *also* navigating the state (Mountz, 2010; Kuus, 2013).

Knowing Nature, Knowing Fire

How Parks Canada has understood 'nature' has changed through time (Craig-Dupont, 2011; Mortimer-Sandilands, 2009; Braun 2002; Bella, 1987). The same could be said for their understanding of fire's place on the landscape and the social implications of this process. As others have found, the means through which national parks are articulated, as in the policy, management plans and actions taken to establish and maintain national parks, are rich sites of empirical analysis (Kopas, 2007; Peck and Theodore, 2012; Mountz, 2010; Sandlos, 2013). Here, economic rationales, territorial expansion, and the emergence of new 'scientific' ways of knowing and managing protected areas all become entangled with how park staff carry out their work and orient themselves within such institutional contexts.

In tracing how fire has been and is known, one observes how articulations of nature and fire are both prompted by and produce new political encounters. As environmental historian John Sandlos notes in the case of another Canadian bureaucracy, the Canadian Wildlife Service, wildlife biology and ecology in its various iterations not only narrated Canadian wildlife

conservation in the Canadian North, but structured the relationships between bureaucrats, Indigenous peoples, non-Indigenous Canadians, and animals (2008, 2011a). As such, a healthy literature on Canadian conservation notes the pivotal role the likes of the national park service, the Canadian Wildlife Service, and various natural resource bureaucracies have played in the production of Canadian natures and the enactment of settler colonialism (Wynne, 2007; Loo, 2010; Foster, 1978). Further, as others have noted, the practice of bureaucratic knowledge creation and governance *continues* to reverberate through *contemporary* relationships between these actors in national parks and surrounding landscapes (Nadasdy, 2007; Youdelis, 2016; Youdelis et al., 2020).

Much of this discussion has been premised on understanding parks as sites of development and economic expansion (Bella, 1987; Neumann, 1998; Neumann, 2004; Igoe & Brockington, 2006), or as spaces that ironically authorize the destruction of spaces beyond park borders (Cronon, 1996). It is in these instances that one observes how ecology, as a way of knowing the world, becomes exercised in projects that engage this knowledge within specific spatialities and in tandem with other economic rationales (Braun, 2002; Prudham, 2006; Mathews, 2011; Holterman, 2020). In the case of natural resource management, ecology, often articulated within the context of a dominant capitalist logic, narrates how natural resource and conservation bureaucrats carry out their work, whereby ecological knowledge can be applied to secure certain 'natures' while allowing others to be interrupted (Braun, 2002; Prudham, 2012). As such, political ecologists and environmental historians alike have witnessed how diverse logics and fixes applied to the 'environment' are often carried out at someone else's expense; whether they be Indigenous peoples, predators, or other land users (Sandlos, 2011a; Loo, 2010; Waise & Waiser, 1995; Nixon, 2011; Clapperton, 2013).

As I explore in Chapter 3, ecology as a way of thinking about fire (and national parks more broadly) enters the Parks Canada Agency in the 1970s through academia and the professional training of certain staff, not becoming a legislated way of understanding and managing national parks until 1988.[17] It is in this public policy context that 'ecological integrity' emerged as a goal, a state to be achieved (Mortimer-Sandilands, 2009; Pyne, 2008, 2011). While this innovative mandate has allowed a set of novel and exciting projects to transpire within Canadian national parks, it often comes into direct conflict with other park mandates premised on economic success (Kopas, 2007; Youdelis, 2018; 2019). As such, scientists and managers come to know and practice ecology albeit within the constraints of a bureaucracy to which ecology as a way of knowing and governing nature was added without rewriting earlier strategies. Canadian National Parks, despite an enthusiastic engagement with ecology and the enactment of practices attuned to this way of knowing, remain sites of capitalist expansion, nationalist celebration, and neoliberal reform (Youdelis, 2016, 2019).

In practice, attuning myself to the ways fire managers *know* nature means attending to both how nature is articulated in park planning documents and in legislation and also attending to the way fire is understood by those carrying out this policy and encountering more-than-humans. This means tracing how this nature has changed through time (Chapter 3), how and what pieces of the environment are counted and valued (Chapter 4 & 6), and accounting for the instances where the means through which nature is known by the bureaucracy and known by practitioners, depart from one another (Chapter 5).

[17] This said, Sandlos (2002; 2011a) reminds us that zoology and wildlife ecology were at work, in some respect, within the Canadian park service as early as the 1930s.

The 'Institution of Nature'

Conservation can be understood as an exercise in governing the life and death of species (Biermann & Anderson, 2014; Braverman, 2015; Lorimer, 2015). In practice, state articulations of nature, and of protected areas in particular, have been established through exercises and mechanisms that aim to make live and let die, often simultaneously maintaining distinctions between what is inside and outside of the 'natural' veil (Lunstrum, 2015; Biermann & Anderson, 2017). As such, various exercises in removing species, introducing species, and caring for species are exercises in producing nature and managing lives through "everyday conservation practices" (Braverman, 2015:11). For some, the discourse of alien, invasive, criminal, and killable have allowed for such mechanisms to take on violent dispositions for humans and more-than-humans alike (Brockington, 2002; Sandilands, 2013; Rutherford, 2013; Pulido, 2017; Massé, Lunstrum, & Holterman, 2018). These scholars have characterized conservation practices as a kind of biopolitical regime, whereby nature is secured for its consumption or for its role in solidifying national narratives. In an era of rapid species decline and extinction, these exercises in life and death are taking place in diverse locales and are not limited to protected areas alone (Shukin, 2009; Braverman, 2012, 2015; Collard, 2013; Lunstrum, 2017). Braverman, in her multi-sited ethnographic account of efforts to govern endangered species in zoos, parks, and laboratories, refers to this work of governing the life and death of species in the face of extinction as part of the 'Institution of Nature', the near-global culture and institutional practice of maintaining a specific vision of biodiversity (2015). The so-called Institution of Nature is embodied and practiced by actors around the world as they attempt to coax species away from extinction. Such an approach invites an interrogation of the architecture of the bureaucratic bodies tasked with governing life and death and invites scholars to see how such exercises move beyond institutional borders and even institutional mandates.

I use the 'Institution of Nature' concept to understand more rigid and contained institutions as well, particularly those tasked with igniting, containing, and extinguishing fire as a means of improving so-called ecological integrity. With fire's reintroduction, containment, and suppression, fire managers and ecologists are tasked with managing a process fuelled by the life and death of others and making sense of what comes after. The work of fire-use is always entangled in biopolitics, it is a process that carries out make live and let die projects but is also one that complicates such measures. As such, fire-use in the field often identifies the multiplicity of biopolitical projects and competing ecological logics (Fletcher 2010; 2017).

Further, these practices are not confined to the maintenance of 'life,' but one also concerned with the maintenance of capital (Roberts, 2013; Simon, 2017). Fire, along with the vegetation that burns, have become enlisted as key subjects in conservation and risk reduction practices. Situating Parks Canada and its fire bureau not just as an environmental management bureaucracy but as an institution tasked with the maintenance of an institutionally mandated 'nature' invites us to trouble the 'nature' that is produced or curated by these exercises in park management (Haraway, 1991). By questioning how institutions articulate 'nature' we are invited to make sense of how the natural is practiced (Neumann, 1998).

Encounters with Nature

When it comes to conservation and natural resource management, it matters *where* policy is operationalized, especially in contexts where more-than-human communities demand tailored responses. Tracing how institutions enact policy, and how they do so differently, can paint a picture of how natures are coproduced by a suite of actors rather than by humans alone (Whatmore, 2002; Latour, 1993; Ogden, 2011). In the context of Parks Canada's fire management policies, how local actors practice these policies and knowledge in-place are

important empirical discussion to have, as national policies and process respond to the specificity of landscapes that burn. As Kuus describes, expertise is a process:

> To analyze expertise in critical policy studies is to investigate expertise as a process and not a thing. The spatiality of that process is more complicated than the transfer of best practices between places. Rather, policy measures, their legitimizing frameworks, and their actors all mutate in the process of mobility. Policies have social lives and these lives are geographically patterned (2013:40)

As such, it is fundamental to observe how policies are enacted in place and how they are transformed, resisted, and enforced (Peluso, 1992; Kosek, 2006; Sundberg, 2011).

One of the challenges posed to those studying wildland fire management as a social process is simultaneously recognizing the multiple knowledges that are embedded in fire management, while remaining attuned to how local political and ecological manifestations of wildland fire push back against national narratives (Franklin, 2006; Ogden, 2011; Neale, 2019). In this dissertation I consider how the trajectory of the national fire program is born out of specific places and characters and enacted and practiced in-relation to distinct socio-natural contexts. As historians of environmental policy in Canada have shown, one's gaze must be set on both the places where policies are produced and where they are practiced (Loo, 2010; Sandlos, 2011a; Pyne, 2011).

In the chapters that follow I describe the acts of fire management as a form of *encounter* with landscapes that burn, whereby vegetation, past management decisions, weather, and human actors all come to bear on how a burn will unfold. As Barad reminds us, we are always entwined with more-than-human agents (2007), and as a fire burns, managers find themselves in what Edwards and Gill refer to as 'fiery entanglements' (2016; See also van Dooren, 2016). I position the practices of fire suppression and prescribed burning as attempts to engage with these fiery entanglements, as fire managers attempt to make sense of and work-with a process that is both

dynamic and actively creating its own set of temporal rhythms (Kull, 2004; Ogden, 2011). Prescribed burning, as I discuss in Chapter 5, is an attempt to coax this process, this entanglement, in a certain direction while simultaneously taking notice of the burn's ability to move beyond containment and trouble the authority of the party attempting to carry it out.

In order to make sense of this process that is a mess of both human and more-than-human actors, I use Pratt's concept of the contact zone to make sense of these encounters. Pratt uses the term to describe those spaces where ''cultures, meet, clash and grapple with each other, often in contexts of highly asymmetrical relations of power such as colonialism, slavery, or their aftermaths as they are lived out in many parts of the world today'' (Pratt, 1991). Pratt, who used the concept to describe encounters between colonizers and those intended to be colonized, describes these meetings as violent, uneven, and sometimes disastrous events (*ibid.*). Scholars with an interest in documenting human encounters with the more-than-human have found this articulation of encounters to be useful in describing social engagement between those that are 'significantly different' from humans and as a means to unpack how parties leave such interactions changed (Haraway, 2003; Collard, 2013; Wilson 2017; Sutherland 2019; Isaacs, 2019; Wilson, 2019). This concept allows scholars to be attuned to more-than-human ways of *being* while remaining attuned to the power specific human actors wield over the lives of others.

In the context of fieldwork, this attention to encounters meant asking fire managers to walk me through the prescribed burning process, identifying when and where official processes ended, and their other ways of knowing fire and landscapes that burn were activated. It meant making space for the recollection of sometimes painful memories, or errors, as burns escaped control or failed to take place. As many fire managers have lived and worked in multiple national park settings, this register of attention was also made legible when I asked fire managers to compare their experiences in different parks. Their appreciation for how dynamic and unpredictable fires

could become, and their frustration with what their agency could achieve, made it possible to discern the diversity of encounters that were made possible and impossible.

Following the Burn

While my attention remains fixed on the Parks Canada Agency, it is also set on the phenomena of the burn and the wider assemblage of beings that this process involves. My approach to the burn as a happening (Tsing, 2015: 168-169; Myers, 2017), aims to avoid ontological assumptions that might frame fires as a momentary, passive, or fleeting events. Instead, I invite the reader to consider burning as an expression of a particularly vegetal agency that emerges in relation-to-many, prompting destruction and renewal simultaneously, and having particularly volatile implications for human and more-than-human actors. In practice, this invitation means remaining attuned to plants, forests, sub-surface materials, and all of the things that can burn *in addition* to those who attempt to manage them (*See* Kirksey & Helmreich, 2010). Plants are an often-overlooked category of more-than-human (Head et al., 2014), but one gaining increased attention as human-vegetal entanglements are made legible and our reliance on them made clear (Robbins, 2012; Sandilands, 2013; Biermann, 2016; Fleming, 2017; Margulies, et al., 2019). Vegetation, as a set of more-than-human actors, are involved in constant world-making processes worthy of our attention and essential to our own survival (Myers, 2017).

As Head et al. explain, "Plants assemble themselves amongst and in the thick of things" (Head et al., 2014: 862). Plants, rather than the process of combustion alone, are the bodies fueling, interrupting, and carrying wildland fire across landscapes. Citing Pyne, Clark and Yusoff explain that "In short, fire unravels what photosynthesis has brought together" (2018:11). As such, many kinds of combustion are fuelled by plants. Even fossil fuels are composed of the transformed bodies of those who photosynthesized or consumed those that did (Yusoff, 2013). As Yusoff notes, we live in a time where one era of extinction is fuelling another.

Figure 2: New life emerges days after a prescribed burn in Point Pelee National Park, April 2018

As I discuss in the following chapters, plants are a key pivot point in the work of wildland fire management. The manipulation and legibility of plants as 'fuel' help to identify how a fire will behave and how it can be manipulated (Chapter 3). Unlike weather, plant bodies are the one component of combustion that can be altered (at least partially). They are the bodies through which fires are understood and planned; for wildland fire managers, encounters with fire are encounters with plants (Chapter 5). More recently, some plants have even gained a special status as they are brought into the fold of species conservation. Their diverse relationships with fire trouble this kind of management and draw attention to wider relationships, rather than singular species (Chapter 6). The burn, as a particular kind of happening, brings these relationships to light.

For over a century, fire managers have attempted to contain fire with profound implications for the composition of the vegetal components of many regions as well as for the likes of infrastructure and human lives (Pyne, 2011; Sandilands, 2016). In the context of Canadian settler colonialism, settlers have remade ecosystems, transformed forests, and interrupted processes that have been ongoing up until this point (Pyne, 2011). These relationships to plants, to land, have pushed others aside, insisting on a specific kind of relationship between man and nature (Haraway, 2015; Sandilands, 2016). It is for this reason that I frame the burn as a kind of encounter, a process coproduced by humans and many more-than-humans (Sutherland, 2019). How settler institutions understood and encountered fire in the past has changed (Chapter 3). Parks Canada, like many Canadian fire institutions, has evolved over the last century. If one follows the burn through the archive of fire management documents and policy, the concerns of the day articulate fire, or rather the threat of fire, in different ways (Chapter 4). These changes, in turn, prompt a state of burning particular to this ongoing relationship, albeit one where fire remains a threat to be contained.

Thus, to study the burn is to study the encounters that have coproduced these national park landscapes. In practice, this means *following* the burn through the bureaucracy and the landscapes it (attempts to) control. This quest to engage the more-than-human in my analysis echoes work in economic geography which focuses on following the thing, or the policy, through a network (Peck & Theodore, 2012), expressions of hybrid geographies (Whatmore, 2002), and rooted networks (Rocheleau & Roth, 2007). While combustion may be only one component of the burn, it is a key touchstone for fire management bureaucracies that are designed to contain wildfire rather than live-with it.

My fieldwork and the questions I asked became entangled with this effort to follow the burn through a national park system while remaining attuned to the specificities of place. As fire

managers in diverse locales attempted to enact fire management policy, the contradictions and limits to fire policy came to light in similar, yet distinctive, ways. By following the burn through policy and interviews it was possible to see how this process disrupted other systems (tourism, extraction, health, etc.)**.** In one way, this approach challenged me to trouble my understandings of 'fire' that may be restricted by a specifically ecological articulation of what combustion is and who it includes. In another, this method became a productive way of identifying the way in which the burn comes to matter to distinct actors. Paying attention to the burn and the process of burning, which includes the development of planning documents, policy, and the enactment of the burn, invited me to consider what burning brought into its fold.

As the introduction of this dissertation suggests, I was drawn to a study of Parks Canada, in part, because it is a leader in the use of prescribed burns. Prescribed burns are an attempt to ignite fire on the landscape for specific reasons (hazard reduction, scientific inquiry, ecological integrity) within contained manageable units. Most policy is designed to conserve or preserve landscapes (whether for ecological or economic reasons) at the expense of processes that have been historically present in many regions of Canada and on which many species depend or benefit. Though policy change has allowed for the active use of fire, a closer look at the history of this practice and the contemporary challenges faced by managers paints a picture of how fire and landscapes that burn are encountered by the institution. By following the burn, prescribed or otherwise, it becomes possible to identify what parts of the institutional architecture of Parks Canada must be overcome, altered, or challenged in order to burn. With so much of the institution's history and contemporary management still premised on suppression, any attempt to reintroduce fire becomes a site of tension, whereby the limits of policies, legislations etc., can be identified. In other words, following the burn became a means through which the limits of the state's notion of nature could be traced.

Rather than focus just on how fire suppression is carried out, this method encouraged me to consider how managers and institutions *respond* to landscapes that burn, thereby troubling temporal and agential assumptions intrinsic to the phrase 'fire management.' In other words, it allowed me to consider the practices that take place outside of direct engagements with combustion. Following the burn also allowed me to consider what work burning did for the organization and how fire could trouble institutional authority when it escaped. In practice this meant following the methods for putting fire *back* on the landscape. A century of fire policy, and land management policy more broadly, has been designed to keep fire *out* (Pyne, 1997, 2011) and by considering the process of putting fire back *on*, I was able to discuss how previous formulations of fire and park management changed.

Research Design & Methods for Studying Institutions of Nature

Research Sites & Multi-sited Analysis

My project began with an ambitious goal to consider fire management within the whole Parks Canada Agency, arguably one of the most decentralized and scattered Canadian federal institutions operating within Canadian borders. This work began with an attempt to map out where 'fire work' took place. Who was working with fire in Canada, and how would I access these individuals and sites? Following preliminary research in 2016, which included visits to Waterton Lakes National Park, Glacier National Park (US), Mountain Parks in BC and Alberta, and Kluane National Park in the Yukon, I gained a more distinct picture of who I would need to include in my study and where I would need to go. This preliminary work was completed while conducting research for the co-investigators of *Canadian Conservation in Global Context*, Drs.

Robin Roth and Elizabeth Lunstrum. These early insights would inform the research questions and methods outlined in my original proposal.

After filing the appropriate ethics application with the Office of Research Ethics at York University via the Human Participants Review Committee, I obtained ethics clearance to conduct my work. I complemented this clearance with a research permit from Parks Canada. In this permit I was asked to share my research goals, methods, and questions (which I describe below) and listed the parks I was hoping to include in my study. I identified parks known to have prescribed burn programs or who have shown an interest in prescribed burning.[18] These parks included:

- *Banff National Park**
- *Cape Breton Highlands National Park**
- *Fort Rodd Hill and Fisgard Lighthouse National Historic Site**
- *Glacier National Park**
- *Grasslands National Park**
- *Gulf Islands National Park Reserve**
- *Jasper National Park**
- *Kejimkujik National Park & National Historic Site**
- *Kluane National Park*
- *Kootenay National Park**
- *La Mauricie National Park**
- *Mount Revelstoke National Park**
- *Nahanni National Park Reserve**
- *Pacific Rim National Park Reserve*
- *Point Pelee National Park**
- *Prince Albert National Park*
- *Pukaskwa National Park*

[18] While wildfire occurs in many northern parks, fire work including active suppression mostly takes place in the context of more 'southern' parks. These also happen to be parks with higher visitation.

- *Riding Mountain National Park**
- *Terra Nova National Park*
- *Thousand Islands National Park*
- *Waterton Lakes National Park**
- *Wood Buffalo National Park**
- *Yoho National Park**

Due to the decentralized nature of the Parks Canada Agency, my research permit required a signature from each site's superintendent. Of those parks Banff National Park, Pacific Rim National Park and Prince Albert National Park did not sign my research permit, though staff from Banff were interviewed during a visit to the park under a Parks Canada research permit belonging to Drs. Robin Roth and Elizabeth Lunstrum under which my name was listed as a member of the research team.

As my description of the research permit process suggests, this research required a multi-sited analysis. While supported by a national network of fire management staff, fire management is exercised in specific locales, a reflection of the place-based nature of this federal agency. As Corson illustrates in her study of international conservation aid, institutions operate at different scales and in different sites as they carry out their work (2016). While fire suppression or ignition activities might take place in a specific park, the policy, planning documents, and people involved in that process span the entire country. Similarly, Rosemary Collard, in her work on the global wildlife trade explains, shows how there are multiple nodes through which processes such as wildlife trade operate (2013). As such, identifying and investigating the nodes of wildfire management paints a picture of how this community of fire managers is connected and where their practices may diverge from one-another.

In the context of a study of Parks Canada's fire bureau, this required an attention to the structure of the park agency and its relationship to other federal institutions. More specifically, it

required an attention to the distinction between park 'field unit' employees and 'national office' employees and their respective policy networks and the local articulation of these policies and practices. While most fire management staff work for national office, they are housed in local field units and work closely with regional staff. As such, an attention to regional institutional challenges, the local translation of national policies, and even the challenges posed by unique landscapes, species, and neighbours became an exercise in enacting multi-sited analysis.

Of those parks listed on my permit, those marked with a (*) are the sites I was able to visit, or in the case of Nahanni, where I was able to speak with the manager in charge of that district. Of those included in my research permit I failed to visit Terra Nova National Park (Newfoundland), Pukaskwa (Ontario) and Thousand Islands National Park (Ontario). The first two were due to financial limits while the latter was at the advice of respondents who noted limited contemporary fire management and staff who would be able to speak to some of my questions. My visits to these parks took place between 2016-2018, typically in the off-season (Early Spring and Late Autumn).[19]

While visiting each site I organized interviews with fire managers, public safety officers, ecologists, fire-vegetation ecologists, fire technicians and resource conservation managers, along with a limited number of fire crew members. Who I spoke with depended on the maturity of the fire program and the role of fire on the landscape. For example, in parks with a long wildland fire management history and active program, such as Kootenay National Park (and the wider field unit), I could expect to speak with a greater number of individuals. In other sites, like Fort Rodd Hill and Fisgard Lighthouse National Historic Site, which does not have a fire program but is

[19] Seasonality was a key challenge to this research. In the summer months fire management staff are fairly busy carrying out fire management activities or other visitor safety tasks (especially in parks where fire management is not a major priority). In some parks, fire management staff are seasonal, making winter a difficult time to meet with staff. Even in the relatively quiet Spring and Autumn, these are times when prescribed burning is conducted and when wildfires still occur.

home to a fire-adapted ecosystem (Garry Oak Savannah), there was only one person on-site who could speak with authority to this topic. As such, this research takes into account fire programs from across the country and goes beyond a strict focus on the well-researched mountain parks (See Stewart, 2005; Pyne 2008). My work in Western Canada, particularly in and around Waterton Lakes National Park, is complemented by discussions with staff in neighbouring jurisdictions in anticipation of future research projects and my interest in the transboundary nature of fire management.

Multi-sited analysis simultaneously invites an exploration of how local arms of a bureaucracy complement and/or contest the institutional line (Kuus, 2013). In visiting multiple parks and sites, this approach allows the researcher to consider how national policies are articulated in local contexts and how local concerns can impact national approaches. Thus, this multi-sitedness invites an analysis of how expressions of bureaucratic goals are uneven and how the articulation of these goals is contingent on specific people and more-than-humans (Sundberg, 2011). In the context of my fieldwork this meant visiting parks who, though not *leaders* in wildfire management, are carrying out the same national policies in new park contexts.

Multi-sitedness also comes with its challenges. In particular is the question of how wide a net to cast. Indigenous peoples were regretfully excluded from this research project due to the immense task of speaking with Parks Canada employees in diverse locals, the limited return I could give Indigenous communities for their time and participation, and the nascent stage of Parks Canada's engagement with Indigenous People on the topic of fire. Once again, my focus was on how settler colonial institutions encountered fire rather than those practices of Indigenous peoples, but I recognize that this project could be greatly improved had these perspectives been included. This said, I believe my work will be important to practitioners interested in putting Indigenous and settler colonial forms of land management into conversation. While Parks

Canada's approach originally upended Indigenous land practices, many contemporary attempts to return fire are also attempts to mimic (if imperfectly) Indigenous fire practices. These are themes I hope to explore in future research.

Expert Interviews

Interviews were used as a means of understanding a number of fire management's components, including: the institutional context within which respondents carried out their work, their day-to-day activities and responsibilities, the process of preparing and carrying out prescribed burns, their engagement with colleagues within Parks Canada and beyond, and more generally, the challenges and opportunities of working with fire. Interviews were semi-structured and lasted between one and two hours. These semi-structured interviews permitted me to tailor interviews to local park contexts, allowed fire managers to identify themes and discussion that they saw as important to the topic of wildland fire management and enabled a report between respondent and interviewee.

A list of contacts was presented to me following the presentation of my Parks Canada Agency research permit. This was complemented by suggestions from respondents in-person and searches within publicly accessible federal employee databases and through names attached to key park documents, such as prescribed burn plans. As relatively public figures within local communities, senior fire managers were also easily identifiable via news coverage of charismatic fire events.

From this list, respondents were contacted by email or by introduction in-person. In addition to my Parks Canada research permit, respondents were presented with a consent form as required by my ethics board. With the exception of two interviews conducted over the phone due to scheduling conflicts, all interviews were completed in-person and on-site. Overall, from 2016

to 2018 I spoke with 40 current Parks Canada employees, along with five staff at the Northern Forestry Centre (Natural Resources Canada) in Edmonton conducting research in Wood Buffalo National Park, and three former Parks Canada employees. Of those interactions, 40 of these were formal interviews. with the rest being informal discussions in the field visiting past and future burn sites. All interviews lasted between one and two hours and took place in diverse settings. While most interviews took place in conference rooms and personal offices, others took place at former burn sites, in trucks, and local coffee shops. In many cases they included looking over maps as burns were described and memories re-visited. While most staff were eager to respond, other interviews hinged on sharing my interview questions in advance.

These interviews were complemented by interviews with staff from: BC Wildfire, Natural Resources Canada, BC Parks, representatives of the government of the Northwest Territories, US Forest Service, Montana Department of Natural Resources and Conservation, Alberta Wildfire and various NGOs in south-western Alberta. These discussions, though not relevant to the entirety of this dissertation, helped to distinguish what was particular about Parks Canada's approach and allowed for data collection relevant to future writing. These interviews also inform discussions on the nature of fire suppression policies and practices relevant to chapters 3, 4 & 5. Overall, I formally interviewed over 50 individuals and conducted a set of additional informal site visits and discussions that complemented these formal discussions.

Parks Canada, though quite large compared to some federal agencies, remains a relatively small player within the context of Canadian fire management, where provinces respond to fires in contexts that far exceed Parks Canada's land base. Unless otherwise specified, respondents remain as anonymous as possible. Given the federal government's treatment of scientists in recent years, my aim was not to expose those who might be critical of contemporary practices; but to foster a common discussion. At times I may identify a region as a means of

contextualizing a response. In cases where respondents are named, I have received consent to do so.

My original intention was to include participant observation in this project, with my intention squarely focused on attending and participating in a prescribed burn. Unfortunately, the nature of Canada's fire seasons, the unpredictable timing of such events, and the national reach of my project, impeded my ability to carry out this portion of the project. Allowing an observer on site may also have compromised a manager's ability to manage a burn responsibly, though this is speculation. Furthermore, in the early days of my fieldwork there were both out-of-control wildfires (Waterton Lakes National Park in 2017) and out-of-control prescribed burns (Prince Albert National Park 2018) which may have impacted the enthusiasm for outside observers. This said, I was able to make several site visits with fire managers and ecologists. This included opportunities to visit burn sites, ask questions out on the landscape, and have more open-ended discussion with fire managers.

Legislation, Policy and Other Documents

Documents play a key role in bureaucracy and institutions more broadly as devices that guarantee authority and instruct how power is to be wielded. They may articulate jurisdiction (Blomley, 2003; Pasternak, 2014), in the way the National Parks Act outlines the authority of the agency and different actors within it. They may dictate mandates, or goals, which these institutions are tasked with, such as the way ecological integrity as a legislated mandate is crafted into management plans and decision tools.; or they may also dictate or record practices. In the case of fire management, a network of directives, procedures, best practices, and management plans of different scope are constantly referred to in the planning and implementation of fire management activities. Further, reports, assessments, and plans may simultaneously witness and authorize a fire manager's next steps. These documents in concert form part of both the

architecture and means through which this bureaucracy and its human actors operate. They are part of the 'structuring structure' of fire management (Bennett, 2003; Kuus, 2013).

These documents compose an often loosely-applied definition of policy. They are the networks through which governance is authorized, recorded, and practiced (Mitchell, 2002). They should not necessarily be understood as a pure articulations of what policy makers mean or a perfect articulation of 'scientific' thought. Rather as Mountz suggests, "Written policies, however, tell only partial stories—idealized versions what *might* be or what *should* happen." (Mountz 2010). These idealized stories presented in documents, of what kind of nature or fire *might* be or how it *should* unfold, were key resources for inspiring research questions and the analysis that followed.

Exploring documents was the first step in my fieldwork. Empirically these documents served two functions. First, they were objects through which I could ask analytical questions about the institution. Questions such as: What policies inform fire management? What legislation authorizes the use of fire as a management tool? How is fire understood institutionally? How many prescribed burns have taken place and what objectives did they have? But documents also allowed for more interpretive analysis. They invited me to consider how the documents compare with what was said in interviews or how park management actually proceeded with respect to fire. The documents invited me to consider questions such as: Where does 'risk' thinking end, and 'ecological' thinking begin in the prescribed burn plan? How is Indigenous knowledge presented (or not presented)? And how have these approaches changed over time?

I obtained documents in several ways. Many documents are publicly accessible. Examples of these would include various situation reports, peer reviewed literature, management plans, and 'state of the park' reports. Some documents were shared with me before, during, or after my interviews with respondents. Examples of these often documents include fire prescription

documents, vegetation and fire management plans, and publications these managers themselves were working on or had completed (such as their master's thesis). Others were obtained via access to information requests. One group of documents particularly relevant to Chapters 5 and 6 comes from a request which provided me with over 40 prescribed burn plans and their corresponding environmental assessments for parks located in Alberta and British Columbia.

Analysis

Prescribed burn plans, management plans, and interviews were uploaded to NVivo, a qualitative research software. Plans and interviews were coded using both thematic and descriptive coding. I also used NVivo to organize other data including: legislation, species recovery plans, histories, and other policy documents.

Burn plans and management plans were coded using thematic codes (Such as ecological integrity; Indigenous knowledge) and analytical codes for said themes (Such as: fire as a tool, more-than-human agency). Similarly, interviews were coded using thematic codes (such as suppression, ignition) and analytical codes for those themes (risk, encounter).

Legislation, earlier management plans, working documents and interviews with former park staff were used more so for tracing the trajectory of themes such as the reintroduction of fire, suppression, and ecology as a means of knowing fire. Comparing consecutive manifestations of these documents inform analysis presented in Chapter 3 which considers the trajectory of Parks Canada's fire management practices over the last century.

While coding tends to focus on what is said, it can also invite analysis of the absence of certain themes. In some fire prescriptions for example, Indigenous content is explicitly referenced while in others this is not the case. In others still, it may be referenced in the preamble

of a document to justify fire's use but is not considered elsewhere in the document. Descriptions of these coding activities are also described in chapter-specific methods sections.

Positionality and Access

Following high school and during my early academic training, I held positions with Ontario Parks (as an interpreter) and Parks Canada (as a visitor centre attendant and public outreach student). Though topically unrelated to my current fieldwork, my time with these different park systems gave me an appreciation for the breadth of the work taking place at various conservation agencies in Canada and beyond. This familiarity with Parks Canada as an institution, and conservation institutions more generally, allowed me to describe my project in greater detail while applying for my Parks Canada research permit and gave me a sense of what a national, multi-sited project might look like within this specific institutional context.

While difficult to measure, I also believe that this history with "parks"[20] enabled me to foster some rapport with respondents in the field. As such, I was able to conduct interviews using a common institutional vocabulary, I was familiar with the significance of park sites and the architecture of 'field units' and 'national office', and I was able to appreciate that any time shared with me, as an outside researcher, was time taken away from an already busy schedule for staff who in some cases were seasonal employees. In addition to this familiarity with the agency, I also shared a great deal with many of the respondents that went beyond my shared history with "parks". In most cases, those fire managers I encountered were also white settler men, often with academic training in forestry, environmental studies, history and geography. As I discuss later in this dissertation, these respondents shared an appreciation for the 'social' element of their work and in some cases I would spot a copy of environmental historian Stephen Pyne's *Awful*

[20] A common short form that refers to the park agency.

Splendour: A Fire History of Canada on their bookshelf. This common ground, for better or worse, made my project familiar and legible to those I met. This all said, as an outside researcher, and especially as a social scientist, this rapport would only go so far. As a 'social' science project, my research permit did not fit neatly within the parameters of what constituted research. While many of the more experienced fire management staff easily made sense of my project, ecologists and newer fire management staff were more skeptical.

Limitations and Challenges in the Field and in the Office

This project, though productive, has identifiable limitations. First, this project focuses on federal responses to fire while most fire management in Canada is carried out by provincial bodies. The reader should be mindful that Parks Canada operates in very different institutional contexts when compared with its provincial counterparts. This said, provincial agencies are increasingly interested in the use of prescribed burns and have a history of partnering with this federal agency in order to carry out prescribed burns and suppression. In the context of a heightened interest in active management (following major fire years in California for example), this research may be productive for thinking about how this future fire-use will unfold in provincial contexts. Additionally, there are other scholars exploring provincial fire organizations (*See* Zahara, forthcoming; Neale, 2016a; 2016b).

Second, this project focuses on federal institutional knowledge, not on Indigenous knowledge. In some ways, this project reinforces a dimension of the institution which it attempts to critique as it does not include the voices of Indigenous peoples. My reasoning for this was threefold. First, there have been endless calls for institutions working with the so-called environment to embrace Indigenous knowledge. The assumption here is that Indigenous knowledge needs to be absorbed by settler institutions. Such calls frequently fail to investigate the institution itself – leaving it as an apolitical container—when in reality, meaningful

engagement with traditional ecological knowledge (TEK) will require institutional change at several scales. Rather than assuming TEK will complement an apolitical and ahistorical ecological knowledge, this study aims to identify what goes into that state knowledge in the first place. Second, due to the national nature of the network of fire managers within the PCA, engaging all communities with ties to land where national parks now operate would require a much larger team. Parks Canada operates 38 national parks, nine national park reserves, one national urban park, four marine conservation areas, and 171 national historic sites and engages or has the potential to engage Indigenous people and communities from coast to coast to coast.[21] In the quest to study a national bureaucracy, the voices of local people were regretfully beyond the scope of this project. Finally, current engagement with Indigenous peoples on the question of fire management is uneven across the national system. There is limited policy to support this work, let alone a mandate to carry out this work. While I comment on this in later chapters, this work would be part of a second phase of this research which could focus specifically on the prospects, challenges, and lessons that could be learned from working with Indigenous communities on the question of what Parks Canada staff understand as fire management.

Third, the scope of this project was exceedingly large. With fire being present in some form in most Canadian national parks, attending to the specificity of fire management in each park was made quite difficult. Further, the distances between sites, the seasonality of fire management activities, and the mobility of fire professionals made access to some sites both logistically difficult and expensive. As I discussed earlier, this was in some ways attended to by focusing on parks where prescribed burning was a key focus, thus excluding some of the most remote parks, particularly those in the far north.

[21] This is not to mention the National Marine Conservation Areas and National Parks that are in the process of being developed. It also does not include other sorts of sites like Heritage Places and Landmarks.

Conclusion: “You’ve got to Burn to Learn”

In this chapter I have discussed how my methodological approach is informed by currents in political ecology, political geography, critical policy studies and, to an extent, science and technology studies. I have focused on the ways in which scholars from these camps attune themselves to the networks and institutions that come to govern, know and to encounter people and landscapes. In this chapter I have also signalled how in some ways my research has become entangled with the very process it seeks to study, by considering how burning, as a process which entangles itself with many other processes and people, can be a helpful method in its own right. As a fire management saying goes, ‘you’ve got to burn to learn.’ While I myself have not set any fires, I have learned to follow them closely. I have also identified the specific methods that I used to operationalize my research project, how I conducted an institutional analysis of the Parks Canada Agency’s fire management bureau. Through the use of a multi-sited analysis, expert interviews, and document analysis I have traced the work of fire-use in particular, and fire management more generally, within this specific federal agency.

Chapter Three: Tending the Fire: A Brief History of Fire Management in Canadian National Parks

Introduction

"Fire" is a nebulous and mobile category, one that attempts to describe phenomena with an infinite set of possibilities across the planet. The combustion that powers industrial petro-capitalism and the combustion that emerges in the Boreal forest following a thunderstorm are distinct, and these empirical differences should incite a thoughtful discussion around what we mean by the referent of 'fire.' This said, there are also important empirical similarities between such events. They are both fuelled by the bodies of organic beings, both extend their reach into climate pasts and futures, both are entangled with the effects of global capitalism, and both blur the line between so-called nature and culture. Despite these similarities, "fire" is a category that deserves ongoing attention as, in practice, it refers to distinct sets of relationships as we move across space and time. Fires are processes that are contingent on how we practice the world.

The Eurocentric instinct to imagine combustion as an isolated event, rather than a happening entangled with things and beings beyond the contemporary moment, has in the last century become the dominant method for practicing this "fire" category in North America and beyond (Pyne, 1997). The hypothesis that fire can be contained and snuffed out has transformed countless landscapes with profound implications for those attempting to live-with fire and those (unsuccessfully) attempting to live without it (Franklin, 2006; Goemans & Ballamingie, 2013; Jensen & McPherson, 2008). This chapter interrogates how this unfolds within Canadian

conservation by exploring how wildland fire management has been practiced over the last century by Canada's national park agency: Parks Canada.

As I explore throughout this dissertation, institutions like Parks Canada practice fire in multiple ways: as a threat, as an ecological process, as a tool, and, more recently, an ally. By tracing how fire has been imagined and encountered by the agency through time, we gain a more nuanced appreciation for the contemporary challenges fire management institutions face and the ways conservation policy can move forward. This chapter positions Parks Canada's response to fire not as static, but contingent on the political-economic, more-than-human, social, and *historical* context in which burns unfold.

This tracing is an exercise in making what is possible and impossible, regarding fire, legible in the institutional architecture of environmental management. The case of Parks Canada offers important insights into both contemporary fire management policy and practice and invites an appreciation for wildfire's relationship to contemporary conservation. By considering the history of Canada's national park fire management practices and policy, this chapter compliments other research interrogating the political-economic, and particularly colonial, context of wildfire management in other settler-colonial states (*See* Kull, 2003*;* Pyne, 2011; Neale, 2016, 2018; Kosek 2008; Simon, 2017).

Canadian wildfire management is best understood as a 'federation' of nested approaches to combustion unfolding within diverse institutional and more-than-human settings (Pyne, 2011). This said, these nested approaches are most commonly embodied by a common aim to suppress fire of all kinds. To put it bluntly, most forest and conservation institutions have designed suppression policies to safeguard diverse economic resources (Roberts, 2013; Simon, 2017; Rothman, 2007). In Canadian national parks, suppression emerged to secure extractive resource

and tourism economies (Bella, 1987; Burns, 2000; Pyne, 2004). Today, securing so-called 'values at risk,' such as timber, infrastructure, and, more recently, critical habitat for species at risk, remain at the crux of contemporary fire management policy (Parks Canada, 2017). Policy and respondents alike underline the role fire suppression plays, not only in protecting certain values, but in maintaining public safety, a task difficult to untangle from securing values at risk from fire. Unlike other fire management institutions, such as provincial agencies concerned with crown land and limited private property, Parks Canada has held a distinct and evolving mandate to safeguard protected areas as places of *national* significance (Stewart, 2005; Pyne, 2004) and of ecological significance. These changing institutional ambitions impacted the articulation of fire management goals. In this Chapter, I trace the trajectory of the changing relationship between parks and wildland fire. I argue that it is in the context of fire's threat to the success of extraction that one observes how the Canadian settler state encounters combustion and landscapes that burn.

North American settler society premised much of the last century of wildland fire administration on a management approach, commonly referred to as 'fire suppression,' whereby wildfires, human-caused or otherwise, are extinguished if it is possible to do so. Through time, the reasons for these fire suppression efforts, the kinds of resources and technologies applied, and the people carrying out this work, have changed. Yet, what these historically contingent suppression approaches have in common is an attempt to contain a threat to the production and circulation of capital (Simon, 2017). In the Canadian context, the Canadian national park agency was one of the first government institutions to embrace prescribed burning to achieve institutional mandates, echoing important discussions across Canadian fire institutions, and remains a leader in this regard (Pyne, 2004).[22] Despite the successes of the prescribed burn

[22] This said, Parks Canada's interventions followed those in the United States which began as early as the 1950s according to H. Rothman (2007). In provincial judications in Canada, prescribed burning was spotty and, when

program, Parks Canada was and remains an organization premised on fire suppression. A history of how this suppression approach crystallized and evolved within the context of Canadian national parks can teach us about how contemporary relationships with landscapes precipitated and how new relationships might be possible (and perhaps necessary) (Neale, 2018).

This common goal of suppressing and extinguishing wildfire has narrated a national encounter with landscapes that burn. Contemporary fire management agencies across Canada are reckoning with landscapes coproduced by a century of fire suppression. With the absence of fire from the landscape, plant communities have changed, forests have matured, and the open areas some species (and humans) depend on have disappeared. In most instances this change has incited an increase in fire hazard, among other vulnerabilities, as fuel loads have built up because of fire's absence. Provincial and territorial agencies conduct most Canadian fire management activities, a function of the sub-national governance of public, or 'crown,' land in the country. Although Parks Canada governs a relatively small portion of the Canadian landscape, the agency offers important insights relevant to its provincial counterparts who share similar policies and historical trajectories premised on fire suppression. The challenge of addressing these altered landscapes has led to a growing interest in the benefits of a more 'ecologically' informed fire management style, whereby fire's historical presence on the landscape is accounted for. In these instances, institutions reposition fire as the rule rather than the exception. Given this renewed interest in fire ecology and fire-use in particular, Parks Canada's approach has become a key point of departure for those hoping to manage fire differently. This said, it is worth differentiating Parks Canada from its provincial counterparts based on its constitutional

applied, used in conjunction with attempts to create fire breaks, slash burning, or as attempts to improve productivity of agricultural landscapes. "Controlled burning" was closely tied to silviculture, whereby landscapes cleared of lumber would be burned as a means of both reducing the 'waste' left behind in the extractive process, and as a means of preparing the landscape for planting. Pyne notes that burning was celebrated in Newfoundland for its use in encouraging blueberry harvests (Pyne, 2007: 412).

commitments to Indigenous communities, its smaller land base, and its legislated mandate to maintain ecological integrity (Pyne, 2011).

Rather than immediately accepting the agency's method as a set of best practices, this chapter insists on tracing the history of Parks Canada's approach. It shows how settler institutions, even those premised on conservation and good intentions, have altered the trajectory of human relationships with landscapes that burn and continue to do so. The chapter is not a recounting of the state's complete mastery of an external nature, rather it describes a set of encounters where fire interrupts emerging ordering projects, competing institutional mandates, and the circulation of capital. In doing so, the chapter will identify the limits of historical and contemporary attempts to contain this unwieldy and volatile process.

I identify roughly three phases of Canadian national park fire management. These phases echo time periods in Canadian park development identified by Mortimer-Sandilands (2009), and that of fire management offered by Pyne (2011) and White et al., (2011). Like these authors, I situate the practice of park management and conservation within the political-economic and ecological context of Canada while recognizing the nested trajectories of fire management policies in Canada's diverse park settings. The first phase of national park fire management that I identify concerns Canadian colonization and early national park establishment, a period that was premised on snuffing out Indigenous relationships to land and consolidating federal authority in the parks (and other regions). This process unfolded differently across Canada, with distinct implications for knowledge relevant to landscapes that burn and for Indigenous communities. I focus on two parks, Point Pelee and Banff, to articulate this period. Next, I turn to the second phase of national park fire management, the suppression era, by meditating on the first years of fire management within Banff National Park, Canada's first national park and birthplace of Parks Canada's fire management practices. I argue that this period of fire management was premised on

protecting the value of natural resources, infrastructure, and tourism potential. I tie these efforts to a grander project of establishing and maintaining a national wilderness or nature (Mortimer-Sandilands, 2009; Sandilands, 2013), albeit one where disturbance events such as fire are inconsistent with an ideal sublime landscape. Finally, I turn to a third phase of fire management that is marked not just by a continued fire suppression approach but by the entrance of ecological knowledge into national park legislation and policy. I discuss how ecology as a way of making sense of parks and fire prompted important discussions within fire management circles. I then examine how contemporary suppression practices absorbed ecological knowledge to continue suppression work, but also left a window open to full suppression alternatives. I argue that these approaches to fire management do not succeed one another but live-on in contemporary policy, management plans, practices, and in the material landscape itself.

Settling Fire: Colonialism's Interruption of Landscapes that Burn

Dispossession of land underwrites the relative success of colonial-capitalist Canada (Coulthard, 2014). Whether by treaty, disease, assimilation, or force, settler colonialism disrupted (and continues to disrupt) the lives of Indigenous people and their authority and responsibility to govern their own land. These prior relationships were diverse and included encounters, responsibilities, and even treaties with more-than-humans (Simpson, 2011; Todd, 2017). Canadian national parks were part of this project of dispossession. The establishment of early parks gave governments the grounds to dispossess land in the late 1800s (and into the 1900s) for recreation, rail tourism, and settler expansion (Bella, 1987; Sandlos, 2008; Foster; 1978). Later on, parks would also emerge via the expropriation of land from white settlers (Sandilands, 2011), or through local activism (Foster, 1978). With the legislation and construction of Canada's first parks came a distinct articulation of what belonged within park borders and what did not (Taylor,

2011). These were also exercises in who *belonged* in parks and who *did not* (Sandlos, 2008, 2011b).

As I have discussed elsewhere, fire is a more-than-human process, a happening, entangled with many actors, human and more-than-human, reverberating beyond a contained event (Tsing, 2015; Myers, 2017; Sutherland, 2019). It is important to begin this section with a reflection on how fire unfolded prior to European settlement and park establishment in North America. Eurocentric approaches to fire treat a burn as an event that begins with the appearance of a flame and ends with its suffocation. We can contrast this with the plethora of Indigenous approaches to so-called "fire" in contemporary Canada and around the world (Pyne, 2011, 1997). Generally, these approaches are not premised on suppression but position burning as a *practice* rooted in *many* other kinds of relationships to land. In the wake of ongoing colonialism, such attacks on Indigenous knowledge and governance have come at the expense of communities and ecosystems (Whyte, 2016, 2018; Todd, 2017).

While reference to Indigenous fire practices often appear in contemporary Parks Canada documents, there has been relatively little scholarly research on the topic of Indigenous fire practices in Canada (*Though see* Lewis, 1978; Ferguson, 2010; Christianson, 2015). According to many contemporary Parks Canada respondents, the quality of in-tact Indigenous fire knowledge in Canada is uneven, a status they themselves attribute to processes of "settlement."[23] Citing the effects of relocation, residential schools, and the criminalization of fire practices, respondents mourned the impacts of this colonial violence. This is not to say that this knowledge ceases to exist, rather it appears to be out of reach for fire practitioners working within this institutional context.

[23] While most respondents did not shy away from the history of colonialism, this process was most often cited as 'settlement' and contained to an event in the past. Interviews 2016, 2017 & 2018.

Rather than account for all Indigenous communities Parks Canada interacts with, what I offer here are two brief accounts of fire prior to the establishment of Canadian parks. These fleeting descriptions offer a limited, though enlightening, glimpse into pre-park fire practices. I base them on available literature, Parks Canada documents and interviews with Parks Canada staff.

Banff National Park

Records suggest that on the Eastern slopes of the Canadian Rockies, where lightning occurs less regularly, it was both lightning and human induced fire that played a role in maintaining meadows and larger open valleys (White, 1985). Prior to park establishment, the region containing Banff National Park was home to several Indigenous nations. Their contemporaries include the Nakoda (Stoney), Kootenay (Kootenai), Tsuu T'ina, Kainai, Peigans, and Siksika. As White (1985), a park warden and early architect of wildfire policy and planning in the park system describes, it is likely that these communities used fire on varying scales on the landscape and in most cases, did so to maintain habitat for key species, including bison and other large mammals. Fire as a key driver of more-than-human, and thus human, relationships in the Canadian Rockies suggest that Indigenous peoples in this region had, in their own ways, learned to live-with 'fire'.

Colonization and the fur trade interrupted Indigenous use of the region surrounding present-day Banff and the greater Bow River region.[24] The impact of railroad construction, mining, and other extractive efforts transformed when and where fire erupted on the landscape, while also disrupting and displacing Indigenous presence on the landscape (White, 1985; Pyne,

[24] This said, according to Armstrong, Evenden, and Nelles (2009), this area was not known to be particularly productive with regards to fur-bearing mammals.

2004). Park establishment in 1872 signalled the eventual expulsion of the Indigenous peoples still present in the area, a process coupled with the signing of Treaty 7 (*ibid*). During this time, Indigenous peoples were criminals in the eyes of the park and blamed for wildfires and poaching incidents (Loo, 2011). Despite an attention to arsonists and poachers, fires after 1880 were more likely to trace their genesis to natural resource exploitation and the expanding rail network (White 1985).

Point Pelee National Park

On the other side of the country, at the southern tip of contemporary Ontario, what became Point Pelee National Park in 1918 had already experienced over a century of European settlement prior to the park's establishment. Unlike Indigenous people in and around Banff, ancestors of the contemporary Caldwell and Walpole Island First Nation already had their land dispossessed for some time before the establishment of a park. Land was ceded via treaty in 1790 although the Caldwell First Nation Chippewa people who occupied the land were not signatories (Leclair, 1988). Prior to this, active human-induced fire was used across contemporary southern Ontario. Fire was set to maintain prairie and oak savannah to improve land for hunting and medicinal plants. They also set fire to marshland for similar purposes. According to the Walpole First Nation, these fires were small and, much like today, were established by crafting a small fire line that would travel across a landscape. Fire was a means of making places flourish, rather than something to be extinguished.

The federal government established Point Pelee at the request of urban birdwatchers (Tewari & Carbrera, 2008), who called attention to the role the region played in avian migration. Soon after its establishment, other forms of early park recreation overtook birdwatching, and included cottaging, swimming, and hunting. This interest in hunting led park staff to set fire to

marshland in the 1930s to encourage duck hunting in the park (*ibid*). Some small experimental fires in the 1960s would follow (*ibid*).

Aggressive visitor-use coupled with the loss of Indigenous land practices literally buried fire's presence under invasive grasses, cottages, farming, and extensive tree planting (*ibid*). This said, fire's presence left clues in the landscape and among Indigenous communities in the vicinity. A fire history prepared by Parks Canada employees in the late 2000s describes how fire set by humans had maintained savannah, prairie and other novel ecosystems. Regarding members of the Walpole Island First Nation, the fire history notes:

> It is known that people from Walpole Island have burned prairies and oak forests to keep them open and facilitate hunting practices and to renew and maintain these ecosystems. Thus, traditional use of fire is happening in the Pelee' surrounding area and it should be considered as a valuable learning opportunity to manage and conserve Pelee's threatened fire-dependant habitats and species." (Tewari & Cabrera, 2008: 9)

This report surmises that fire, in addition to other disturbance events, was key to maintaining habitat for rare species. Further, it echoes currents in conservation that were taking Indigenous knowledge more seriously.

Interviews with contemporary park managers note that both the Walpole Island and Caldwell First Nations have become involved in the park's fire management. They suggest that while one community kept hold of its fire knowledge, the other has reported the deterioration of theirs. For contemporary managers, this traditional knowledge is of immense value. As Tewari & Cabrera note:

> According to the World Wildlife Fund, the Walpole territory contains seven of the most diverse tallgrass prairies and oak savannahs sites remaining in Canada. These ecosystems, once abundant in the region, but now exceeding rare, have survived here due to the maintenance of burning by the Ottawa, Ojibway, and Pottawatomi tribes of the delta, virtually without interruption from pre-contact times down to the present. Indeed,

> the history of burning on the island, the knowledge and attitudes of the local people, and the methods they use in burning have established the islands as a rare example of a central North American grasslands landscape where the ancient practice of burning has been perpetuated. (2008: 24)

While colonization and fire suppression have reordered much of the landscapes of southern Ontario, the work taking place with the Walpole and Caldwell First Nations speaks to the resilience of Indigenous fire knowledge despite centuries of colonial encounter.

Common Histories, Common Challenges

While these brief vignettes are unique to the places they describe, they offer familiar descriptions of three themes common to other parks and underscore the complexity of contemporary challenges to fire management in these places. First, in each case, national parks became part of the reordering processes of colonialism that sought to expel Indigenous people from their land. These actions echo scholarly research on protected areas the world over (Neumann, 1998; Kull, 2004; Lunstrum, 2014). Indigenous expulsion guaranteed the entrance of colonial administration and jurisdiction over the likes of wildlife, land, and a plethora of more-than-human things rendered as resource (Pasternak, 2014; Sandlos, 2008; Braun, 2000; Coulthard 2014). Further, Indigenous people put extractive projects at risk and were not compatible with early ideas of parks as places empty of human history (Clapperton, 2013; Binnema & Niemi, 2006). While the context of Canadian national parks is distinct, the processes that guaranteed this dispossession facilitated similar ends for much of the rest of Canada, not to mention other settler colonial states (Brockington, 2002; Brockington & Igoe, 2006).

Second, fire suppression, as a relation to fire, was new. Whether they were lit by humans or not, it can be said that prior to European colonialism there were a diversity of relationships with these landscapes that burned and absolute suppression was a new phenomenon. Scholarly work

completed in fire regions around the world echoes this sentiment (Neale, 2018; Verran, 2002; Pyne, 1997; Kull, 2004). These scholars position burning as a process entangled with other processes, ecosystems, and humans and one disrupted by colonial expansion among other processes and explore how burning and "fire" are more than just combustion (Ogden, 2011; Myers, 2017; Pyne, 2011; Sutherland, 2019). As I discuss later in this dissertation, a focus on combustion is premised on an understanding of "fire" as an immediate threat to value or property and is a relatively restricted means of describing such a dynamic process.

Finally, these vignettes show how it is difficult to speak about the expulsion of fire in isolation. Many other government projects have had violent impacts on the trajectory of 'fire' knowledge as it exists today. Residential schools, the reserve system, and other projects have interrupted, if not abused, Indigenous knowledge on this topic (among others) (Truth & Reconciliation Commission of Canada, 2015). Further, the interruption of land practices entangled with fire, such as hunting, gathering, ceremony, and travel, have also had contingent implications for the maintenance of fire-adapted landscapes. While the interrogation of this period is beyond the focus of this dissertation, it is certainly an avenue of research that deserves further attention. Attempts to re-engage Indigenous knowledge in fire management must acknowledge the colonial state's role in earlier and ongoing attempts to suffocate other ways of knowing and practicing the world (Nadasdy, 2003).

Fire suppression, as I argue later, bears a striking resemblance to other projects to civilize the Canadian frontier. In refusing Indigenous encounters with these landscapes, and replacing such encounter with forms of park, wildlife, and fire management instigated a colonial administration of nature (Nadasdy, 2003; Loo, 2009; Sandlos, 2011a). Fire suppression as a means of living-with(out) fire was a logic *brought* to Canada during colonial expansion and one still ongoing today. Unlike the relatively damp and deforested Europe settlers left behind,

Canada was home to places where wildland fires were far more active (Pyne, 2011). For the early settler administrations, fire was out-of-place and a threat to valuable timber, settlement, and homes. This attitude was further enshrined following major urban fires that plagued cities in Canada and the United States with profound implications for the frontier under urban management (Pyne, 2011; 2017). Though fire played a role on the farm and other sites of colonial expansion, fire-use was an exception rather than a rule (Pyne, 2011).

Fire Prevention and Suppression in Banff: The Threat of Fire in Canada's Park

When the Canadian Pacific Railway (CPR) weaved its way through the Canadian West, it facilitated resource extraction, brought about rail tourism, and prompted the establishment of Canada's first national park (Bella, 1987). The expansion of the Canadian confederacy and the Canadian economy hinged on such infrastructure investments (*ibid*; Cambell, 2011) and the contemporary park system can trace its roots back to the railway's western march. In 1883, the 'discovery' of hot springs by railway workers at the base of Sulphur Mountain, near the present-day Banff town site, prompted a flurry of activity and speculation. Though many attempted to lay claim to the hot springs, it was in fact the federal government who asserted their title to the springs and surrounding area, doing so with the signing of the Rocky Mountains Park Act of 1887 (Lothian, 1976; Kopas, 2007). In doing so, this Act carved out Canada's first national park and foreshadowed future relationships between transportation networks and conservation. With the park's origins firmly tethered to the tracks, this landscape of mountains, glaciers, valleys, and pine simultaneously challenged westward expansion by rail, spurred the beginning of the Canadian national park system, and struck awe into those who visited (Lothian, 1976). In 1930,

Canadians would rename Rocky Mountains Park, Banff National Park after the, by then, well-established tourist hub (*ibid.*).

In his history of wildfire in Banff National Park, Clifford White, who later played an influential role in the development of wildland fire management, describes the period between 1880s and the 1920s as a phase of intense human burning along the rail corridor (1985). He quotes governor surveyor J.J. McArthur:

> It is a matter of regret that fires incidental to the railway construction have devastated much of the country in the vicinity of the railroad, and have spoiled much of the wonderful beauty the environs of these mountains (Dept. of Interior Annual Report for 1886).

During this period, fires sparked by the railway, human incident, and lightning strikes to waste piles, left the mark of colonialism's flames on the park landscape (*ibid*). To avoid such conflagrations, Canada's warden service, along with Canadian Pacific Railway fire patrols, attempted to address such events through organized prevention efforts (White, 1985; Burns, 2000). In fact, the creation of the Warden service in 1909 lends its very origins to the perceived threat of poaching and fire (Burns, 2000; Loo, 2010).

Fire, during this period, was a threat to both productivity and economic expansion within and beyond park borders (Pyne, 2008; 2011; Bella, 1987). As White and others have noted, wildfires during the early days of park establishment were characterized by early witnesses as events leading to waste (*see* Stephen Pyne, 2004, 2011). To these early actors in the park, fire consumed and wasted valuable timber, infrastructure, and viewscapes (Bella, 1987). From roughly 1887 to the 1930s, national parks were not yet sites of conservation in the contemporary sense but were sublime landscapes for elite tourism and sites of resource exploitation (Bella, 1987; Mortimer-Sandilands, 2009). Early park administrators bemoaned the impact of the fires on the beauty of the landscape (Bella, 1987), a sentiment shared by early visitors. As Bella

explains, “In the late 1880s, when the CPR began to exploit the Banff area for tourism, the company had to touch up their picture postcards, adding green to the skimpy forest of black bristles” (Bella, 1987:9). Here, in what likely appeared to be an endless bounty and wilderness to tame (and consume), fire endangered the extraction of timber and access to other natural resources. Ironically, it was these same operations of settlement and recreation that often ignited such fires.

As a remote embodiment of the federal bureaucracy in the fledgling settler colonial state, fire management in Banff and the other mountain parks had fairly humble beginnings and emerged via a relatively small group of men aided by pumps, horses and trails (White, 1985; Burns, 2000). Their work as ‘fire guardians’ was difficult and came with only relative success. Technology and limited infrastructure restricted the success of human intervention, allowing wardens only so far into the bush (White, 1985; Pyne, 2008). Burns (2000), quoting Chief Superintendent Douglas, provides a glimpse into this state of affairs:

> Since we have inaugurated our new plan of fire and game guarding by the appointment of a competent staff of experienced men under the direction of a chief, the fires have been less frequent and have done less damage than ever before. These men have looked carefully after the piling of limbs and brush on areas granted to numerous parties for the cutting of cordwood, mine props and lumber, and if this system of protecting the forest from chance of fire is continued, it is only a question of a few years when we will have but one place where our men will have to exercise their constant vigilance, namely the railway right-of-way.
>
> The regulation governing the starting of camp fires, &c., is having the effect desired and…the residents in the park are commencing to take a keen interest in safeguarding the

> forests from fire….[and] the staff of forest guardians is without doubt the most important we have, as so much depends on them to maintain and perpetuate the beauty of the park and protect game.
>
> Too much cannot be said in favour of a good and intelligent system of protection for our natural resources. (Dept of Interior Annual Report *in Burns 2000:27-28)*

Parks during this time were firmly attached to the prospects of economic development (Bella, 1987), and fire management emerged to guarantee this process.

Given the stakes of such fires and advances in technology, it wasn't long before park wardens added buggies, improved pumps, and lookout towers to their arsenal of fire prevention tools (Burns, 2000). Despite these advances, these early tools did not allow wardens to overcome the question of scale within Banff National Park or the growing national park network. The inaccessibility of the backcountry in Banff meant that, prior to 1940, many of the park's fires burned regardless of human intervention. Advances aside, the actualization of suppression goals were restricted by the limits of technology (mechanical pumps were still fairly novel), mobility (getting pumps into the backcountry was difficult), and labour. Instead of suppression success, thousands of hectares of land would burn; albeit as later records show, still less than the period prior to park establishment (White, 1985: 83).

Wildfire was not the only thing 'out-of-place' in Canadian national parks at this time. Though fire prevention, in the form of firefighting and manipulation of the landscape, was a key duty of early park wardens, these duties were one among many. In the summer and early autumn, fire management work complemented the construction of park infrastructure including trails and roads (Burns, 2000:29), while Wardens were also expected to attend to the extermination of predators (Burns, 2000; Sandlos, 2011a; Rutherford, 2011; Loo, 2011). In autumn and winter,

wardens focused on preventing poaching in the national parks. Like fire, poachers (settler and Indigenous) and predators were not within the purview of the nature park wardens and the Dominion Park Service[25] had in mind. Most of these early park management practices were premised on the success of the park as a resource frontier and elite tourism destination and was not yet translated through 'ecological' registers. By today's standards, this was a period where park managers sought to interrupt a series of ecological processes including predation and wildland burning. It is in this context of containing fire as a threat that suppression within national parks emerged, not within a preservationist ethos inspired by a wilderness ideal or ecological integrity, but in the maintenance of production and circulation of goods through this emerging leisure and resource landscape.

Preserving "Wilderness": The Maintenance of Value

As early as Banff's creation in 1887, national parks in Canada played a vital part in articulating a notion of Canadian identity and nationalism (Sandilands, 2009). This role crystallized in 1930 when the National Parks Act proclaimed, "the parks are hereby dedicated to the people of Canada for their benefit, education and enjoyment [and that] such Parks shall be maintained and made use of to leave them unimpaired for the enjoyment of future generations" (Government of Canada, 1930). Unlike the 1911 Forest Reserves and Parks Act, which signalled the beginning of a national park system (Mortimer-Sandilands, 2009), the National Parks Act of 1930 articulated the vision and direction these protected areas should embody moving forward (Kopas, 2007). By this time, the national park system entered an era marked by particularly preservationist themes, whereby "parks were understood as common, national resources" (Mortimer-Sandilands, 2009:169).

[25] One of the early iterations of the contemporary Parks Canada Agency.

Though national parks outgrew their purpose solely as sites of extraction and elite enjoyment,[26] through an emerging preservationist ethic they began a new trajectory towards parks as sites for nationalist celebration and economic expansion (Bella, 1987; Mortimer-Sandilands, 2009: 169). This preservationist approach echoed currents in national forest policy in the United States (Rothman, 2007). Such policy premised management on maximizing the wise-use of resources (Bella, 1987; Pyne, 2011), thus bolstering efforts that aimed to extinguish fire. Timber, infrastructure, and viewscapes consumed by wildland fire would mean such environments were laid to waste, a lost opportunity for consumption and a loss of national significance.

As wilderness enclaves, national parks functioned as sites of untouched Canadian splendour for public consumption (Bella, 1987; MacEachern, 2011). But this articulation of the park system was for a specific public, not all were welcome. During this time, the Dominion Parks Branch, which would become the Canadian Parks Service and eventually the Parks Canada Agency, along with the whole crown, maintained a racist policy towards Indigenous people.[27] Banff National Park for example, was closed to several Indigenous communities, except for during the so-called Indian Days when Indigenous people were invited to return as entertainment for park visitors (Clapperton, 2012).

By 1950 and through to the 1980s, the changing character of park visitors, from train passengers to highway users, along with developments in fire suppression technology, presented a new era of park management premised on further developing the parks' tourism options. With the emergence of automobile tourism and an expanding highway network, parks quickly became a retreat for a wider set of Canadian and American tourists (Sandlos, 2011b). Roads also became

[26] Although as Bella (1987) explains, these industries continued to prosper as boundary lines were redrawn and tourism expanded to include a wider set of Canadians in the wake of auto-tourism.
[27] This is not to mention the other colonial processes that were at work in during this time, including the pass system and the reserve system in general.

important bargaining chips for those hoping to establish even more parks (Bella, 1987). The expansion of tourism infrastructure, along with growing town sites in Banff, Jasper, Wasagaming, and Waterton, multiplied the 'values at risk' in the growing set of national park landscapes and also created more opportunities for accidental human-caused wildfires (White, 1985).[28]

Yet, from 1950 to the 1980s, there was a remarkable shift in the amount of land burned within the mountain parks and the growing park system. The rapid development of firefighting technology and capabilities, along with climate conditions not as conducive to fires, led to a period where the presence of fire was remarkably less intense and the extent of land burned far smaller (White, 1985:82). For a time, it appeared the threat of wildland fire was contained, that fire suppression had been a success. However, in the eyes of contemporary fire managers, these developments in the success of fire suppression efforts were perhaps too successful, as unburned land has prompted more complex fire hazards for today's fire managers. [29]

The 'success' of fire suppression practices reverberated through the more-than-human communities left untouched by flame, propelling ecosystems into novel trajectories. In the mountain parks, this meant aging pine forests and the encroachment of trees into the meadows and valleys so important to local species (Banff bow valley Study, 1996; Parks Canada, 2019). In Eastern parks, such as Point Pelee and Thousand Islands, the absence of fire was part of a longer trajectory of interruption in eastern Canadian ecosystems, one that was coupled with the arrival of new species and farming techniques (Tewari & Carbrera, 2008). In parks like La Mauricie and Kejimkujik, centuries of logging had completely transformed park ecosystems, further complicating the story for those hoping to reconstruct pre-settlement fire regimes (Parcs Canada,

[28] Although according to White (1985) education campaigns appear to have significantly limited the number of human-caused fires in Banff.
[29] Interview with Clifford White, October 2017.

2002; Parks Canada, 2009). The loss of fire, coupled with the encroachment of invasive species and landscape manipulation, established rather novel ecosystems throughout Canada and crafted challenging conditions for native species to thrive (Parks Canada, 2016). The impacts were particularly acute in regions where Indigenous fire-use, now limited, functioned as a primary means of ignition.[30]

While extraction and tourism activities in parks ironically sparked several fires, advances in technology, new fire suppression techniques, and policy that supported this approach as the status quo, facilitated fire's containment (Pyne, 2011). Fire suppression policies in national parks echoed approaches in other North American fire management agencies, prompting a vulnerability that extended beyond jurisdictional borders in parks that neighboured provincial crown land. Smokey Bear personified this shift to suppression, bringing fire's containment into mainstream media and enlisting park visitors to help keep fire out of the parks and forest (Kosek, 2006; Pyne, 2011).

Despite suppression's popularity and functional success, new ways of thinking about fire, much like that of predators (Dunlap, 1990; Loo, 2011; Burns, 2000:204-205), were evolving behind the scenes. Ecology as an academic discipline questioned resource management objectives and practices and had already been put to use in other federal bodies.[31] Emerging ecological knowledge of fire questioned the mainstream understanding of these 'disturbance events' (Botkin, 1990; Rothman, 2007; Zimmerer, 2000). The notion that floods, fires, and avalanches might provide benefits to park landscapes was novel (Canadian Parks Service, 1989). This is not to mention the difficulty early proponents of such ideas had in attributing value to a

[30] Interviews, 2016, 2017 & 2018.
[31] Although as John Sandlos (2007) discusses, ecological approaches enacted by the Canadian Wildlife Service and others concerned with mammal conservation in the Northwest Territories were entangled with political ventures and sometimes a lack scientific validity. As such, ecological arguments were often lodged against Indigenous sovereignty in the territory.

process that destroys resources, a challenge contemporary managers still face.[32] Even by the late 1960s there remained some unease around the very role of *science* in Canadian national parks (Dupont, 2011:190). This unease aside, by the 1970s the Canadian Park Service would have biologists, foresters, ecologists and others employed within their ranks (Lothian, 1976; Pyne, 2011). By this time, the suppression logic, though key to protecting human safety and the ever-expanding list of 'values at risk' within park boundaries, felt unsustainable to some. These new arrivals, including the likes of the previously mentioned Clifford White, were proponents of a more ecologically-informed approach to wildland fire. For those who intimately knew fire from their time on the fireline, the so-called Keepers of the Flame, there was also a sense that this process had a role to play that was consistent with their agency's mandate.

'Keepers of the Flame': The Rise of Ecological Thinking in National Park Fire Management

New ideas emerging out of the maturing ecological sciences soon challenged the first generation of the Canadian Parks Service's fire policies. Arguably born out of the many colonial projects still ongoing in the 1800s (Kingsland, 2005; Sandlos, 2002), ecology began as a way of ordering and describing the environments of European colonies (Anker & Anker, 2009). In fact, some key ecological concepts were born out of colonial Canada when the Hudson Bay Company set out to better understand the dynamics of fur-bearing animals, information of immense value for the company in light of the near extirpation of beaver in the James Bay region (Loo, 2011). As other scholars have observed, ecology is by no means a static knowledge system, nor should 'ecology' be used as a synonym for 'nature.' As Braun suggests:

[32] Interviews, 2016, 2017 & 2018.

> "…the appeal to ecology opens up as many questions as it answers. To borrow a phrase from Donna Haraway (1992), ecology is a discourse, not nature itself; its knowledges are at once cultural and political, even as they engage with, and are shaped by, encounters with humans, animals, and other organisms. Perhaps more important, ecology does not speak with one voice—it is internally heterogenous and its concepts have changed over time." (Braun, 2002:225).

In the context of Parks Canada, this sentiment rings true. Ecological knowledge entered the agency slowly and would transform as it worked its way into legislation and policy, and as it was enacted by park staff.

Ecology, originally born out of practices in observation and description (Kingsland, 2005; *See also* Botkin, 1990), developed as a kind of field science and produced a series of sub-disciplines all with immense relevance to the goals and challenges faced by national parks in Canada and similar federal agencies such as the Canadian Wildlife Service (CWS, formerly the Dominion Wildlife Service). This novel approach to understanding park landscapes complemented earlier contributions from zoology and forestry that had entered the agency as early as the 1920s (Sandlos, 2002, 2011a; Pyne, 2011). In the 1970s and 1980s, ecological concepts and science were also adopted by a growing environmental movement to critique industry (Braun, 2002; Prudham, 2012) and national park management practices such as predator control and the introduction of alien species. In this context, ecology gave critics, particularly of industry and government-owned protected areas, a language with which to address and frame issues of environmental destruction (Braun 2002).

The National Park System Plan of 1970, inspired in part by the Leopold Report in the United States from 1963 (*see* Stewart, 2005: 7-8 & Rothman, 2007)[33], articulated parks as

[33] The Leopold Report, officially *Wildlife Management in the National Parks*, was a report to the American Secretary of the Interior that proposed a number of ecosystem management goals with regards to wildlife for the US

examples of specific 'representative natural areas.' Through the lens of the plan, places like Banff were to represent the 'Rocky Mountains,' and Cape Breton Highlands National Park, created in 1936, would represent 'Atlantic Coast Uplands', and so on (See Canadian Park Service, 1990). Though these places had already existed as parks, they now fit into a new vision of Canada's protected areas system that sought to identify and celebrate the diversity of Canada's landscape. Mortimer-Sandilands compares this process to the emergence of multiculturalism policies that emerged around the same time (2009:174) positioning parks as part of a continued nation building project, this time enlisting ecosystems.

With the entrance of ecological thinking via the vernacular of its critics, the growing number of scientists working in the parks, and through partner organizations like the CWS and Canadian Forest Service, the Canadian Park Service of the 1960s and 1970s transformed. Legislation, policy, and management plans that governed these landscapes as 'natural regions' would complement the ecological discourse within the park system that considered these places as habitats and natural wonders. Though they would remain places of recreation and national identity, the entrance of this ecological register had lasting impacts. This transition changed how the Canadian Park Service presented itself to the public through educational events and materials, along with its actions on the ground (Mortimer-Sandilands, 2009; Woodley, 2010). Wardens who were once tasked with exterminating wildlife became enlisted in their monitoring. Creatures who were once fed by roadside tourists in the 1920s and 1930s were now *wild* and not to be bothered. It is during this time that the preservationist era and mandate of the 1930s would transform into preservation articulated through an emerging but nascent ecological thinking (Mortimer-Sandilands, 2009).

National Park Service. This report had wide reaching impacts on American, and indeed Canadian, national park management and fire management in particular.

It is important to appreciate that prior to the 1960s there was little in the way of language or policy that could articulate, let alone legislate, the role of events such as flooding, wildfire, and erosion within national park spaces. Further, the nested ways in which these disturbances unfolded within specific landscapes prompted localized challenges. Outside of the national park context, research was calling attention to the role these events played in the life cycles and health of local species, while also making note of how much more there was to learn (White 1985; Banff-Bow valley Study, 1996). Ecology, as a means of knowing nature, attempted to account for how different components of an ecosystem interacted and, in doing so, moved park logics beyond a siloed understanding of species offered by biology and the earlier manifestations of ecology that hinged on climax communities and the descriptions of optimal manifestations of ecosystems for hunting and trapping (Sandlos, 2011; Loo, 2010). The entrance of this more dynamic form of ecological thinking challenged basic assumptions made by land managers around processes like wildland fire, and created a productive tension between the policies and actions of Canadian park staff.

This appreciation for disturbance outside of the park system aside, the preservationist ethos of earlier decades was engrained in management plans and policy, making this process illegible, or in the case of wildfire, extinguishable. Park officials and the public had to learn how to see a process framed as destructive, in a new light. It is important to note that the theory and science of ecology is distinct from the 'ecological thinking' and practice of ecology that unfolded within the parks, here science needed to be deployed in dynamic social landscapes and tailored to the institutional goals of the Canadian park service. In particular, the relatively radical concepts and way of understanding the likes of predators and disturbance events questioned the legitimacy of several decades of federal park management. Any adoption of ecological thinking had to attend

to how earlier policies unfolded and would have to make note of such errors before moving forward.

By the 1980s and 90s, a century of suppression within parks like Banff National Park sparked a moment of crisis as this approach was exposed for its role in producing increased fire risk. The absence of fire over time led to a change in the composition of landscapes within Banff including the Bow River Valley home of the Banff town-site and most tourism amenities (Banff Bow Valley Study, 1996). As Wardens and later park managers successfully suppressed fires from the 1950s to the 1980s, they had increased the 'fuel load' on park land, the amount of flammable material. Such management decisions also disrupted landscape change in parks, allowing trees to encroach upon historically open valleys, important thoroughfares and habitat. According to Clifford White the 1980s marked a moment of realization where the crisis of fire's absence on the landscape set up an opportunity for institutional change.[34] Policy changes engaging a more 'ecologically' framed national park system, along with action from staff working directly with the landscape, prompted the transformation of Parks Canada's approach.[35]

Immediately following the publication of Parks Canada's 1979 National Parks Policy document, which outlined the direction of the growing park and historic site system, Van Wagner and Methven of the Canadian Forest Service, an institution Parks Canada leaned on for some scientific knowledge,[36] published their document *Fire in the Management of Canada's National Parks: Philosophy and Strategy*. In this document, the authors responded to park policy resistant to artificial or mechanical approaches to ecosystem management. Though parks were

[34] Interview 2017.
[35] This echoed what was taking place in the United States. While the National Park Service had been experimenting with fire in specific sites (like Yosemite National Park and Everglades National Park) as early as the 1950s, fire-use was not widespread and major fire events like those in Yellowstone would prompt the uneven deployment of fire-use in the American national park system. According to Rothman (2007) a combination of skepticism, limits on park funding, challenging relationships with neighbours and stakeholders, along with strongly held beliefs by senior staff made this work difficult.
[36] Much like the Canadian Wildlife Service, the Canadian Forest Service had also been involved in much of the science taking place within Canadian national parks.

unnatural idealized human visions of nature, intervention on the part of humans troubled the sense that these were oasis of untouched wilderness. This said, fire's return would hinge on "returning" the most "natural" fire regime as possible. The document speculated on how best to determine the historical presence of fire in Canadian national parks and identified the obstacles European settlement and recent suppression posed to completing this work (*ibid*:14-16). The authors note that moving forward with this issue would require more research before management decisions could be formalized. Likely in response to debate around human-use of fire, and human intervention more generally, the authors explain that "the effect of any fire is quite independent of how it started; the forest certainly cannot tell the difference" (1980:19), hinting at a future where 'wild' fires (lightning and accidentally caused fire) would be extinguished and 'controlled' burns would be set. It made explicit calls for more research at the park level by requesting studies on the historical presence of fire in the parks and positioned fire as something 'natural' to many Canadian landscapes.[37] This document, prepared by the Canadian Forest Service, was one of the first to identify the next steps for park managers and would be followed by other through the 1980s.

In 1985, Clifford White, then a Warden in Banff National Park and graduate in forestry, would publish a *Fire History of Banff National Park* written in preparation of a Fire Management Plan for the park. In his history, he notes the Indigenous use of fire in the Banff region (1985:23-25) and, going further than the authors of the Canadian Forest Service document, made an argument not just for fire-use to mimic lightning fires, but an explicit call to mimic Indigenous fire-use. His history notes the disappearance of large burns and suggests that the program may have been too successful in its attempt to address fire on the landscape. The fire history was not only a record of dates and statistics of past burns but was also an exercise in

[37] Based on some of the authors cited in these documents, there was certainly some cross pollination with research on fire ecology coming out of the United States.

pushing institutionalized ecological thinking of the time. In it there is an attempt to position ecosystems not as an external nature separate from a kind of human civilization, but instead to consider the participation of different humans in this fire-adapted landscape. Even in the 1980s, there was a kind of material reflexivity as managers were looking for clues within the landscape in order to reckon with how colonization in the Rockies had altered fire regimes. Lightning, it seemed, could not explain everything. As managers like White took a closer look at records, tree rings, aerial photographs and the like, colonization, extraction, and expulsion became details observable in the material and social archives they were trying to understand (Sutherland, 2018).

With the publication of the *Interim National Fire Management Directive* in 1986, these currents would begin to take shape within new policy. As Stewart explains,

> "The emphasis was on fire control; fire use was contingent upon a demonstrated capacity to control fire. When using fire, it urged managers to use the mode of ignition (lightning or management-ignited) "that best achieves objectives while minimizing costs and threats to other values" (p. 41). The directive also stipulated that an approved fire management plan was required before using prescribed burning." (Stewart, 2005: 26).

Though staff like White were making an argument for human-use, this park stuck to an approach to fire that positioned it as a process that unfolded within an ecosystem and that the role of humans was to manage those fires while attending to the threat it posed to so-called 'values at risk.' The notion of fire control positioned fire as something that could be used as a tool to achieve specific park mandates. Further, the management directive (echoing the advice of the Canadian Forestry Service) required parks to reckon with their fire-adapted landscapes through the preparation of fire histories and fire management plans, and in doing so nodded to a future where fire-use could be a legitimate form of resource management within park borders.

The Yellowstone fires of 1988, which burned over 3000 km^2, would illustrate what kind of disaster was possible if fires in fire-adapted ecosystems were systematically and consistently extinguished. For park officials around North America, the fire that consumed much of the United States' most famous park was a wakeup call, albeit one that made making the case for fire even more difficult in the immediate future.[38] In the eyes of fire management staff, the Yellowstone fire illustrated how the absence of flame on the landscape did not guarantee human dominion over combustion; it simply put it off. While Yellowstone prompted change (or at least further research) in some protected areas, the event further enshrined suppression efforts in others (Rothman, 2007).[39] Events such as the Yellowstone fires underlined the reality that many land managers in North America and beyond were, in fact, managing fire-adapted landscape, landscapes that were not only able to survive fires, but flourished in their presence. A proposal by Parks Canada employees would punctuate this exciting time of ideological transition, as they identified how, but also why, Parks Canada staff should work *with* fire within national park contexts. This working document, entitled *Keepers of the Flame* (1989), positioned fire not only as a 'natural' process on the landscape, but identified this process as 'eco-cultural', positioning the process as not one of an external nature but a process that connects humans, specifically Indigenous peoples, to the landscape. It also positioned suppression as an unsustainable response to managing fire-adapted landscapes.

This said, their proposal remained akin to the controlled approach offered by both the Canadian Forest Service and the Interim, and the soon final, Fire Management Directive of 1988. As such, fire remained a process requiring human control. Rather than a binding policy, *Keepers of the Flame* was premised on inspiring a review of contemporary practices and positioning fire as a common national concern. It is important to appreciate that despite the emergence of new

[38] Interview, 2017.
[39] Interview with Clifford White, 2017

national policies, legislation, and directives, park management was still rather decentralized with a great deal of authority still resting with local park superintendents and limited national coordination with respect to fire. The document did not suggest that suppression should be abandoned but rather outlined additional tools and policies Parks Canada could add to its fire management regimen. In this sense it was relatively conservative in its proposal, it was not demanding a fundamental change to the park system's mandate, nor was it identifying an incompatibility between ecological management and the maintenance of industries unfolding within and beside park borders.

Yet in other ways their proposal was radical in how it imagined future fire-use. First, by positioning ecology as a medium through which fire should be understood and encountered, it signalled the development of new tools and practices. Framing fire as an ecological process created an alternative approach to the model that had been used to date: full suppression. This way of knowing the parks was one where systems and processes were not something that just needed to be guarded but which needed to be cared for and, in this case, *stoked*. Second, the working paper positioned fire as a 'natural' process, although not necessarily one devoid of human involvement. Here, combustion was positioned as a process that was firmly 'in-place' within Canadian national parks and one that challenged any divide between 'nature' and 'culture'. Combustion was articulated as an ecological process whereby humans not only played a role in its management, but in certain instances, played a part in what made it 'natural' in the first-place. The document, echoing the Canadian Forest Service, also noted how little was known about fire and its role on the landscape at the time of publication, critiquing the role suppression had played in understanding the cycle of fire's presence on park landscapes. Any deployment of fire as a resource management tool, it seemed, would require exercises in remembering how things used to be done. This call foreshadowed emerging approaches to a new model for park

management, one linked more intimately to 'ecology' as a practice of encountering 'nature' rather than one about witnessing and guarding 'nature.' The executive summary makes this work explicit,

> "Recent amendments to the National Parks Act require that: *"Maintenance of ecological integrity...shall be the first priority when considering park zoning and visitor use in a management plan." This direction provides new impetus to effectively manage fire in Canada's national parks requiring notably fire control, or all activities concerned with the protection of people and property, and resource values from wildfires, but also fire use, or the deliberate use of prescribed fire to meet natural resource management objectives" (Executive Summary:1).*

The preparation of the *Keepers of the Flame* working paper, along with its dissemination, prompted the emergence of a network of fire professionals, not only in the Rockies but in the other 'fire' parks including Wood Buffalo and Prince Albert National Parks.[40] Much of this hinged on nationalizing and professionalizing national fire response (Stewart, 2005:26) and identifying the ecological role of fire in ecosystems across the park system. The creation of a network of fire professionals, information, and resources to future fire-use was essential as the network remained relatively small. Today, these recommendations are embodied by a network of fire managers that design and facilitate prescribed burn plans, a collection of mobile initial attack crews (crews of 3-6 individuals trained to fight fire from a helicopter and available to national incidents), and the continued cross pollination of fire management expertise more broadly, and of ignition tactics in particular. For those who witnessed this transition, it was a key step in positioning fire-use as an indispensable tool in wildland fire management and a form of management consistent with agency priorities.[41]

[40] Interview, 2017
[41] Interviews, 2017

This new articulation of the role of fire within an ecological system prompted a new way of encountering fire through changes in how fires and the creatures dependent on them were understood and governed. Ecologists from Parks Canada, along with members of the system's warden service, had to reconcile this new ecological way of understanding fire on the national park landscape with those of the suppression era. The backdrop to this period of relative reflexivity was an era when the category of 'values at risk' would drastically expand (Stewart 2005). Besides infrastructure, the public, and timber, ecologically sensitive areas would join this list of so-called values at risk. This would include the growing list of attractions built alongside parkways and highways that traversed Canada's growing park system (Burns, 2000). Though certainly an era of introspection these changes did not negate that it was also a time when Parks Canada (then the Canadian Park Service) was more attuned to the interests of their neighbours, whether those be communities, logging, or mining, who might be negatively impacted by fire moving beyond the park boundary. While Parks Canada staff would continue managing the park with the dual mandate of human-use and ecological integrity simultaneously, early park documents focused on fire suggest that the enactment of these new ideals would expose the contradiction of these two presumably complementary mandates.

In the 1970s and 80s, combustion remained a process to be contained and controlled by a class of expert practitioners, but how they came to know the landscape, and the manner in which they governed it, was in flux. While early documents like *Keepers of the Flame* were radical in their proposition that burning was an eco-cultural process (1989; White et al., 2011), the cultural component of this process was diluted within park policy and practices and an idea that would all but disappear at the national scale until a later date.[42] This said, it is during this era that a new set of relations to fire emerged, one between the expert-manager and landscape, as well as one

[42] It wasn't until 1999 that Parks Canada established an Indigenous Affairs Branch. In 2000 the CEO Alan Latourelle assembled an Aboriginal Consultative Committee.

through which fire, but also vegetation, became *known* as an *active* part of an external nature, albeit one that needed to be contained. While fire practitioners may have recognized the value of historical Indigenous burning to fire in some national parks, there has been limited institutional support for this kind of engagement (White et al., 2011).

The Crystallization of Ecological Thinking, Towards 'Ecological Integrity'

The 1988 National Parks Act recognized the importance of parks as functioning ecosystems and positioned recreation as a compatible mandate. This renewed National Parks Act enshrined and emboldened ecological thinking in legislation that governed all components of the national park bureaucracy. It is at this point, with respect to fire, that sustainable funds for ecological projects came to fruition, marking a transition from ecological integrity as an intent to that of a practice. As Stewart points out, the "Federal 'Green Plan' funding from 1988 to 1994 provided the means by which to implement much of the direction in *Keepers of the Flame* working paper. Despite this support, the implementation of fire use has been much slower than expected" (Stewart, 2005: 26-27). As some respondents noted, it is easier to do nothing than to do something, even if it means watching a wildfire go out of control:

> Well that's simple. If you don't light the fire, if you don't cull the animals, if you don't have objectives, you haven't done anything wrong. It's a real natural bureaucratic trend, and it's just, you know, we didn't do it.[43]

The 1990s were thus a time of research, consideration, and waiting as parks attempted to act on the goals outlined in *Keepers of the Flame*. Securing reliable funding would continue to be a

[43] Interview, October 2018

theme of fire management moving forward, especially when it came to the relatively costly price tag of prescribed burns that could not be positioned as forms of hazard reduction.

Throughout the 1990s, a number of documents crystallized fire management within the national park system. For example, Parks Canada's Guiding Principles and Operational Procedures (1994) noted that "the manipulation of natural occurring processes such as fire […] may take place". Likewise, the Banff-Bow Valley Study (1996) not only identified the historical presence of fire on the landscape but was also somewhat critical of how Parks Canada's management of the valley had interrupted a series of ecological processes and species. Among management plans, the new Banff National Park Management Plan contained "…an objective to "achieve a target of 50% of the long-term fire cycle through prescribed burns or random ignitions" (1997:19). These changes in policy and planning gave fire managers clearer objectives and options when it came to fire use.

Though experimental burns had been conducted prior to this, the 1980s and 1990s saw the rise in the use of fire to achieve specific, rather than exploratory, objectives. The first prescribed burn under this new direction and management plan was conducted in Banff National Park in 1983. It was during the 1990s and 2000s that Canadian national parks began a relatively unfinished project of coming to terms with what this ecological mission statement could mean when it came to *the return* of ecological processes and species to Canadian parks. This said, findings from the Panel on the Ecological Integrity of Canada's National Parks (2000) noted that much more work had to be done. This document identified system wide objectives for attending to a new mandate to manage the ecological integrity of the system's growing number of parks. Efforts such as the panel echoed ongoing efforts to harmonize national park management.

These relatively recent modifications to park policy have changed the trajectory of fire management in Canadian national parks. As Stewart notes, "Ecological integrity is now to be

considered in all aspects of park management, not just zoning and visitor use. The [National Parks] Act provides a powerful legislative mandate for the maintenance or restoration of fire as a natural process in the national parks" (Stewart, 2005: 18). Such changes gave fire staff and park administrators the authority to return ecological processes by making them legible to federal bureaucracy. Nevertheless, the relatively benign definition of 'ecological integrity' simultaneously fueled and hindered park management as parks were re-understood through an ecological register rather than through the more static preservationist logic of earlier decades. In practice, ecological integrity was taken-up with uneven enthusiasm and oversight across the system. For example, the use of fire on the landscape as one such example of attending to ecological integrity was a particularly difficult concept for the Canadian public to digest, after decades of preservationist education embodied by the likes of Smokey Bear campaigns that had quite clearly erased fire's historical role on countless North American landscapes (Kosek, 2006).

This era of ecological thinking is thus not only characterized by the deployment of an ecological vision of what constitutes fire and 'nature' more broadly, but also by how it produced a complex policy and legislation landscape with which park scientists and bureaucrats were forced to consider.[44] A particular challenge was deploying the idea of disturbance in park ecosystems that were limited in size and scale.[45] Examples of disturbance events park officials may have to make sense of include wildland fire, ice, erosion, 'pests', and predation. Disturbance events like fire challenged earlier conceptions of the so-called climax community, a term for an ecosystem in a mature stage of succession, in ecology but also challenged what a healthy or successful ecosystem looked like (*See* Botkin, 1990; Zimmerer, 2000). Such an approach also encouraged other park staff to not only consider the aesthetic impact of fires, but to see how such 'destructive' events could function to prompt more biodiverse and resilient landscapes

[44] Interviews, 2017
[45] Interviews, 2017, 2018

(ecological concepts that also deserve our attention). Further, park staff had to make sense of how disturbances would play out in the relatively small parcels of land they were tasked with governing, landscapes that were not 'natural' per se but were the function of how the federal government developed the extent and composition of the park system itself.

As such, disturbance events also posed key institutional challenges (Zimmerer, 2000). As a process that continuously returns to landscapes over time, fire management and prescribed burning was always going to be an unfinished project for park managers, posing key funding issues.[46] Rather than funds to support contained ecological initiatives, fire required never-ending attention. Earlier policies that focused on migratory birds and species at risk, which were fairly species-centric, made it difficult to include ecological processes that might put creatures in harm's way.[47] Processes like wildland fire expose some of the contradictions and limits to conservation policy in Canada. Given the preservationist logic of earlier park policies and the species-centric articulation of ecological integrity, which hinged on biodiversity as a key point of departure, fire reintroduction had to be premised on its connection to species that would thrive in its wake. The reintroduction of fire could thus be premised on its connection to vegetation communities, species at risk, and the reintroduction of species. Yet, where fire use found its real success would be through its role in reducing risk of larger more uncontrollable fires, and as such, as a tool to protect local and neighbouring values at risk.[48]

Though fire was identified as a process needed to achieve ecological integrity under the new Canada National Parks Act of 1988, the slow emergence of supporting vegetation management plans and fire management plans suggest that the maintenance of fire risk became one of the primary means through which these early prescribed burns, and fire management more

[46] Interviews, November 2017.
[47] Interviews, 2016, 2017 & 2018
[48] Interviews, 206, 2017 & 2018.

broadly, were articulated. Such an approach conveniently side-steps a notion of fire as productive beyond an economic register, and brackets ecological benefits of burning as a co-benefit to this attempt at reducing risk. This framing also avoids bringing Indigenous knowledge into conversation with fire policy, fire management as a form of risk management may not be compatible with other relational means of knowing fire and landscapes that burn.[49]

Figure 3: Interpretive Panel in Grasslands National Park invites visitors to learn about the relationship between fire and grazing

Furthermore, as one respondent identified, fire management did not only become folded into contemporary approaches to vegetation management but would become one of the most successful projects in addressing ecological integrity.[50] Ecological integrity has allowed park managers to make fire legible as a process within the portfolio of legitimate ecological interventions in the Canadian national park system. In doing so, managers have to balance these

[49] In a sense, this is a key obstacle to contemporary engagement with Indigenous peoples on the topic of fire. One must consider if the diverse manifestations of fire knowledge, which might not pivot on fire as the key component worthy of attention, can proceed in the context of an approach to fire management where actions are premised on nested conceptualizations and practices of risk. If such knowledge systems are to be enacted they would have to make sense of settler articulations of value and property and consider if they are compatible with other ways of knowing and relating to land. Further, such interventions would have to recognize the diversity of Indigenous knowledges in Canada and their unique orientations.
[50] Interview 2016.

attempts to restore ecological integrity with human use but also with the interests of Parks Canada's diverse neighbours. In other words, prescribed burns could be conducted, but within parameters set by the goals of other park mandates. Part of the success of the program, as some respondents commented, can be attributed to the fact that fire management never stopped being about suppression and never ceased being about the protection of various kinds of value. In this way, ecological goals simply reoriented where and how risk was conceptualized, and whose success could often also be made through an economic argument.

Ecological integrity in Canadian national parks was also tethered to the development and maintenance of national natures (Sandilands, 2009, 2013). In contemporary prescribed fire communication strategies and in Parks Canada messaging, fire is actively positioned as a natural process in these nationally representative spaces. Fire ecology signage on park trails, press releases, and guided walks, all attempt to position fire as firmly in-place and part of local park ecosystems. While these educational and communications materials do not make note of the economic nuances of fire management, they do attempt to position fire as part of a *rewilding* of Canadian national park spaces where fire has been absent. Thus, when fire is prescribed, it also becomes enlisted in an attempt to *return* a more natural, and more Canadian, nature. Though contemporary managers may not position their attempts of returning fire as attempts to return to a pre-colonization ecology, it remains something to be mimicked. While beyond the scope of this chapter, ecological integrity, and the projects cited as key steps towards it, are tangled-up with parks as nationalist projects.

Despite this new ecological orientation, human enjoyment, albeit repositioned, remained ingrained in park legislation and policy. Tourism within parks still bolsters management practices aimed at suppressing wildfires and these interests are embedded in actions to return fire to the landscape. Ecological integrity was also a very flexible concept and park staff were left

with only a limited sense of what ecological integrity was and when it was achieved. This isn't to mention an absence of repercussions in cases where it continued to deteriorate (CPAWS, 2016). Though there was variation across field units within the Canadian national park system, this approach premised on a kind ecological thinking authorized new, or transformed, relationships with landscapes that burn. This included the use of fire as a management tool to support the livelihood of certain species, the production of actual science on the topic (though this was not sustained), new relationships with neighbours, and the emergence of ecological thinking as a way of prompting new ways of encountering fire risk and hazard (Chapter 4).

These transitions towards parks as places of ecological and economic value have left the window open for other manifestations of fire management. Though prescribed burn plans and fire management are carried out through this vector of ecological thinking and hazard reduction, new policies and federal commitments have made room for working with Indigenous people with claims (ancestral, legal, and otherwise) to various national parks. Though a policy framework for engaging Indigenous people on fire today is perhaps embodied by a mosaic of local policies and procedures, such actions remain removed from national policy on the parks more generally. This said, those working with fire and preparing plans continue to make reference to the premise of fire being an eco-cultural process even if it is not articulated by management plans and internal policies as such.

Conclusion: Contemporary Challenges, Fire Management from 2005-2019

While this chapter is not a complete history of Canadian national park development (but see Mortimer-Sandilands, 2009; Kopas, 2007; Cambell, 2011), it does offer a glimpse into how the evolution of protected areas in Canada can be read through the development of fire management

strategies. It also offers a story that positions the Parks Canada Agency as a colonial institution that continues to govern how Canadians should relate to landscapes and processes. The story of fire management within Canadian national parks begins with an attempt to 'impose wilderness' in the colonial context of Canada (Neumann, 1998; Cronon, 1996), albeit one that has changed as new ideologies and sciences permeated that definition. Early national parks with their nested origin stories, are all premised on the transformation of Indigenous land into that of the Canadian state. This process of dispossession is not just premised on the establishment of authority over land but the ordering of that land, and the creatures and processes found there as well (Foucault, 2005; Coulthard, 2014; Todd, 2017). While this chapter offers only a cursory overview of this period, I invite the reader to leave with a sense that what matters here is the overarching interruption of Indigenous access and authority. Despite modest moves to encourage partnership with Indigenous communities, this interruption persists as Indigenous fire history and knowledge remains stubbornly obscure in Parks Canada fire planning.

As the park system grew, it continued to be built upon earlier manifestations of colonial dispossession (Sandlos, 2008), the expropriation of land from Canadian settlers (Sandilands, 2011), and an attempt to complete a representative sample of Canada's natural diversity (McNamee, 2010; Mortimer-Sandilands, 2009). This said, today's contemporary manifestations of national parks have been marked by the emergence of so-called National Park Reserves, which acknowledge regions with ongoing treaty negotiations, a series of parks born out of agreements like the Nunavut Land Claims Agreement (1993), and exercises in co-management in places such as Gwaii Haanas National Park Reserve and recently Thaidene Nëné National Park Reserve in the Northwest Territories.[51] These new manifestations of park management have

[51] Co-managed parks were not included in this study. In most cases these parks do not have active fire management programs. This said, future research should consider how fire management and the adoption of Indigenous fire knowledge might unfold in the context of co-managed national parks.

prompted distinct relationships between Parks Canada and local communities with a variety of implications for fire management. In places like Gulf Islands National Park Reserve, which saw its first prescribed burn on Tumbo Island in 2016, the burn saw the engagement of an unprecedented number of stakeholders and rights-holders including several Cowichan First Nations communities. Elsewhere, the wishes of Mi'kmaq community members halted the use of burning in Kejimkujik National Park for fear of their impact on significant birch trees.

The solidification of a suppression approach overwhelmingly dominates the above history. This method is also the case for jurisdictions in much of North America. As Simon (2017) explores in the case of California, North American land management, like many other parts of the world, is designed to facilitate the production and circulation of capital even in regions where these processes hinge on disastrous possibilities. In the context of Canada, where many fire institutions at the provincial level have little agency over land management decisions, the stakes seem even higher as crown land is left unchecked (Lindsay, 2019). It is in this context that the case of Parks Canada is relatively unique. Canadian national parks are one of the few jurisdictions where the authority to manage a landscape and the authority to encounter fire line up, although in practice this work still requires some diplomacy between superintendents and fire management staff. While the above discussion is somewhat critical of the entrance of ecological thinking, and the way it has manifested, it is one of the few instances in North America where landscapes can be understood not just as places where fires happen, but as landscapes that burn. Indeed, new ecological knowledge gives park managers insight into how to manage these landscapes differently, as ecology makes more-than-human processes like fire legible.

Yet, several other issues restrict the possibilities of new encounters with fire and landscapes that burn. First, ecology, rather than challenging earlier management decisions, was absorbed by those earlier projects as ecology became a new register through which old mandates

were articulated. In particular, a focus on protecting values at risk and maintaining public safety remain firmly intact despite the contradictions an expanding tourist infrastructure and visitation rate would pose to the possibilities of improving ecological integrity and reducing fire risk. In Chapter 4, I further discuss how ecology provides a new way of understanding fire risk, and in turn prompts a new generation of suppression efforts. Second, Parks Canada has created a geography of where wildfire processes *may* and *may not* take place. While new ways of knowing and measuring the landscape have allowed suppression activities to continue in some spaces, new management tools allow managers to burn less risky and less valuable regions of their parks. In these spaces, where the park landscapes are positioned as less risky, fire is permitted. In Chapter 5, I discuss how managers navigate and instigate these encounters with landscapes that burn and how this orientation has made space for prescribed burns. A third challenge faced by contemporary managers who have inherited this institutional heritage is that ecological thinking, in its adoption by policy makers, has ironically produced ecologically informed policies that conflict, or at least contradict, one another. In Chapter 6, I discuss how ecology and conservation biology brought about relatively radical policies in order to protect the likes of species at risk, while also making space for ecological processes through different articulations of biodiversity and ecological integrity. While these projects emerged out of an ecological register, this shared heritage has not guaranteed compatibility.

Chapter Four: Is risk management good fire management? Ecology, value and fire risk in Canadian national parks

Abstract

Canadian national park fire management pivots on tools that address risk. Risk is the sum of the probability of an ignition, the potential intensity, and the consequences of wildland fire. In this chapter I show how despite an agency mandate to maintain and promote ecological integrity, many fire management decisions made by park staff pivot on the risk wildland fire poses to values at risk and public safety. Park staff's focus on and interpretation of risk management leads them to act in ways that treat fire as an economic threat to the production and circulation of capital within and beyond Canadian national parks. The entrance of fire management approaches that treat wildland fire as an ecological phenomenon invites new conceptualizations of risk and new mitigation efforts. Fuel, the vegetation that drives the burn across a landscape, has been identified as one component of the apparatus of fire risk that can be manipulated by human beings. The manipulation of fuel coupled with maturing fire management techniques that take stock of ecological temporalities prompt alternative approaches to living-with fire-adapted landscapes. Vegetation, as fuel, and prescribed burning, to reduce fire hazard, are enlisted as means of containing fire and thus protecting the production and circulation of value. In this sense, ecosystems are put to work in an effort to reduce the threat of wildland fire – and mitigate against risks to values. This paper contributes to a growing literature focused on the political economy of wildland fire management, and environmental management more broadly.

Introduction

Is risk management good fire management? Across Canada, fire management is premised on preventing and suppressing wildland fire. This work is about containing a threat: the *potential* for a fire and the potential for it to run *wild*. In the last century important interventions from the ecological sciences have sparked transformative changes to how this threat is understood and how it is addressed, prompting both novel interventions and the maintenance of familiar dead ends. My review of Canadian national park fire management and conservation policy, along with my discussions with park staff, paint a picture of how approaches to this phenomenon evolve and how they are practiced. Today, the national park agency Parks Canada is focused on suppressing wildfire and, when amenable, allowing other fires to burn within contained prescribed burns or agreeable zones.[52] While Canadian national parks are intended to maintain and promote so-called 'ecological integrity', when it comes to the ecologically significant disturbance process of fire there are clear limits to how this process is authorized to unfold.

In practice, fire suppression in Canadian national parks is about maintaining public safety, allowing the tourist season to continue, making space for some fires to burn, and being a good neighbour. But put another way, fire management is about containing the risk wildland fire poses to the above concerns; promoting ecological integrity is only one piece of this larger discussion that orbits economic concerns in and outside of the park. In Chapter 3, I recounted the trajectory of fire management practices within Canadian national parks over the last century. I discussed how fire has been imagined and reimagined through changing articulations of nature and of value. Parks as nation-building projects were part of this process and such orientations live-on in

[52] Parks Canada fire management identify up to three fire management zones. The Intensive Fire Management Zone describes a zone where full response initial attack is carried out, prescribed burns may be used in these zones for risk reduction. The Intermediate Fire Zone, where a modified response may be used. Depending on the park and location of fire. The fire may be managed to achieve specific ecological or hazard reduction objectives. The Extensive Fire Management Zone describes a zone where minimal intervention will take place on the part of fire management staff. Prescribed fire in these regions is primarily used to achieve ecological objectives.

contemporary approaches to secure the 'ecological integrity' of these nationally significant protected areas. Despite this focus on parks as ecological settings, I explained that fire management hinges on the protection of so-called 'values at risk' and human safety and is articulated via the application of a fire suppression policy and concurrent tactics. I also considered how emerging scientific registers for understanding the role of wildland fire on the landscape altered institutional policy and approaches to fire and vegetation management. I examined the significance of ecological thinking and a mandate to encourage and maintain 'ecological integrity', a mandate with significant implications for Canadian national park fire management, one that made fire legible to park managers as more than just a threat.

In this chapter I show how despite a mandate to maintain and promote ecological thinking, many fire management decisions made by park staff pivot on risk. Park staff's focus on and interpretation of risk management leads them to act in ways that treat fire as an economic threat to the production and circulation of capital. Rather than position this mode of fire management in opposition to ecological thinking, I contend that ecological thinking has been absorbed by a mode of encounter that is primarily focused on containing this ecological process and maintaining a kind of *economic* integrity. Furthermore, instead of challenging the full suppression approach taken by Parks Canada, fire, ecological knowledge, and ecosystems themselves have been put to work in maintaining not only ecological integrity but also the safety and – most profoundly – the economic potential of Canadian national parks and their neighbours by prioritizing risk management. This orientation suggests that, at times, ecological integrity is sacrificed in favour of maintaining economic potential, and that the potential for fires in the future may be ignored in favour of decisions that favour agreeable fire-relations in the present.

This chapter is inspired by the growing interest in using ecologically informed approaches to fire management and the use of prescribed burning as a mitigation tool that reflects the goals

of this new orientation. It contributes to a critical discussion of a form of land management that is witnessing an increase in popularity as land managers across North America (and beyond) come to terms with the limits of a full suppression approach, reckon with local fire regimes, and are challenged by the changing conditions set into motion by global environmental change (Jensen & McPherson, 2008). Many scholars note that fire management benefits from an attention to the social context of such challenges and invite others to take stock of the diverse forms of pyro-heritage found around the world (Pyne, 1997; Kull, 2002; Head et al., 2014). Thus, this chapter contributes to a growing body of work centred on the social world of fire by focusing on such themes as fire knowledge (Verran, 2002; Kull, 2004), fire management (Pyne, 2011; Neale, 2016), the political-economic dimensions of fire management (Roberts, 2013; Simon, 2017) and critical discussions of fire risk in particular (Neale & Weir, 2015). Further, through its focus on fire as an ecological process involving multiple beings, it contributes to an emerging literature that attempts to document and discuss encounters between humans and vegetation (Head et al., 2014; Robbins 2012; Franklin, 2006).

I begin the chapter by reviewing key theoretical contributions to the question of risk with a focus on scholars who have an empirical focus on wildland fire. After a brief review of the methods that contribute to the chapter's empirics, I explore how fire risk has manifested in the policy, management style, and tools of Canada's national park agency. I argue that there is a transition from the historical interest in fire as a conflagration, a contained event posing a threat, to a preoccupation with fire as an expression of ecosystem disturbance in wider temporal frames. I show how the move towards maintaining ecological integrity does not instigate a new approach to fire management goals per se, but that ecology has been absorbed as a new medium through which fire suppression is achieved. I argue that ecological thinking is a means of putting vegetation and fire to work. Fire management, I argue, remains a quest to contain wildland fire,

to contain risk. This said, I propose that this move has also made fire and its role on the landscape legible to a wider public and should be considered a particularly fruitful point of departure for those considering new means of living-with fire, one which takes the more-than-human potential of wildland fire and those that burn seriously.

Risk and Nature

Scholars in political ecology have considered the many ways in which 'nature', and environmental crises in particular, are coproduced (Whatmore, 2002; Braun, 2002). Such an approach considers how the concept of nature, but also the more-than-human assemblages to which this word often applies, emerges because of the ongoing interaction between forces traditionally confined to a nature-culture binary. These scholars have paid particular attention to the political-economic context in which environmental crises arise (Blaikie & Brookfield, 1987; Brockington et al., 2008) and are critical of how environmental knowledge is deployed to address or 'fix' an environmental issue (Forsyth, 2004, Castree 2008a; 2008b). For example, Prudham (2012) describes how the ecological sciences are put to work in order to maximize the yield of forests in Oregon. In describing the capitalist modes of management in forestry, and their impacts on old-growth forests in particular, Prudham paints a vivid picture of how ecological thinking can lock into capitalist expansion. Ecological knowledge is used to simultaneously identify the limits of earlier practices while further deepening the grip of a contemporary system (*See* Klein & Peet, 2008).

Political ecology has been keen to discuss not just how capitalism has reordered environments but how particularly neoliberal policies and agendas have created a set of distinct challenges and assumptions around how 'nature' should be accounted for (McCarthy & Prudham, 2004). Büscher et al. suggest we frame neoliberal conservation as,

> […] inherent to broader capitalist processes, and as a particular set of governmentalities that seeks to extend and police profitable commodification processes based on artificial and arbitrary separations of human society from biodiverse-rich (non-human) natures. (2012:23)

In the literature on conservation and protected areas, scholars have argued that the emergence of neoliberal logics have forced ecosystems to prove their worth, prompting countless attempts to 'enterprise nature' (Castree, 2007; Heynen & Robbins, 2007; Dempsey, 2016). In Canadian national parks, where protected areas have arguably always been about facilitating capitalist expansion (Bella, 1987), the idea that parks must pay for themselves is not novel but is certainly being reformulated (Youdelis, 2018, 2019). In fact, some have referred to protected areas as a 'triple win' as they are enlisted into neoliberal and biopolitical projects to promote biodiversity, mitigate climate change, and enable economic growth (Biermann & Anderson, 2017; Cavanagh & Benjaminsen, 2014).

This desire to put nature to work has changed as our conceptualization of what constitutes nature has changed. Rather than raw resources or a sublime backdrop to elite rail tourism (Bella 1987), these more-than-human assemblages are being re-conceptualized as ecosystems, species, and ecological processes. If nature in the context of these new categories can prove its worth, become a site of investment or be monetized, it becomes legible to capitalism (Moore, 2015). With fire management, nature is enlisted to guarantee that the circulation of capital is not interrupted, even when it has the potential to do otherwise. As Dempsey notes in the world of global biodiversity politics, it is becoming abundantly clear that "…for diverse nonhumans to persist, biodiversity conservation must become an economically rational policy trajectory, sometimes even profitable." (Dempsey, 2016: 3). From this perspective, nature must not only be valuable but productive.

While some forms of conservation have stalled, unable to prove their worth, in the wake of neoliberalism's extension into the conservation arena, Brockington et al. (2010) suggest it might be fruitful to look at those "conservation strategies that are untouched by neoliberalism" (Brockington et al., 2010: 480). Though fire management in Canadian national parks is not untouched, in the sense that it has gone through the same series of cuts experienced by the rest of Parks Canada following Harper-era reform, it continues to have access to staff and resources that other sections do not enjoy, such as their access to emergency funds to address ongoing wildfire events that are a major threat to public safety. This is because fire management fulfills a set of functions that other park responsibilities do not, namely the maintenance of a productive park landscape. As a bureau nested within the national park bureaucracy, fire management ensures fire does not interrupt tourism within park borders, and the interests of neighbouring stakeholders.

With its roots tied to the emergence of Canada's first national railways and parks, fire management is perhaps one of the oldest 'operational' components of the park system, and one that has been reformulated as new ecological understandings of fire and landscapes that burn are enacted. As I've discussed elsewhere, fire management in Canadian national parks has been preoccupied with containing the negative, mostly economic, implications of wildland fire. While historical responses pivoted on extinguishing the threat to industries like rail, tourism, and lumber (Bella 1987), contemporary fire management has become preoccupied with limiting negative impacts on tourism and industries beyond park borders, using fire to reduce the threat of fire in new temporal packages.

As a form of land management that emerges to contain the threat that fire poses to the production and circulation of capital, I argue that fire management is preoccupied with addressing risk rather than 'fire' per se. As Ulrich Beck suggests in his influential text *Risk Society,* "In advanced modernity the social production of wealth is systematically accompanied

by the social production of risks." (Beck 1992:19). Risk, in other words, cannot be understood as a threat brought about by mechanisms inherent to ecological processes, but are rather the product of both what is seen to be at risk and the threats that manifest as a result of ongoing attempts to bracket such vulnerabilities. Whether a by-product of a century of fire suppression, resource extraction, planning decisions, imposed wilderness, or global environmental change, "Risk may be defined as a systematic way of dealing with hazards and insecurities induced and introduced by modernization itself" (Beck, 1992:21). Much of the last century of fire management has not been focused on understanding the process of wildland fire itself, but on how it can be contained so that a form of land management that brackets reoccurring wildland fire events may continue. In a landscape where wildland fire events remain relatively unexpected, parks and surrounding land can be managed as though economic activities, including tourism, may proceed without interruption. Yet, as charismatic wildland fire events in the last decade have shown, our refusal to acknowledge wildland fire as a process in-place, a process that is 'natural', historically present and *of* the landscape, comes with a series of vulnerabilities of our own making.

Hazards such as wildland fire push the neoliberal natures literature in new directions. In the spaces where political-economic rationale and wildland fire ecology collide, what Simon (2017) terms the "Incendiary," the contradictions of contemporary management, which simultaneously bracket fire's ability to erupt on flammable landscapes while promoting riskier practices, are exposed in sometimes deadly events.[53] Despite these contradictions, the public come to see fire and disaster as inherently related, or synonymous, rather than coaxed into destructive relation through political-economic practices. As Simon proposes, a major challenge is that "Contemporary management and scientific discourses on fire depoliticize the Incendiary

[53] Simon notes how land-use planning and support for a wood shingle industry run contrary to what is known about how best to build communities in fire-adapted landscapes. In Canadian national parks, fire suppression and limits on the use of prescribed burns are key to maintaining an uninterrupted tourism sector and extraction sector beyond park borders. Yet, these policy stances can run contrary to long-term vulnerabilities.

and the political economic root causes of fire disasters." (Simon, 2017:20). In contemporary forest and park policy, fire remains exceptional and illegitimate in relation to private property and the contemporary economic system. Simon, like others (Roberts, 2013), argues that fire management is not apolitical but constructed of a group of systems where our "...vulnerability is shown to exist as both a process and a condition" (Simon, 2017: 21). Other political ecologists who have considered risk and vulnerability of floods, fires, and hurricanes, echo this sentiment, often arguing for an attention not just to the material conditions of those that are vulnerable but to the systematic constitution of such vulnerabilities in the name of economic success for others (Pelling 1999; Park & Miller, 2006; Huber et al., 2017; Collins, 2008, 2010). Like other natural hazards, how fire is understood, how it is contained, and why it is contained has a direct impact on our current and future relationships with this volatile process over which we have only limited control.

Given this contradiction of fire management practice, it is no surprise that risk and vulnerability have received a great deal of attention in the 'social fire' literature (See Neale & Weir, 2015; Neale, 2016a, 2016b; Sherry et al., 2019). Some have noted how these vulnerabilities are embodied (Sword-Daniels, 2018) and how they are entangled with gender (Eriksen, et al., 2017; Eriksen, 2013), race (Davies et al., 2018), and class (Collins, 2008). As is becoming abundantly clear in the twenty-first century, natural disasters often highlight system-wide inadequacies baked into our way of encountering events often rendered as forces of "nature." Attempts to address these vulnerabilities are often carried out through various attempts to mitigate their consequences, rather than reconstitute the land management policies, practices, and systems that produce such outcomes.

Risk mitigation, in theory, attempts to limit or at least address such socially instigated vulnerabilities. Citing geographer John Handmer's analyses of flood risk, Neale and Weir invite us to

> think of both wildfire and flood risk mitigation as an intermediary stage between 'risk creation' and 'residual risk'. Risk creation names those processes, such as urban planning, through which populations, values and assets are placed in relation to a natural hazard.[…] Subsequently, risk mitigation involves those processes through which government-mandated agencies and individuals attempt to limit given vulnerabilities to that hazard. (Neale & Weir, 2015:257).

"Mitigation does not redraw the state of affairs, rather it attempts to work within the given parameters and remains entangled in institutional norms and goals. As those who work with fire know well, some alternatives may not be politically (and economically) viable, leaving practitioners with little choice in how to deploy such mitigation efforts. Rather than mitigate all risks, practitioners are forced to distribute the remaining vulnerability to others (including ecosystems) or bear it themselves. What is left is the "residual risk," whereby "[the] remaining vulnerability is distributed to, and knowingly and unknowingly borne by, emergency management, private agencies and individuals, insurance companies and others" (Neale & Weir, 2015:257).

In the context of Parks Canada, and Canada more broadly, fire managers are simultaneously attending to the risk posed by the possibility of fire and its presence on the landscape, while also making use of various efforts to reduce risk *on* the landscape. They achieve this through the use of prescribed burns, thinning, and sometimes, leading active fires into less valuable areas of the park. It is in this sense that vegetation and ecosystems at large are enlisted

as a means of addressing and/or bearing that risk that a fire and its possibilities pose. Risk, as Beck (1992) suggests, does not disappear but is relocated, downloaded to the other.

While it may be possible to identify vulnerabilities, risk is also contingent on making sense of, or accounting for, the unknown. Neale (2016: 2027), in considering the mitigation efforts in southwest Victoria, Australia, reflects on how risk management is also embodied by attempts to calculate and control for uncertainties, what he terms an 'anticipatory regime' of fire management. For Neale, this 'anticipatory regime' is best practiced with an attention to different temporalities, when past, presents and futures are folded into one another and made legible to those working with fire and risk more generally. Neale explains:

> "not only is wildfire similarly approached through the folding of aleatory futures into the present but it also gives rise to parallel questions of the politics of decision-making, valuing and devaluing, and governmentality encoded within its anticipatory management (Adams et al., 2009: 248– 250; Anderson, 2010: 794)" (2016: 2027).

How risk management is practiced has ongoing implications for humans and more-than-humans alike because the material changes fires produce (or don't in instances of suppression) have lasting impacts on how a landscape is materially and ecologically composed. Burns are a happening, a dance between beings drawn into the (de)composition of vegetation as it burns (Neale, 2016; Sutherland, 2018; Sutherland, 2019; Chapter 3). Any kind of anticipatory management is challenged by our contemporary moment that finds it difficult to move beyond the needs and desires of *present* economic relationships. That this is also an era punctuated by landscape change and global climate change, challenges our conceptualizations of risk and time further.

While it is unlikely that these fire management tools could (or should) be abandoned in their entirety, there is a question of whether risk should be the primary means through which we

encounter ‘fire’ and landscapes that burn. The success and failures of these tools are continuously built-into landscapes as a result of fire’s presence and absence and could potentially make matters worse if fires were absolutely extinguished. How an anticipatory regime and it's accompanying mitigation efforts are crafted has implications at time scales that extend beyond annual budgets, careers, and lifetimes. Fire, with its local and ecologically specific cycle, is not contingent on human, let alone institutional, timelines, but our conceptualizations of risk are. If our encounters with fire are filtered through such narrow conceptualizations of risk, not to mention solely capitalist articulations of risk and time, there is a danger of actively ignoring the disastrous consequences such mechanisms might spur. In this chapter this means asking hard questions around who and what is really being protected by this approach to risk and fire and how these concepts could be imagined otherwise.

Methods

I base this chapter on an institutional analysis of Canada’s national park fire management program with a focus on the suppression and mitigation strategies used by Parks Canada. This research answers ongoing calls for interdisciplinary, social, and qualitative studies of wildland fire management (Machlis et al., 2002; Coughlan & Petty, 2012; Christianson, 2015) and particular calls to study wildland fire practitioners (Neale, 2018). This research project took place from 2016 to 2018, with visits to 16 Canadian national parks. It is complemented by meetings with fire practitioners and natural resource managers in neighbouring jurisdictions, with a particular focus on those adjacent Waterton Lakes National Park. During preliminary fieldwork in 2016, respondents identified fire risk and new articulations of fire hazard presented in updated fire management plans as key topics worthy of further analysis.

In 2016, I was granted a research permit from Parks Canada to access park staff. This permit included a list of primary contacts in each field unit. I expanded this group of contacts on-site, via email, and through recommendations from respondents and other park staff. Interviews focused on the policy and practice of fire management and species conservation in Canadian national parks. Our discussions on fire risk, fire management across institutional and international borders, and ongoing suppression efforts are especially relevant to this chapter. Interviews lasted between one and two hours, and, with few exceptions, were conducted in-person and on-site.

These interviews complemented the analysis of 30 prescribed burn plans and accompanying environmental assessments, from six national parks in Alberta and British Columbia: Banff National Park, Glacier National Park, Kootenay National Park, Revelstoke National Park, Waterton Lakes National Park, and Yoho National Park. I supplemented this analysis with a review of fire management plans, park management plans, vegetation management plans, and species recovery strategies (which I explore in greater detail in Chapter 6). While most documents like park management plans are publicly available, I accessed the prescribed burn plans through an access to information request. Prescribed burn plans and their accompanying environmental assessments depict several fire risk planning tools at work.

Fire and Values at Risk

The goal of excluding combustion from park landscapes comes out of an ongoing history of securing access to resources, maintaining public safety, and a set of policies unable to reconcile new knowledge with institutional practices that contradict new ecologically informed arguments in favour of burning. According to critics in political ecology, the maintenance of value is at the crux of fire management in the United States (Kull, 2002; Roberts, 2013; Simon, 2017) and a

key tension to any intervention to imagine fire otherwise. We could say the same for most Canadian fire institutions who, like Parks Canada, remain fire suppression organizations, as they have for over a century (Pyne, 2011; *See* Sherry et al., 2019 for a discussion of Alberta).

While early park wardens put out fires along rail corridors and work camps using early pumps, wagons, and horses, contemporary fire managers and ecologists suppress fires with a suite of computer models, aircraft, hand tools, and since the 1980s (in Canada) have also used fire itself to prevent larger wildland fire events. Though fire suppression has remained a goal over the last century, the means with which they achieve this goal has not been static. Rather, fire management in parks has been entangled with wider park policy and local political and economic concerns. Although the focus and success of suppression has altered through time, the risk fire has posed to Canada and the park's economic success has remained at the centre of this volatile work, even when public safety is positioned as the primary concern.

As other scholars have discussed, ongoing fire suppression efforts across the board remain premised on protecting, if not maximizing, the productivity of so-called values at risk, especially in the growing wildland-urban interface in Western North America (Roberts, 2013; Simon, 2017; Pyne, 2011). The defining features of ‘values at risk’ are diverse; this is a category that is produced and practiced by managing institutions and their partners, encompassing a set of values that reflect institutional goals and concerns. Values can include forests, public infrastructure, buildings, and tourist sites. They have traditionally been composed as a category of assets. How values at risk are articulated is also institutionally specific, as one respondent describes, there are important differences between Parks Canada and its provincial counterparts who might attribute solely economic value to trees:

> The biggest difference between provincial fire programs and Parks Canada is we look at trees as just trees. And unfortunately, or fortunately, depending on who you ask, every tree

> in the province, especially in the working forest, is seen as a source of economy, so that's the biggest difference. That's why they have to put fires out all the time. That's why Alberta has sort of doubled up on everything. […] But that's the great luxury we have in national parks, it's that the trees are just trees.[54]

In recent decades, sites of ecological significance and heritage sites have also become legible as forms of values at risk. In the context of Canadian national parks an increase in public and private infrastructure (Youdelis, 2018), growing town sites in and around national parks, and the legislation of critical habitat for species at risk (Chapter 6), values at risk and the challenges of fire suppression and mitigation have only multiplied as park facilities expand and species at risk efforts are enacted (Chapter 6), making the work of fire management more complex.

Further, as discussions with respondents from Parks Canada echo, the concern for values at risk go beyond one's own institutional border. In Waterton Lakes National Park, which is in Alberta but also borders British Columbia and Montana, fire management staff must consider the values at risk that lie just beyond park borders and beyond the federal government's jurisdiction. In doing so, park managers take into account the values at risk of a neighbouring reserve (The Blood Tribe or Kainai Nation), ranch land in Alberta and Montana, a British Columbia provincial park, Glacier National Park (USA), not to mention the many businesses operating on leased land within park borders. For those working with fire, the stakes are specific to each park and can have wide-reaching implications:

> This town—if Jasper Park Lodge burnt down, it's a billion dollars. Maybe that's a little dramatic, but it's 750 million dollars to replace that. Fire's a— it's so good and so bad. It's the perfect yin and yang. And a fire, whether it's in Banff, Bow Valley, or the Athabasca Valley, and we have a fire that shuts down the transportation corridors, [that's] trains and

[54] Interview, June, 2016

> [..] thousands of trucks. The economy of Canada flows through Jasper, so yeah, it's pretty major stuff.[55]

Though fire managers may only be responsible for fires within their jurisdiction, their concern for fire extends beyond these borders. With fire suppression and fire-use (Chapter 5) fire managers must navigate both a mosaic of jurisdiction, and a geography of values at risk. This has implications for suppression efforts and mitigation efforts, particularly when it comes to prescribed burn planning where such burns can be perceived by neighbours as a threat. These relationships have implications for which fires might receive greater attention and resources, where prescribed burns can and cannot take place, but also where fire can protect common values at risk.[56]

The concerns and the actions taken to protect values at risk in both suppression and risk mitigation settings make processes of capital's circulation and production legible. Fire management is about containing any interruption of these processes and/or ending it as quickly as possible. As I discuss later, values at risk contribute to the articulation of geographies where fire is in and out-of-place, regardless of an institutional mandate to ensure ecological integrity. Tourist seasons, or the concerns of a firm with lumber rights to land neighbouring a national park, may challenge the use of fire on the landscape as a mitigation strategy or may invite a more robust response from neighbouring fire agencies. Conversely, the risk of a wildland fire with the potential to escape containment within park borders may stir partnership. As several prescribed

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[55] Interview, 2016.

[56] These parameters are listed in a fire management plan specific to each park. Such plans position how specific parks fit into the national fire policy, how they fits into wider legislation, make note of a park's regional socio-economic context, the geographic context (including climate, biophysical description, and a description of the local fire regime), how fire can and cannot be used within a park (or wider field unit), describe the various values at risk , prescribed burn implementation priorities, fire management zoning, prevention and detection, resources, and external relations messaging and practices. Prescribed burns, planned and calculated attempts to put fire back on the landscape, put the goals of a fire management plan into practice.
Fire management plans are creatures of the superior park management plan. These describe a wider set of priorities and practices.

burn plans illustrate, the identification of a common threat can sometimes prompt cooperation in attempts to carry out mitigation efforts such as mechanical clearing of trees and the execution of prescribed burns. Ironically, the very process that risk thinking attempts to bracket, combustion, is becoming repositioned to address it.

Background: Knowing Fuel, Knowing Hazard

Knowing what is at risk is only half the work. The work of fire management is also embodied by how practitioners come to understand what puts things at risk. New knowledge regarding fire behaviour, fire ecology, climate, and weather has expanded the set of variables that can be included in articulations and projections of fire risk. For example, in the fire management plan for Grasslands National Park in southern Saskatchewan, a formula is offered to communicate how risk is calculated:

Risk = Potential Intensity + Ignition Probability + Consequence

How we understand this equation and the variables therein has an impact on our response. In the case of describing specific fire management units, parcels of the park that could burn, this simple calculation is actualized using a matrix scoring system that conveys the complexity of fire risk. Risk factors in this matrix include: the fuel load complex, escape potential, adjacent fuel complex, visitor use, park management use, park values at risk, neighbouring values at risk, fire spread potential and fire response limitations. Managers apply these scores to each of these factors, the higher the score, the higher the risk. These scores paint a picture of fire risk in specific locales outside of specific "wildfire" events that might use a set of other risk assessment tools.

Much of this scoring hinges on the vegetation present in a given unit. Here, vegetation, ecosystems, and more-than-human relationships of all kinds are rendered as fuel, a mobile and

relatively static definition. While some fuels may allow for fire to move quite quickly across a landscape (for example, 0-1 Grass), others may be nearly impenetrable to fire in most climatic and seasonal contexts (for example, M2— Boreal Mixedwood-Green). The amount of fuel (the fuel load), along with other environmental factors that impact possibility for spread (how cured vegetation might be, slope, etc.), are also concerns. A solid understanding of the patchwork of fuels in a given park or unit allows fire managers to make sense of how a wildland fire event will unfold and may allow managers to use different fuel types to contain a burn or lead it in a new direction away from values at risk. In this 'fuel' form, plants, living and dead, become legible to calculative devices through their potential to inflict and avoid consequence. As such, the way in which fire managers understand fuel has implication for how models relevant to fire management assess and react to increasing fire risk. Indeed, this categorization allows for quick decisions in high stakes situations and allows fire managers to adapt to relatively diverse ecological settings.

While the research that contributed to the description of fuel types and their articulation in models are not concerned with specifically ecological questions, their role in formulating ecological goals is paramount. As more than one respondent from Parks Canada explained to me, fuel is one of the few components of fire risk, danger, and hazard that is malleable, or where human hands can intervene (Neale echoes this in the Australian context, 2016:2029). Through the creation of firebreaks, prescribed burns, and mechanical manipulation, fuel loads and fuels can be altered, and the risk reduced. It is in this context that those things that burn, vegetation, are understood within risk calculations and management as 'fuels' rather than components of a wider system. As Neale explains:

> "Across these national contexts, as in other fire-prone countries (see Agee and Skinner, 2005), government attempts to reduce impacts have focused upon controlling confluences

> of ignitions and fuels, and rendering emplaced objects – human and nonhuman alike – more resilient to wildfire events" (Neale, 2016: 2029).

Vegetation, as fuel, is enlisted as a means of both knowing and actively reducing wildland fire risk, but at what cost? If we only know vegetation and things that burn through the risks they pose to values at risk, we risk managing only for a nested understanding of where and when risk exists and narrow conceptualizations of what is valuable.

In recent decades Parks Canada has attempted to tease out this point of tension between conceptualizations of risk focused on the present and the near-future, and those that attempt to make sense of the long-term risk on the landscape: the fire *hazard*. While many organizations fixate on fire danger, park planning has attempted to steer fire managers towards the management of fire hazard. A respondent explains the difference between these two terms:

> The biggest evolution that we have here has nothing to do with the program. It has to do with what's going on with the environment, with global climate change and the fact that we've been so good at suppressing fire for the last 100 or so years, [and] we now have a really major mountain pine beetle issue. And besides the beetle itself, what's left in the aftermath? The change in the fire hazard. When you go to Alberta, they use the term fire hazard to talk about fire danger, which I constantly remind them [is] not the proper terminology, but they've been using it for years. But fire hazard [by] definition, […] is the amount of fuel available to burn. So, you change the fire hazard only when you cut down trees; you burn trees, or trees grow from the forest or the fuel. Fire danger is what changes every day. Yesterday we were in high fire danger. Today, with this weather, we're in low fire danger. So that's what changes with the fuel moisture and weather.

Addressing fire hazard, which the matrix above hints at, treats landscapes as living and cyclical ecosystems. Although risk thinking cannot make ecological functions or more-than-human interests legible, this ecologically inspired appreciation for the temporal rhythm of wildland fire on the landscape is an important site of friction because it shows that the picture is a bit more

complicated. Today, attempts to manipulate and alter the fuels of a given landscape are narrated by a conceptualization of fire hazard *in addition* to fire risk or danger. As such, fire is reformulated as a process that *will* happen on the landscape and will do so again and again.

From Risk Thinking to Ecological Thinking

In the 1980s, the adoption of a more ecologically informed approach to national park management altered fire policy and practice within the Canadian parks. A number of internal working papers and policies were developed to reflect this new focus. As such, fire was repositioned not just as a natural disaster in Canadian national parks, but a form of ecological disturbance naturally occurring within many ecosystems across the park system (see Chapter 3). With the move towards a new mandate to maintain 'ecological integrity' in the 1988 National Parks Act (which was later strengthened in 2000) disturbance events like fire became institutionally legible and 'encounter-able' (Chapter 5). The recognition of fire as an ecological process triggered the development of fire histories across the national park system and fire management plans for parks where fire had not been a primary concern. This recognition also forced an alternative to full suppression within the national system.

Rather than a phenomenon giving way to waste, unruly fire events could now be understood as an ecological process with implications for many more-than-humans on the landscape. Though fire breaks had been built long before the entrance of ecological thinking within the national park system, and produced by various means, emerging ecological thinking allowed the maintenance of such fire breaks to also be experiments in understanding *ecological* responses to fire. In this way, vegetation gained a more prominent role in how fire managers understood their work with fire, not just as fuel to contain, but as a more dynamic entity worthy of ongoing attention and partnership. Today, for example, some parks have prepared fire and

vegetation management plans as concurrent plans, reflecting the entanglement of these two systems within the context of 'fire-adapted landscapes.' Elsewhere, fire has been used as a means of maintaining the health of cultural landscapes, as with the Fortress of Louisburg, where fire has been used to limit the negative impacts of plant life on sub-surface artifacts.

Despite the late arrival of ecological integrity as a mandate, national park staff were already discussing fire in these terms prior to the late 1980s. In Banff, as I discuss elsewhere (Chapter 3), a detailed interrogation of the park's fire history was intimately entangled with attempts to provoke an alternative approach to fire management throughout the entire park system. Much of this hinged on tracing the park's fire regime, which Natural Resources Canada defines as "… the patterns of fire seasonality, frequency, size, spatial continuity, intensity, type and severity in a particular area or ecosystem" (Natural Resources Canada, 2019). The tracing and analysis of fire regimes provoked important discussions not only on the historical presence of fire within national park jurisdictions but also instigated a reflection on the effects of fire suppression. These exercises in knowing fire force higher-level park managers to recognize a temporality beyond the fire season and beyond annual budgets. These histories taught managers and the Canadian public alike, that fire was firmly in-place within (most) Canadian national park ecosystems, rather than sudden and unexpected events. At their most radical, as was the case with White's fire history of Banff (1985), these histories attributed contemporary challenges to earlier management failures, namely: full suppression and the interruption of cultural burning practices. These new fire management plans, fire histories, and the emerging ecological research in parks repositioned fire as an event to be expected rather than one to be surprised by.

The adoption of a goal to return 50% of a park's long-term fire cycle is one key illustration of this new understanding of fire. Such a target speaks to the interval at which fire should return as a presence on the landscape in a way that is specific to each park. This measure is sensitive to

both the unending work of fire on the landscape and the way burning is embedded within local ecological communities. Unlike other indices, such as the Fine Fuel Moisture Codes, Duff Moisture Codes, and Drought Code[57] which focus on current conditions (temperature, relative humidity, wind, rain, etc.), fire hazard endeavors to understand the sum of present conditions. In this way, fire hazard is a means of understanding risk outside of the fire season, giving fire managers like those at Parks Canada the tools they need to argue for increased fire-use as a means of building a more 'anticipatory regime' that is attuned to both ecological and hazard reduction goals (Neale, 2016). Unlike fire danger, which has its use in the context of imminent events, fire hazard attempts to consider the potential for fire on the landscape beyond specific wildland fire events. Although the goal would be limited to 20% a few years later, many fire management staff still refer to the original percentage as an ideal and it is often cited in contemporary fire management plans despite a national commitment to the lesser of the two figures.

Despite this reduction, the return of a fraction of the long-term fire cycle and the identification of fire hazard are a means of accounting for the potential for fire through a set of new temporal packages. In the context of Parks Canada, these anticipatory tools are enacted through the production of maps and planning documents that marry an ecological sense of a landscape with risk management strategies and responses. Generally speaking, managers overlay values at risk and fire hazard to articulate a hierarchy of fire management zones. As I discuss elsewhere (Chapter 5, Sutherland, 2019), these zones create the spaces for the possibility of different encounters with fire. These encounters include the use of prescribed burns to address fire hazard and in the context of a few parks, zones where wildland fires are authorized to roam free, albeit within certain parameters. But these zones also create spaces where fire is absolutely

[57] These are some the components of the Canadian Forest Fire Weather Index System.

excluded. While such planning invites alternatives to full suppression, any attempt to reduce fire hazard unfolds within strict containers, whereby fire-use projects must navigate the protection of values at risk, the interests of neighbours, species at risk, and tourist seasons (Chapter 5).

More recently, ecological knowledge has been put to work in order to understand 'new' fuels. In Canada, the Canadian Forest Fire Behaviour Prediction System, along with a set of other modelling tools, are used to understand how fuels behave under changing conditions. Most of the fuels described in this system are those relevant to Canada's timber industry. The history of this system's development is nested within Canada's resource extraction sector and its accompanying bureaucracy. Thus, landscapes that were rendered productive are the most well-known to science and management in Canada. Contemporary fire managers must still account for ecosystems that did not fit into this profile, a task of particular importance to national park staff who work in ecological settings chosen specifically for their novel (though representative) characteristics. In Cape Breton Highlands National Park, for example, the provincial government of Nova Scotia partnered with Parks Canada to understand fire behaviour in the park's shrubby highlands. The fire dynamics of this shrubby highland vegetation is not well understood and in the context of climate change, where summers may become dryer and warmer, the likelihood of fires in these environments may increase. As one respondent explained, these experiments will be of interest not just to Canadian partners but to those outside of North America including such countries as Ireland and the United Kingdom who share similar fuel types.

Figure 4: Staff at Cape Breton Highlands National Park record the number of species returning to a former prescribed burn site.

Ecology, as a means of knowing park landscapes and fire, is being put to work in order to, simultaneously, complement and identify the limits of contemporary practices. Despite this new 'ecological' approach, fire remains positioned as a threat to be contained. Assessing the fire hazard of different units and landscapes is part of this work, but in extending its field of view beyond the imminent fire season, this particular tool of making hazard legible allows for new tactics. As I discussed, the identification of fire as a common hazard has invited partnership at various scales and invites a thoughtful discussion on the sustainability of current practices in parks and beyond. A common ecology embodied both by a continuum of fuels and the possibility of wildland fire encourages, if not demands, coordination; a realization that has implications for institutions who do not share an understanding of fire as a process *in-place*. In some instances, this has been embodied by the use of prescribed burns to remedy the impacts of fire suppression and fire's absence along shared borders. In other instances, it has seen neighbouring jurisdictions make use of ignition and prescribed burning specialists from Parks Canada, putting their

knowledge and methods to work in landscapes governed by very different conceptualizations of what constitutes nature and value.

Fire Management in Neoliberal Times, Putting Vegetation to Work

Parks Canada's fire management program is positioned as a relative success within Canada and within the organization itself. Indeed, Parks Canada has created relatively novel management practices that position landscapes as ecological settings where fire is 'natural' (if not always welcome). Accepting wildland fire as an ecological process was key in the development and use of prescribed burning practices as a means of addressing both risk reduction and ecological integrity goals. This focus on ecological integrity is also a characteristic that sets Parks Canada apart from some of their provincial counterparts in natural resource management. This said, Parks Canada has been criticized for its inability to address other ecological concerns, calling into question the health of the agency's ecological mandate. Concerns raised by critics include the decline in woodland caribou populations, the impact of oil sands development on Wood Buffalo National Park, the expanding footprint of tourism, and the lack of support for ecological monitoring (CPAWS, 2016). Unlike these other efforts, fire management is not necessarily configured as an ecological project when compared to other projects carried out in park borders, such as bison reintroduction or invasive species monitoring. What differentiates fire management from these other conservation programs is a direct link to attempts to secure public safety and protect values at risk. In other words, fire management's success as an element of national park conservation is intimately tied to its ability to contain and reduce threats to the park's *economic* integrity.

As Brockington et al. suggest, it is helpful to pay attention to conservation programs that remain, or even thrive, in the wake of neoliberalism (2010). Following several decades of attacks

on Parks Canada's funding, the fire program stands in contrast to other ongoing and discontinued projects. We can attribute the success of the program to three key characteristics. First, ecological thinking has allowed practitioners to see risk in more robust temporal packages. Second, ecosystems and their naturally occurring processes (such as wildland fire, carbon dioxide capture, etc.) can be put to work in addressing risk in ways that other ecological projects cannot. And finally, fire management can be shown to be a good 'return on investment' when compared with other projects.

Ecology has taught fire managers to see risk in new places and in new temporal packages, by which I mean the new material-temporal timelines through which park managers can articulate risks posed not by fire but by fire-adapted ecosystems in their entirety. While these temporal packages do not necessarily allow for a critique of the policies and legislation that prompt these hazards, they allow for reflexivity at more local scales as managers consider the variables that prompt present-day challenges. This reflexivity and the attempts to address past mistakes are what Neale refers to as examples of 'calculated rearticulation,' whereby staff translate novel or radical goals through existing, often more conservative, politics and practices (Neale, 2016). There is also a growing appreciation for exercises in fire management that take place outside of fire suppression that may be key to containing fire's threat to values at risk and public safety. With few exceptions, prescribed burn plans present ecological and hazard reduction goals in tandem, articulations of fire management made possible by this new ecologically informed temporal frame.

In the context of this maturing fire management policy and practice, ecology is a mode through which vegetation and its capacity to burn is made legible within fire management frameworks. Here, ecological thought is operationalized as a means of understanding the risk posed by disturbance events like fire, and ecosystems are manipulated as a means of containing

and narrating this potentially disastrous event. In this sense, both ecological thinking, and the ecosystem itself, is put to work in order to maintain the division between a specific economic order and a more-than-human disorder. In the context of suppression, these new ways of knowing the landscape help to identify a geography of more and less hazardous settings with implications for suppression strategies and modes of attack. For example, in contexts where leading a fire away from the 'Intensive Fire Management Zone' is an ideal tactic, ecosystems are enlisted to burn so that other regions may not. Within this is a double move of simultaneously securing values at risk while also returning fire to parts of the landscape. While not necessarily a key intention, some fire managers noted that, sometimes, this approach would allow them to burn parts of the park without going through the bureaucratic hoops of a prescribed burn plan or an environmental assessment (Chapter 5; Sutherland, 2019).

Ecological thinking has ushered in an anticipatory form of risk management whereby the threat fire poses becomes legible in the long term. This method of knowing risk on the landscape enlists ecosystems as a means of both knowing and managing these risks. This is realised through the application of prescribed burns and the mechanical alterations of the landscape for fire breaks, whereby the landscape is used as a means of reducing fire hazard on the wider landscape, creating ecological barriers to contain unwieldy and undesirable wildland fire events. In this way, fire management as conservation *and* fire management as risk reduction are components of an attempt to safeguard value. The institutional standard of securing values at risk and public safety (as public safety in the present) remain, albeit within a frame of reference that acknowledges the rhythm with which these combustible happenings proceed and the possibilities of fighting fire with fire.

This is not to say that this is a form of management where vegetation's enlistment is completely dominated or authored by human action but is instead a way of framing this as an

encounter narrated by a respect for the volatility of this more-than-human process and an acknowledgement of the burn's unwieldiness. Learning to see this threat, this vulnerability wildland fire incites, in new ways encourages a kind of encounter that resembles partnership. Yet, this encounter is only viable because of the effects the burn can achieve. For a fire to be authorized within the spaces of a national park, it must be put to work and prove its worth. Of the burn plans analyzed for this dissertation, the most ambitious burns can be linked to specific long-term containment strategies. These burns provide a return on investment as park managers can contain the threat of larger, more unwieldy fires while simultaneously fulfilling their mandates to maintain public safety and improve ecological integrity.

Though this reformation of fire management is still unfolding, risk management in this new form has not addressed the processes that have instigated the vulnerabilities fire is said to incite in the first place. It does not address the multiplication of values at risk and does not aggressively come to terms with the material reality of landscapes that burn. Fire does not place values at risk on the landscape, it does not extend the reach of capitalism or park infrastructure deeper into wild landscapes, and it does not snuff itself out at the expense of larger fires in the future. Rather, as Beck suggests, our risk society, as enacted and reflected in the Canadian national park system, has simply reorganized vulnerabilities (Beck, 1992). The risk posed by fire remains on the landscape, downloading the possibility for disastrous events into the future, while also eroding the so-called ecological integrity of spaces where fire is contained to the point that it departs from historical records of its presence. While earlier renditions of fire management downloaded the vulnerabilities of fire to future managers, newer interpretations of risk have done the same while also sacrificing certain landscapes in order to maintain a limited engagement with wildland fire. The more-than-humans that make up this landscape bear the impacts of a continued suppression policy that still has few tools that can articulate the value of disturbance in a way

that does not reduce risk to capitalist interests or institutional authority. Despite a quest for maintaining ecological integrity, fire management remains constricted by a focus on fire as a threat to value.

Conclusion

This chapter is not intended to be a critique of the work of fire management practitioners who put their lives on the line to secure wildland fire. Indeed, their work protects human lives and is an attempt to contain processes that result from both naturally occurring ecosystems and the ongoing articulation of troublesome land management policy that is not unique to the Canadian national park system. Rather, this chapter calls attention to how, even in the context of spaces often conceived of as cathedrals of an untouched wilderness and wild nature, the maintenance of value remains at the crux of fire management, and perhaps park management more broadly.

Rather than interrupt risk thinking with a re-evaluation of the institutional mandates that embed the park system in the circulation of capitalist value, ecology as a way of knowing fire has been absorbed into the status quo. Though ecological thinking has prompted new articulations of how fire management should unfold within an organization mandated to maintain so-called ecological integrity, it must do so without fundamentally altering the success of other mandates, or in other words, the *economic* integrity of the park system. Despite these constraints, and while others have cited the relative dilution of ecologically-informed management decisions elsewhere in the system, ecology *has* facilitated new conceptualizations of risk that have permitted this once vilified process to return. As a process that is able to simultaneously secure park infrastructure, tourism, and ecological integrity, fire management remains one of the most successful avenues for introducing novel management techniques, experimentation, and the

reintroduction of processes that were not only disallowed by earlier administrations but militantly extinguished.

For those who work with fire, it is not just the process of combustion that is volatile, but the institutional diplomacy required to convince colleagues, communities, and neighbours that setting a park on fire is the right plan of action. The challenge of contemporary fire management is not just putting fire back on the landscape, but also accounting for what cannot be sacrificed, taking stock of what is absolutely necessary in order to avoid catastrophe. Working with fire forces practitioners to rub up against institutional contradictions in the presence of a landscape that can disregard such constraints. As such, they are tasked with finding the spaces where fire is welcome; as some of my respondents would say, some fire is better than none.

Today, practitioners are further challenged by governments and institutions who fail to take climate change seriously. At the time of my research, respondents confirmed that Parks Canada did not have a robust set of policies and practices concerning climate change monitoring, and also confirmed that climate change was not prompting revaluations of contemporary fire management plans and policy. Yet, in the wake of wildland fires in Canada, the United States and more recently in Australia, the embodied threat that anthropocenic wildland fires pose to us and our more-than-human kin remains front of mind. Though beyond the scope of this chapter, more research is needed on how environmental management practitioners navigate such institutional dilemmas.

Chapter Five: Encountering the burn: Prescribed burns as contact zones

Abstract

Encounters with fire and landscapes that burn have the potential to be both disastrous and life-giving events. In Canadian national parks, where a century of fire suppression has ruled human encounters with fire-adapted landscapes, fire managers and ecologists are eagerly returning fire to diverse ecosystems in the hopes of building healthier ecosystems and reducing the risk of larger wildfire events. Ongoing changes to park policy have made new relationships with fire possible on these federal lands. Prescribed burns, whereby fire is applied to the landscape by park managers, is one such emerging encounter made possible by these policy changes. By reconceptualizing the burn as a process constituted by encounters, in what Mary Louise Pratt would call a contact zone, we gain insight into how thinking and working with fire requires an attention to how humans and more-than-humans encounter one another and the institutional settings which narrate and often constrain these encounters. In the case of Parks Canada's fire program, this tool of active management, and an alternative to full-suppression, illustrates how thinking and working with fire consists of a set of encounters which take place at both an institutional and embodied scale.

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Introduction

In national parks across Canada, park managers are returning fire to diverse ecosystems in the hopes of reigniting what they frame as an ecological process with an ancient presence, a process that has been actively suppressed by most resource management organizations in North America. Setting fire to a landscape like a beloved national park is no easy task and is a practice that requires attention to the dynamism of a landscape at both an institutional and material register. Prescribed burns, a practice of diagnosing a landscape and treating it with fire so as to achieve ecological or hazard reduction goals, is a calculated process involving several parties, not all of whom are human. It is a series of steps and hurdles that unfold over several months, sometimes years, and requires fire managers, ecologists, and resource conservation staff within institutions like the Parks Canada Agency (PCA) to carry out a careful diplomacy as they convince colleagues, superiors, and communities that dropping the torch is the right thing to do. As fire professionals know, encounters with fire and landscapes that burn have the potential to be both disastrous and life-fostering events.

According to the Canadian National Wildland Fire Situation Report, as of September 2018, over 2,250,000 hectares of land in Canada burned (Natural Resources Canada, 2018). This was not necessarily a higher figure than any other year, but the proximity of these fires to areas of interest, such as sites of resource extraction, to communities, and to national parks, made it yet another year of dramatic events with disastrous consequences. Though these spectacular and disastrous encounters with fire dominated news headlines across the country, less has been said about the other varieties of encounter with fire that are taking place in the very same regions—the work of prescribed burning. This approach to fighting fire with fire deserves consideration as it signals a departure from one articulation of resource management to another. This paper is

about how fire managers move beyond an approach that wholly excludes fire from the landscape and instead works toward a practice of making use of it.

For Parks Canada fire managers, burns have value for their role in building healthier, more biodiverse ecosystems. Fire management in many park management plans, along with their complementing fire management plans, is noted as a legislated resource management tool that can be used to maintain or restore ecological integrity (see Parks Canada Agency, 2010, 2017). Burns also have value for their role in mitigating the risk of larger, more uncontrollable wildland fires. By lighting smaller planned fires, also referred to as burns, fire managers can manipulate the landscape on their own terms, avoiding those larger fires and changing the composition of the landscape so as to protect certain assets. The prescribed burn, I argue, is an attempt by fire managers to engage with a dynamic and agentic rhythm (Ogden, 2011: 55), an attempt to encounter fire and the vegetation that burns in such a way that fire managers narrate the direction of that relationship into the future, one that is materially and institutionally distinct from a suppression approach. A burn is an articulation of its context, where fuel types, weather conditions, and institutional decisions about those landscapes come to impact how a wildfire or planned burn will unfold. A burn is thus a process fueled by encounters as much as it is fueled by vegetation. What goes up in flames and who comes to encounter a burn matters, combustion is only one piece of the story. Thinking with and through these burns requires conceptual tools that can make both the institutional and the material contexts of these processes legible.

Mary Louise Pratt's concept of the contact zone is well suited to facilitating this particular discussion of encounter as it is attuned to the unevenness and difference between parties participating in the act of encounter, while simultaneously being sensitive to the role geography plays in these events. Pratt suggests that these encounters in the so-called contact zone are between figures who are significantly different from one another. Participating in these

contact zones does not leave each party unmarked; each is, or will become, something else in the process (Pratt, 1991), each is changed by this encounter. Reflecting on colonial encounters, Pratt (1991) explains that these meetings can be violent, uneven, and disastrous affairs.

Scholars inspired by Pratt's focus on human encounters in the so-called contact zone have moved beyond analyses of explicitly human encounters in colonial settings to include meditations on and analyses of human encounters with the more-than-human (Wilson, 2017: 4). Collard and Gillespie (2015), as others in this issue have already noted, have made an explicit call to think with Pratt in this regard. Including the more-than-human within the fold of our analysis not only identifies new sites of inquiry but also prompts more nuanced understandings of ourselves (Haraway, 2008). This desire to consider more-than-human encounters demands an ability to qualify a broader range of others and the possibilities of contact, some of which have been explored in this special issue. This growing literature has made more diverse articulations of agency possible (see Lorimer, 2015), more complex manifestations of power relations legible (see Braverman, 2015), and has also explored new sites of exploitation (see Collard, 2013).

This paper considers how a prescribed burn can be understood as a kind of contact zone, a particular set of actions and processes that ignite new relationships between humans and landscapes that burn. The places where burns unfold are already entangled in specific political and institutional geographies. In the context of national parks, a century, or more, of management has often remade the ecological communities and fire dynamics of these places. In an attempt to snuff out combustion, suppression has maintained an encounter with environments premised on the refusal of fire's role on the landscapes and its relationship with species that depend on it. Unlike a wildland fire, the prescribed burn is an attempt to introduce the process of burning on terms set by the managing institution. It is what resource conservation staff refer to as a form of ''active management.'' I want to argue that the ''Contact Zone'' allows one to

consider interactions with landscapes and processes, like that of combustion on fire-prone landscapes, through a register of encounter rather than via the constraining narrative of management which tends to ignore the unruliness of creatures, landscapes, and materials often relegated to a passive category of ‘‘nature’’ that are propped up by human exceptionalism. Looking closely at the process and methods of the prescribed burn carried out by Parks Canada staff, this paper considers the way in which fire managers come to encounter flammable landscapes and their own institutions’ response to them.

This paper begins with a reflection on how fire management has proceeded in the context of Canadian national parks. Fire management, I argue, has been, and continues to be, about managing what kind of encounters happen between people and landscapes that burn. My goal here is to not only give the reader a glimpse into the trajectory of human–environment encounters through the narrative vehicle of fire, but to illustrate the material implications of these histories that haunt landscapes and those who encounter them today. I then move on to my empirical section which outlines three distinct dimensions of human encounters with landscapes that burn. First, I consider how there has been an expansion in the possibilities of encounter with landscapes that burn. I consider the transition from suppression to ignition that is unfolding within the PCA and what policy changes authorize these new actions. More specifically, I explore how policies and legislation that aim to improve the ‘‘ecological integrity’’ of these spaces and reduce the risk of more disastrous fire not only make new encounters possible but empower staff to follow through with other ecological work that a suppression approach would have refused. Next, I consider how these new encounters are contained by park staff. The fire prescription, a document that outlines the use of fire as a management tool in a specific context, is used to illustrate how the encounter will be contained under human control but also how it simultaneously paints a picture of the limits of human agency in these flammable landscapes.

Finally, I turn to the reflections made by park staff on the experience of working with fire, with the flame and landscape, in the context of the deployment of the fire prescription. Here, I consider how fire managers come to witness more-than-human agency through their respect and assessment of the burn. I reflect on how both parties become changed by this experience, one affectively while the other materially, in ways that go beyond the institutional register of encounter.

Methods

This research comes out of an interest in what it means to live-with more-than-humans in the context of the so-called Anthropocene (Haraway, 2016). In Canada, where wildland fires, along with urban interface fires, are expected to increase in light of a warming and drying climate, understanding our relationship with landscapes that are already fire adapted will be important for both human and more-than-humans alike. Coupled with this emerging challenge is the reality that Canadian, particularly in more human populated regions, landscapes have been altered through fire suppression and land use change (Johnson et al., 1998). Countless scholars and practitioners have noted the key role prescribed burns will play in reducing the risk large fires pose to human populations, but they have also identified the role this practice will have in attending to ecological communities negatively impacted by an era of fire suppression (Jensen and McPherson, 2008; Fernandes & Botelho, 2003; White et al., 2011; Canadian Council of Forest Ministers, 2016). This is a practice of environmental management that is receiving increased interest in Canada, but which often conflicts with contemporary policies in forestry, municipal planning, and agriculture. Parks Canada was identified as a key player in the work of ignition and the use of prescribed burning to achieve ecological as well as hazard reduction goals.

This paper is based on a multi-sited analysis of Parks Canada's fire bureaus in national parks across Canada between 2016 and 2018. During this period, I visited over a dozen national parks across Canada where fire suppression and/or prescription is a key component of park management. During this time, the author completed interviews with 30 Parks Canada staff including fire managers, ecologists, and recourse conservation officers. Interviews were coordinated via the head office for the PCA and were conducted in-person. These meetings lasted between one and two hours and focused on the work of governing, knowing, and encountering fire in the context of Canadian national parks. Given the diverse ecological contexts of Canadian national parks, most of these conversations focused on the deployment of national strategies and approaches in relatively unique ecological and institutional settings whereby managers are tasked with making sense of the realities of local politics, ecological health, risk, and funding resources and how these variables will impact their work with fire adapted landscapes. In some cases, they included visits to burn sites. These meetings were also an opportunity to discuss fire management practices that did not fit neatly within the container of institutional documents and procedures. These meetings were complemented by interviews with staff working in neighboring jurisdictions or institutions that partner with Parks Canada.

Interviews accompanied analysis of national park fire management plans, prescribed burn plans, and other institutional documents that inform the use of fire and fire's suppression. These documents, as key components to the practice of fire management, were not only analyzed for their role in carrying out the work of fire suppression and prescription but were also key points of departure for considering the practices of fire management that go beyond said documents. Interviews and documents were coded using NVivo software to identify common themes and references made by respondents.

Remembering landscapes that burn

As environmental historian Stephen Pyne (2017) has been keen to identify, Western fire management, characterized by a suppression approach, is not the only way of living with fire adapted landscapes. He has shown at length that the fire management practices of today, particularly in settler colonial contexts, have displaced diverse ways of knowing and living with landscapes employed by Indigenous peoples from North America, and beyond (Pyne, 1997, 2011, 2012). Indigenous people, he has argued, as some of my respondents have also echoed, have engaged with burning practices and/or lightning fires for hundreds, if not thousands, of years. For Pyne, burning is a social process, one that troubles any distinction between nature and culture, as fire is continuously shown to be a process steeped in, and capable of impacting the social context in which it unfolds (Pyne, 1997). Through the succession of different periods of settlement, landscapes in Canada have been remade and Indigenous relationships with fire have been partially or completely disrupted (Pyne, 2011). Understanding current encounters with fire requires reflection on which relationships were forbidden as a result of settler colonialism (Myers, 2017b; *see also* Adams and Mulligan, 2003), while any contemporary celebration of the return of fire must be understood within the context of not just the suppression of combustion, but the suppression of burning practices and knowledge as well. In the context of Canadian National Parks, this process of displacement was articulated by the forced relocation of Indigenous people and their relationship to park land—a process receiving uneven attention within the federal agency. As Zoe Todd (2014) reminds us, the displacement of land practice has fundamentally and violently changed the multispecies relationships we see on landscapes and is a process that continues today. Though beyond the focus of this paper, it is important to remember that in the colonial context of Canada certain encounters are taking place at the

expense of others. The authority to encounter fire, like many components of jurisdiction over land, is an authority that has been secured as the settler colonial state emerged (Pasternak, 2014).

The advent of suppression is perhaps the most notable and pronounced relation with fire and landscapes that burn and punctuates what has become the set of relations we call ‘‘fire management.’’ It is an approach born out of a relation to forests as resource, where the value of timber but also the infrastructure that weaves through these landscapes must be calculated and secured. While suppression has had varied success through history, it has been successful in changing the presence of fires at the landscape level and has altered the trajectory of ecosystems across the country and beyond. In Canada, most wildfire and forest management agencies continue to apply a suppression approach, with most of this work done at the provincial and territorial scale.

Today, one of the greatest challenges facing the PCA is reconciling current practices with over a century of fire suppression. Up until the 1980s, Parks Canada’s approach to fire mirrored those of their provincial colleagues, whereby suppression ruled supreme (Pyne, 2011). Fire had no place in most national parks, particularly in those parks in close proximity to major highways and urban centers.[58] Up to this point in time, fire was not only a risk to the beauty and sublime nature of Canada’s famed national parks, but a risk to lumber and other extractive industries neighboring various parks, as it remains today (Pyne, 2011). The fires that were encountered during this time were ‘‘wildfires,’’ fires whether caused by lightning or human error, that were deemed out-of-place and extinguishable by park administration.[59] Landscapes where fire had been present prior to settler colonialism were interrupted by these interventions, changing in many cases the very makeup of various grassland, forest, wetland, and savannah ecosystems

[58] More remote parks like Wood Buffalo National Park, which straddles the border between Alberta and the Northwest Territories, were a slightly different story. Fire was able to move across the landscape in ways it might not in parks like Banff National Park in Alberta.
[59] There are of course exceptions to this. In parks like Point Pelee National Park, fire was used to create optimal duck hunting conditions.

(Pyne, 2011). The absence of this process would impact park ecosystems in several ways, including the slow deterioration of populations of fire-dependent species, the encroachment of species into landscapes traditionally maintained by a fire cycle, and the buildup of fuel loads on already quite flammable landscapes. This work of fire suppression would ironically put people and species at further risk as fuel loads increased and larger, hotter, more unruly fires became a possibility.

As Isaacs (2019: 732) reminds us, conceptualizations of disturbance in conservation biology, ecology, and more-than-human social theory are still evolving. Further, ecological thinking remains a relatively new addition to the suite of knowledge systems that inform resource or environmental management in Canada (See also Zimmerer, 1994). Death, disturbance, cycles, and unruly processes do not fit neatly within linear modernist logics of management and are not easily integrated into institutions that have been tasked with mandates that would theoretically resist these characteristics of functioning ecosystems. As Prudham (2012: 67-68) found with the Oregon logging industry, successful firms had to reckon with the ecological realities of Oregon forests and the fading supply of old growth forest or face a crisis of supply. In the 1980s, when Parks Canada would be given a legislated mandate to consider the *ecological integrity* of the lands that they manage, Canadians would witness the slow change of the institutional architecture of policy connected to fire management. These changes prompted by park staff and ecologists (Canadian Park Service, 1989) would give managers in select national parks the tools to make ‘‘fire use’’ a possibility within Canada’s park system. Fire as a disturbance event, nested within a broader regime of ongoing balance, historical presence, and essential role to the ecological integrity of the places under Parks Canada’s care, would disrupt mainstream understandings of fire’s role in Canadian parks and ‘‘wilderness.’’ Much like the United States, the Canadian public had during much of the mid to late 1900s embraced a Smokey

Bear politics toward fire, a logic whereby most fire was *disastrous*, if not alien, and out-of-place (see Kosek, 2006). Untangling this logic and reconciling it with new knowledge altered by an ecological lens would prove difficult to deploy and challenging to reconcile with public attitude toward the now ‘‘natural’’ process.

Today, with respect to fire management and conservation, Parks Canada as a federal-level environmental management institution occupies a unique position. It is a federal agency with near complete authority over its land base and a mandate significantly different from most provincial bodies as it is premised on the protection of representative samples of Canada’s ecosystems and is authorized explicitly to use fire, among other tools, to achieve these goals (Parks Canada Agency, 2017). In addition, it carries with it the mechanisms to finance these expensive operations. Parks Canada must also balance this work with its other mandate, that of human use, which has positioned many parks as very popular tourist attractions. Critics have questioned the compatibility of these two mandates, and such critiques spill over into the realm of fire management (Dearden and Dempsey, 2014).

During my conversations with fire managers, I was continuously urged to consider how burns are fueled by past institutional encounters with the landscape. Coming to know and remembering what a landscape used to look like, and how it has been manipulated by human beings and their institutional practices, is one of the core tasks of their work when it comes to both fire suppression and designing prescribed burns (Sutherland, 2018). For resource conservation officers of various sorts, it is necessary to contemplate contemporary encounters and past encounters with a landscape in order to shepherd in future decisions. Furthermore, staff must reckon with the fact that the impacts of these decisions may not be observed in their entirety within the span of one’s career (or even lifetime). In the context of fire management, this means being attuned to the kind of species that have been present through time, what kind of

material remnants they have left behind as they decay, how humans have altered the landscape through management and the expansion of infrastructure, and even what kind of contaminants and hazards may be lurking in these sites from previous extractive or agricultural industries and communities.

As Helen Wilson (2017) reminds us ‘‘encounters are not free from history and thus whilst the taking-place of encounters might be momentary, they fold into multiple temporalities’’ (12). Similarly, burning as an ecological process depends on material that has grown over time and that will fuel the process of its own undoing. Ecosystems that burn, as Anna Tsing (2015) and Laura Ogden (2011) have considered, draw-in multiple temporalities and actors. Furthermore, Tsing (2015: 168–169; Myers, 2017) urges us to think about burns as a happening rather than a singular event, simultaneously fueled by past human–environment histories, and intimately embedded in the creation of new human–environment histories. As such, fires, along with mushrooms, highlight the implications past encounters of capitalist production of the forest have had on futures both distant and close at hand. Rather than bracket these sets of encounters in the natural world as being irrelevant, we are urged to see how encounters are etched into the material landscape and consider what implications these encounters *will* have.

Prescribed burning: Encounters with landscapes that burn

Treating the prescribed burn as an encounter allows us to situate the prescribed burn as a social encounter with landscapes—an encounter that situates subjects and processes typically relegated to the realm of ‘‘nature’’ as part of a social process unfolding in and through the production of a place. The contact zone concept, as a way of thinking through and with encounters, invites us to situate these relationships between specific humans and more- than-humans in a historical and spatial context, to see them as a set of relationships taking place in and actively part of the

creation of a new geography. It also allows us to attend to the ways in which parties come to, in the words of Pratt (1991), ‘‘grapple with’’ one another, including those engagements with more-than-human processes like burning. This notion of ‘‘grappling’’ acknowledges that both parties, the institution and the many more-than-humans that make up the landscape, come to be changed by each other in this process.

The prescribed burn is an attempt to harness an encounter that has been actively suppressed but is now authorized. Prescribed burns today are an attempt to articulate an ecological vision of fire through the institutional constraints at hand but are also an engagement with an unwieldy process that can escape those constraints. Institutional intentions are forced to reckon with the messy reality of human actors managing processes that are sometimes beyond their control. For fire managers operating within the context of Parks Canada, fire can play many different roles, from a process that recycles nutrients on the landscape, to a tool for protecting archeological sites from vegetation. This particular tool can also be read as an attempt to control, guide, and/or prescribe how, when, and where fire takes place on the landscape. It is, in other words, a prescription for how fire and the landscape are to be encountered, or how we will burn together.

Authorizing Encounter: From Suppression to Ignition

Though prescribed burns are becoming a more common feature on the landscape, the PCA remains a suppression agency. This means most fires, particularly in southern parks closer to major populations, are actively extinguished by fire management teams. Parks Canada’s Wildland Fire Management Directive (Parks Canada Agency, 2017) continues to frame public and fire fighter safety as paramount, meaning these parameters continue to impact all fire management practices, including the use of fire as a form of active management. Park

management plans, which dictate how the park operates, echo this mandate. Changes within the organization at a policy and operational level were required in order for the agency to be able to tend to fire in a manner outside of a logic of complete suppression. Policy, legislation, and management plans were required to, in a sense, authorize different kinds of encounters, and funding needed to become available to facilitate these different approaches to fire. In other words, these steps were required to make flammable landscapes encounterable as such. By authorizing specific kinds of encounters, new landscapes could emerge.

As I've already described, the PCA has a dual mandate to protect the environment and to facilitate human use. The articulation of the environment in park policy has most recently been facilitated through the advent of ''ecological integrity,'' as an organizing principle (see Mortimer-Sandilands, 2009, for a more detailed history and interrogation of the concept as used by the PCA). The Canada National Parks Act (2000) defines ecological integrity as: ''[.. .] a condition that is determined to be characteristic of its natural region and likely to persist, including abiotic components and the composition and abundance of native species and biological communities, rates of change and supporting processes'' (Section 2 (1) of the Canada National Park Act). This new approach, confirmed in federal legislation to apply to all Canadian national parks, made explicit room for processes characteristic of Canada's diverse but often fire-dependent or adapted regions. In addition to this change in legislation and the network of policy that would develop around it, a great deal of work by scientists and managers within Parks Canada in the 1970s and 1980s, culminating in a document entitled ''Keepers of the Flame,'' was required to make fire a process legible to park bureaucrats as a form of management required for the maintenance of said ecological integrity (Canadian Parks Service, 1989). Documents such as *Keepers of the Flame* highlight change as a natural component of the ecosystem and made room for management approaches that attempt to replicate historical disturbance events like

burning. In many cases, the facilitation of ecological integrity has required the completion of a ‘‘fire history,’’ a look back on what a landscape used to look like prior to park establishment, but also settler colonialism. In the case of fire, this has and continues to spark important reflection for ecologists and fire managers tasked with piecing together the natural rhythm of fire on the landscape or what they refer to as the fire regime. This institutional process has provided an explicit opportunity to reflect on management practices that have negatively impacted native species and ecological communities but has also prompted important discussion around the relationship between diverse Indigenous communities across Canada and their use of fire in specific ecosystems such as Garry Oak Savannahs in British Columbia, or in the Grasslands of southern Saskatchewan and other prairie parks. Despite this, traditional knowledges across Canada are passed over for Western scientific knowledges as the primary source of knowing landscape and burning practices. Ironically, the original ‘‘Keepers of the Flame’’ document highlighted the need for an ‘‘ecocultural’’ approach to fire management within the agency.

Today, this ecological work is simultaneously supported and constrained by other pieces of legislation and policy such as the Migratory Birds Convention Act and the Species at Risk Act. In particular, the Species at Risk Act is often what props up various applications to apply fire to a landscape because it is used to help support the success of specific fire- dependent species. Species that require fire for habitat creation, as is the case with whitebark pine (*Pinus albicaulis*), may depend on such fires especially in parks where most, if not all, wildland fires are suppressed. Funding for prescribed burns often orbit the health of species populations rather than the reintroduction of ecological processes. Given the expensive nature of returning fire to the landscape, respondents explained that it is almost impossible to return fire unless it is linked to a specific species or within the realm of hazard reduction. Returning burning as a process in its own right is not enough to secure funding under contemporary policies.

Operationally, though authorized within legislation, fire needs to be explicitly positioned within a park management plan and other supporting documents as well. For example, the Banff National Park Management Plan (2010), which outlines the management of Canada's oldest national park (and in many ways the birthplace of the use of fire for ecological reasons), positions fire both as something that is *natural* to the park and as a tool for achieving mandated goals. It does so all while acknowledging that former policies have interrupted these processes and created new challenges as this short excerpt illustrates:

> Fire is a natural force of renewal and disturbance. Its suppression over more than a century has altered the structure and composition of forests and grasslands, contributing to the loss of landscape biodiversity and wildlife habitat, resulting in forests that are more susceptible to forest insect and disease, and increasing the threat of high-severity, difficult-to-control wildfires. These changes have implications for public safety, property risk and the health of terrestrial and aquatic ecosystems;
>
> Forest thinning in and around the community and prescribed burning, are restoring vegetation communities to a more natural state and reducing the risk of uncontrolled wildfire losses;

This said, this institutionally prompted ecological interruption is not only seen as a risk to ecosystem functions but to public safety and property as well. Historical anxieties around fire remain, but new approaches are simultaneously made possible. As the risk of uncontrolled fires are made legible by new technologies, knowledge of fire dynamics, and perceptions of where risk lies, prescribed burns have emerged as a means of mitigating risk. Hazard or risk reduction, which focuses on the threat fire poses to various values at risk such as infrastructure and critical habitat, has become a register through which encounters with fires is narrated in park documents.

The category of *values at risk* is a common concept across North American fire management agencies working with large landscapes and is used to denote and map values worthy of protection from fire. These values can include things as diverse as infrastructure, homes, endangered species habitat, and valuable timber. Different kinds of values at risk, and where they are located in a given landscape, come to impact where fires are suppressed (and the resources applied to those operations), and where it is possible to make use of burning. All encounters with burning, prescribed or otherwise, come to be through a register that accounts for the geographic articulation of these objects of value. The reduction of this risk, something that had traditionally interrupted attempts to put fire on the landscape, has and continues to be a register through which some prescribed burns are achieved, as confirmed by many of the activities described to me by park staff. Some fire managers have even used risk as a means of partnering with neighboring stakeholders, engaging municipalities, First Nations communities, and provincial partners with burns along park borders.

Prescribed burns are one particular articulation of these new understandings and practices of fire management. They are premised on building different relationships with landscapes that burn but also on an attempt to dictate the geography of encounter so as to build these more livable landscapes for certain species. This said, burns continue to challenge the organization's hold on public safety and can put many assets and so-called values at risk, straining relationships with neighbors and partners along with the public's support for prescribed burns. This means that burning may be legitimized and rendered to be in-place within a national park in some respect but *out-of-place* and deemed extinguishable if certain variables change.

What remains is that slowly Parks Canada has produced scenarios in which active burning is possible, it has produced institutional infrastructure that renders fire adapted landscapes encounterable while also authorizing those encounters through a set of

institutionalized responses and practices, moving beyond a suppression model. There is a departure from encounter as response, to encounter as invitation to make contact, albeit within specific geographic containers dictated by a geography of values at risk and competing institutional mandates.

Containing encounter: Crafting a contact zone

If policy, legislation, and management plans make fire encounterable through the authorization of new possibilities, the fire prescription itself is the spatial and institutional articulation of these new possibilities. Given the parameters described above, the work of putting fire back on the landscape takes a great deal of time as multiple variables, from institutional funding to the response from species, are considered. Public safety, the interests of neighboring stakeholders, and public perception come to matter as discussions proceed on how best to carry out this work of ignition. Since fire managers are manipulating the landscape, impact assessments must also be completed to account for what risks and alterations will be posed by this form of active landscape management. Prescribed burning thus consists of a series of documents that support the eventual use of burning as a tool on the landscape.

This new kind of encounter unfolds within a temporal and institutional framework of its own, prompting a network of park bureaucrats, fire managers, ecologists, and colleagues across the national system to become involved in drafting the encounter of the prescribed burn. Fire managers and their colleagues often reflected on the extended timeline that is required for the creation of such a plan:

> You know, you'd think it'd be that easy, but they are complicated. An easy one is 6 to 8 months, not that you're working on it 6 to 8 months straight, but [writing the plan] often involved a lot of back and forth [with other staff]. Some of them have taken us years

> between writing the actual prescribed fire plan and the impact assessment. [They could take] 2 to 5 years at a time. And that's just generally for the more complicated ones.

The fire prescription gives us a glimpse not only into how the encounter is institutionally narrated but also the extent to which these social actors are entangled in the return of a process through their institution. It is difficult to pinpoint a single trajectory for the authorship of a prescribed burn, as a burn can be prompted by different institutional goals but also prompted by the interests of different staff. What remains clear is that these burn plans are not necessarily mobile, they are intimately dependent on the context in which they are designed to unfold. It is a process that requires an attention to what an encounter could mean for both the material and the human, moving beyond a purely ecological model of management. As one respondent put it, using Yoho National Park in British Columbia as an example, it begins with looking at the landscape:

> [We] start with [asking] what did fires look like in the past and then we look at what does the park [.. .] look like now with respect to fire? So how far deviated are we? We had a lot of fires in certain zones, none in others, then we focus on those zones. In the case of Yoho there hasn't been much fire in any of them so it's wide open, we can burn pretty much wherever we want to go, except for places where there's high values at risk, or places where the park is not going to want us to burn. Like they're not going to want us to go burn Emerald Lake, right? Lake O'Hara, places like that where people come [to visit], they don't want to come and see a prescribed fire.

This manager is describing how the process of authoring a prescribed burn begins with simultaneously identifying locations where fire is needed, which is conceptualized as places where fire has been missing as a result of fire suppression, and where it would be institutionally

viable to burn without interrupting other park priorities, such as tourism. Prompting an encounter within the constraints of institutional mandates and responsibilities is thus also about containing that encounter. This becomes a mapping exercise of sorts whereby the articulation of these various variables becomes something that is traced onto the landscape both through the text of the document and the eventual burning of the land. Mindful of these diverse interests, fire managers attempt to craft a scenario agreeable to their senior management and within the parameters set by their park's management plan.

A prescribed burn, in other words, is an attempt to dictate the parameters of how a burn will unfold. It is an articulation of how the fire will behave on the landscape, the conditions under which it will burn, the location where it will burn, and the time of year at which the desired impact and ability to safely manage the fire will be at its best. Multiple forms of expertise come to play a part and this work can require a degree of diplomacy as park managers weigh the perceived positive and negative impacts of fire on their colleagues' portfolios. This can involve staff considering the impact on park visitors, infrastructure, but also on respective species that may be positively or negatively impacted by a prescribed burn. As one respondent reflected, this is work that requires ongoing discussion with colleagues:

> There are almost two elements: the actual writing of the prescribed burn plan itself, there's often quite a bit of back and forth, you gain information and you re-think your objectives and often rethink how you will actually do it, where you will put your anchors and that sort of thing. Once you've got a good plan, the impact assessment piece is usually like the winter's work. But it can get more complicated when you're back and forth with someone like a wildlife specialist or an aquatics specialist that's telling you, [or] not telling you [what's going on], but you're trying to figure out how to restore fire

> on a piece of landscape where there might be complications relative to stream habitat concerns [for example].

This manager hints at how returning fire to the landscape for ecological reasons is not straightforward and requires collaboration with staff with different forms of expertise and who are tasked with representing different species, park functions, or park mandates. Managers engage ecologists from their field unit, an administrative unit comprising one or more parks and sites, who speak to how vegetation or wildlife will respond to a burn. Ecologists may even disagree on the use of a prescribed burn in a given area as they may be considering the interests of different species with competing responses to fire on the landscape. One example of this would be the corresponding interests of woodland caribou (*Rangifer tarandus caribou* (mountain ecotype)) in the Canadian mountain parks who require old growth forest and whitebark pine (*P. albicaulis*) which benefit from the open landscape provided by fire to thrive in similar regions. Both are species at risk, meaning they have special protection on federal land in Canada under the Species at Risk Act, but also require different relationships with fire. Their interests also begin to compete because of the relatively small parcels of park land where these policies are enacted. Staff must work together to not only ensure that federal policy regarding species at risk is respected, but that the actions these policies spur do not interrupt the livelihood of other species at risk. This particular scenario offered insight into the scales at which this effort to identify agreeable places to burn unfolds. As one fire manager reflected, this approach can be a frustration when attempting to return a naturally occurring process to a landscape with many species with diverse needs:

> [W]hat drives me crazy is single species management, where we get hung up on the needs of a single species, and that dictates what we can and can't do [for] all the other

> species that are either fire adapted or fire dependent. Aren't we doing detriment to them by focusing on one species, as opposed to being like 'look at the whole landscape as a whole', [shouldn't we be asking] what historically did it do? Because historically caribou moved through here, so ok, we should burn...it would have burned in the past. [In this case we] are guided and strongly influenced with respect to fire for a single species that isn't even on the landscape anymore.

Once again, thinking about fires as a burn functions as a reminder that this process engages other more-than-humans, humans, and variables in different ways and that each burn is an expression of the particular relationship between those that come to burn. A whole ''crowd of others'' (Haraway, 2008), whether they are grasses or municipalities come to contribute to the creation of the zone, whether directly or indirectly. Accounting for the different modes and spaces through which species might come to encounter a burn suggests that a prescribed burn is about creating a zone, a space for particular encounters, but where the goal of changing, manipulating, or safeguarding many of those more-than-humans, as members of an ecological community or landscape, is the goal.

The creation of this zone for the prescribed burn also includes articulating the ideal weather conditions for achieving the desired outcome. Wind speed, humidity, incoming weather (such as a rain storm to follow), and various moisture codes for fuel types are just some of the variables considered for the creation of an ideal burning environment. Especially in larger parks where valleys and mountains can create unique settings when it comes to those variables, perfect conditions can be difficult to achieve. These variables impact not only how the fire will behave in relation to various species on the landscape, but how the burn will behave under human care as it is carried out. These ideal conditions are ideal not just for controlling how the fire will move through the landscape, but describes the conditions needed for the fire crew and managers to

respond safely to the fire. The creation of the zone is meant to contain encounters to a desired quality of risk in relation to those actually carrying out the fire, but also in relation to values at risk. Much of these anxieties outline the limits of an encounter under control, and in doing so outline how burns can become otherwise. The fire prescription is thus the description of the ideal container for encounter and the instructions for how the encounter is to proceed. These documents, while outlining the ways through which these fires will be controlled, also tell us where the limits of human control lie if this fire were to be set by lightning or to escape the parameters of the polygon described in the plan.

Pratt contends that the contact zone is where subjects grapple with each other. Prescribed burn documents and the landscape itself can be read as texts where the ideal encounter is described but also where the possibilities of how the fire could become otherwise are meditated on. What is striking is that the text itself is used as a means of controlling that encounter, of narrating how the encounter should proceed, while simultaneously reading the material risk the landscape poses. This process of attempting to contain and narrate the encounter thus also acknowledges the potential for a more-than-human refusal of this strict format of encounter as thresholds simultaneously describe the possibility for success and failure.

Witnessing Encounter: Respect in the Contact Zone

If a prescribed burn plan attempts to situate the ideal conditions for the burn to take place, the actual enactment of the burn, and the ways combustion and the burning landscape respond, becomes a setting where immediate but also future-making encounters with fire take place (Neale, 2016). Through the articulation of ideal burning conditions, the fire prescriptions make legible the conditions under which a fire could escape this plan and disrupt the ‘‘controlled’’ nature of the burn. Within such descriptions of the ideal soil moisture, weather, and

communication strategies we can also find a description of the distinct thresholds of human control over this process. A prescription is as much about nodding to the unknown and the uncontainable as it is about control.

While some managers outside of Parks Canada and beyond refer to prescribed fires as ‘‘controlled fires’’ or ‘‘controlled burns,’’ one manager from Parks Canada pointed out the bravado of this thinking, and in doing so they invite us to understand how burning is conceptualized by some park staff:

> No matter what you think and what models you use and what you predict is going to happen, sometimes you get lucky. So, we used to use the term ‘controlled burns.’ We never ever use that term anymore. I’ll go to the point where if people call it a controlled burn, I’ll correct them because until you can control the weather you can never control the fire. Like we can do everything for a prescribed fire. You can have all the guards in, do your test burn so you know what the fire behavior should be like. And everything’s perfect. And you light it up and all of a sudden there’s a wind shift. That’s happened to me a couple of times. Can’t predict that. You’re in the mountains, you can never predict the wind in here. You can do your best.

This nod to the limits of one’s agency over fire and the landscape is an acknowledgment of a burn’s potential to be otherwise, to escape the limits of the prescribed encounter. This manager is positioning fire not as one entity but a collective of components. In doing so, they identify specific more-than-human variables as components that require our attention.

In addition to identifying the limits of what is under human control, there is also an important register of respect for fire being articulated in this statement. A sense that this refusal of containment on part of the burn also carries with it a kind of more-than-human agency worthy of our attention. Assessing the possibility for the burn to take place or for the burn to escape

control goes beyond the metrics described in the burn plan. In addition to using mobile weather stations, weather forecasts, and models depicting fuel conditions in the park, managers will also make use of small test fires to ‘‘see how the fire will behave’’ and use their own body to get a sense of the soil conditions, leaf litter, and wind conditions that may not be captured by technical tools. As one manager describes:

> [We] generally walk the site before we burn, so we'll get out and walk the forest, we'll snap twigs, we'll feel stuff, is it ready? Is it not ready? Because you can tell a lot, right, because you might have a weather station there but maybe a rain storm came through, and it didn't get reported on the weather station, [.. .] or you get in there and you say ahh it's still not quite right. The feather moss is still wet, it's not going to carry fire. So, we might take a lighter with us and just burn little stuff, little test fires, snapping twigs, checking stuff, burning lichen, burning moss, is stuff going to burn? Is it not going to burn?

Even before the prescribed burn begins, leadership for the burn is interacting with the different components of what will burn. They are feeling, sensing, and in some cases burning, to consider how the larger burn will unfold, they are burning to know the landscape and how it responds (see Myers 2017a). Technical tools are coupled with the body, the sensor that will in fact narrate the rest of the process as leadership on the burn observe the behavior of the fire and the surrounding landscape. Depending on the scale of the burn, this close proximity may be replicated when ignition specialists walk the line with a drip torch.

Knowing the fuel types, which are various categories that describe the makeup of vegetation on the landscape, though a key component of the fire prescription variables, is not the only way through which this manager comes to know the vegetation and behavior of the fire.

When asked about other kinds of knowledge at work during a prescribed burn, one veteran fire manager and ecologist responded:

> There's almost these— and they're not written down anywhere— but there's almost this suite of unwritten rules that we have, or little sayings, [for example] ''You gotta burn to learn'', is one of ours, you know. We've had that for years. It's about these different ecosystems, till you've applied some fire. Learning about fuel types, you can stare at them for a long time and pick them apart scientifically, but until you see some fire in them you won't understand them well. There's a whole suite of those and they're almost all tongue and cheek and have come from us sitting around in the evenings chatting and that's why they're not written into any of our documents, but they're pieces we share with each other that kind of bind us together and are part of the team's vernacular and logic.

Encounters with burns are thus not only mediated by institutional registers of ecological and economic risk but are also narrated by embodied respect and knowledge for what burns are capable of. Thinking here with Pratt, there is a sense that fire managers are grappling with the possibilities of encounter presented by these landscapes that burn. This grappling is defined both by the knowledge of what *can* happen and an acknowledgment that there are unknowns. This said, continuous engagement with landscapes that burn leaves these managers with new knowledge, new appreciations, and understanding for how different vegetation communities burn.

This notion of respect for fire was articulated in a number of ways by those I interviewed. Fire managers explained to me at length the respect they have for what fire can do for the landscape through their continued framing of fire as a central component to diverse ecological

communities. For these individuals, fire was a particularly important process that *needed* to be returned to the landscape. For them, fire had been bracketed from entire ecosystems at a cost and there was a sense of duty to this project of return. They also explained the embodied danger burns and wildfires can pose as they told stories of the deaths or close calls of colleagues, thus extending this respect to the risk fires can pose to the fire managers themselves, their staff, and the public. Fire was something that deserved attention, which was articulated through the detailed plans they would craft and deserved a form of serious attentiveness during the act of burning. In a sense, their quest to find the ideal conditions for a fire is also an articulation of this respect, an acknowledgment that things can go sour. Respect as a register of encounter was a means through the limits of one's own agency and the possibility of an other's was witnessed.

Respondents acknowledged that much of the anxiety surrounding a prescribed burn takes place before, and in the very first moments of a fire. Respondents explained that once you have an opportunity to see how the fire is actually behaving on the landscape, to see how vegetation is responding, the behavior of the fire, and your staff's ability to respond, you become more comfortable. A respondent describes this period:

> [The] most nervous times, the times of heightened anxiety, are usually the day of, [and I'm saying to myself], OK is this going to work or is it going to work too well and then there's always stuff, its windy, its dry, if there's a storm coming, [there's] a chance of 70 km winds hitting our fire that afternoon, you know? Less than a 20% chance, do you go with it or not? [.. .] You have to take those risks in order to do it, if you don't take the risk with prescribed fire, you're never going to burn. So, you have to be wanting to take those risk, so that's the risky part that kind of worries me, that always worries me the most. [.. .] Then you make a decision, ok we're going, a little bit better and then you start to go and you're burning and it's not doing as much, it's doing what you want it to do:

> excellent, carry on. And you get past the crusty spot, that's the challenging pieces, and so you get past that 25% mark [.. .] and its holding and everything is going well and you're like ahh cool we can do this. Then the rest of the 75% happens as long as something weird doesn't happen, like an accident or something where somebody is hurt or injured, its honky dory, you're cruising.

Encountering the burn well means to acknowledge its unwieldiness, to give it the respect you've come to learn it deserves. Further, it is this affective component of encounter that is required for the institutional goals to be achieved. Though not recorded formally, this institutional knowledge has to be lived in order to be successful.

Learning from the Challenges of Encounters with Landscapes that Burn

Donna Haraway, in her work on companion species, works with Pratt to describe the contact zone as a zone of becoming and play—a place where significant-otherness is discovered and witnessed (Haraway, 2008: 216). This significant-otherness is an acknowledgment of one's co-constitutedness while also an acknowledgment of the difference of the parties involved in that process. Haraway asks us to think about how we are always becoming-with others, others that may not necessarily be human but may be critical to making us so. The process of igniting fire on the landscapes described above echoes this image. Fire managers, though working within the constraints of the institution, are attuned to acknowledging the significant-otherness of burning vegetation and the flames these communities produce, but this had to be made possible within the architecture of the institution through changes in legislation, policy, and available science.

The process of the burn poses important challenges to compartmentalized notions of who and what we encounter, as a burn is an encounter with *many*, with what Haraway (2008) might refer to as ‘‘a crowd of others.’’ Managers are tasked with not only accounting for diverse more-

than-humans but are also tasked with tracing their place within the material and institutional infrastructure of the burn site, and how they might be changed by this encounter. The burn is not a straightforward process of becoming-with or becoming something different in the process, but is also a process of *becoming undone*, as landscapes go up in flame consuming life while also making more livable futures for others that depend on these landscapes—places that some may consider ruinous but others may see as places of possible flourishing (Tsing, 2015: 151). Natasha Myers (unpublished manuscript) tells us that fire compels us to contemplate what we really mean by ‘‘life’’ and ‘‘death’’ in multispecies work. She challenges us to think about how processes of transition, specifically fire, trouble categories as broad and sweeping as the more-than-human.

Combustion as a kind of process and encounter links multiple humans, more-than-humans, and materials together through their mutual destruction and the production of new possibilities. Encounters with processes challenge us to consider whom else we are encountering and when and where those encounters began. As Laura Ogden (2011) suggests in her analysis of everglade ecosystems in Florida, where fire plays an important role, ‘‘... landscapes are assemblages constituted by humans and nonhumans, material and semiotic processes, histories both real and partially remembered’’ (35). Landscapes for Ogden are laced with encounters, and an attention to those multispecies encounters tells different stories than those that would be purified of what some may consider more- than-human chaff. Burns are great to think with in this respect. Burns cannot be understood without an attention to both the material implications these processes have nor without the meaning they carry with them in the minds, policies, and management plans of human actors.

For good reason, there is a recent trend to imagine how to build more livable worlds, whereby the concept of flourishing encourages us to think about building more livable encounters and futures (Collard et al., 2015; Haraway, 2016). The burn troubles our notions of

flourishing and compels us to think about how any notion of flourishing needs to be interrogated for any hidden inflection of modernist ‘‘progress,’’ any notion of a ‘‘climax community’’ in an ecology that could flourish in disruption (Tsing, 2015). As Anna Tsing reminds us, disturbance of the environment ‘‘realigns possibilities for transformative encounter’’ (2015:152) and makes room for constant opportunities for the making of new relations. These possibilities must also be articulated by those who wish to engage with these disturbance events. For this to happen, disturbance must be rendered encounterable. This paper has considered how opportunities within a governing institution like Canada’s national park agency made it possible to encounter fire and landscapes that burn differently via mandates for so-called ecological integrity and hazard reduction. These alterations made room for the use of prescribed burns as a tool of active management—a form of encounter with these landscapes that narrated new possibilities beyond a refusal of encounter.

Conclusion

Thinking with the contact zone not only invites more-than-humans into discussions of encounter, but it also helps us to understand how these encounters proceed and how they may proceed differently. In the case of Parks Canada, disturbance had to be rendered encounterable before landscapes could be encountered differently. Through the lens of the contact zone, these encounters were seen to be the meeting of a multitude of humans, variables, and more-than-humans—a process where a landscape and those burning it become something else together. In this paper, the contact zone also enabled a means of understanding encounter as something that can be facilitated. While fire managers are attuned to the unwieldiness of vegetation and the burns that they can produce, fire managers work to co-produce these landscapes as a means of achieving specific institutional goals. While burning is only invited to take place on the terms set

by the fire manager and within the architecture of a colonial institution, it is done with an appreciation and respect for how the burn can escape control. Finally, this paper pushes the contact zone, like others in this special issue, to consider affective encounters with fire. Touch (Isaacs, 2019: 732) among other senses, along with a register of respect, aids practitioners as they attempt to carry out the burn. This process of burning becomes a shared experience as the human carrying out the prescription of the burn comes to meet vegetation going up in flames, they are invited to burn together.

Chapter Six: Making live on landscapes that burn: The biopolitics of species conservation and prescribed burning

Abstract:

Canadian species at risk legislation, policy, and practice are a kind of biopolitics, an attempt to articulate a form of species conservation premised on making some species live, while allowing others to die. Prescribed burning, as a make live tool, can permit species rendered 'at risk' to flourish in spaces where their protection is federally guaranteed. In some instances, the presence of species at risk initiate the return of wildland fire, a process historically suppressed in conservation areas like Canadian parks and an important component in achieving the park system's mandate to achieve 'ecological integrity.' This said, not all species benefit from fire, and prescribed burn planning exposes the multiplication of biopolitical projects at work in Canadian national park landscapes. In this chapter I follow two species at risk, woodland caribou and whitebark pine, and trace their different relationships to fire and species at risk policy in Canadian national parks. In doing so, I discuss how the multiplication of make live projects challenges species recovery and the attempts to return a fundamental ecological process to these protected areas. This chapter complements existing literature on the biopolitics of conservation through a focus on wildland fire and urges this literature to consider how ecological processes interrupt or are enlisted in biopolitical projects. This chapter also highlights a tension in Parks Canada's mandate to achieve 'ecological integrity' by identifying the practical challenges of carrying out species-based and ecosystem-based conservation practices in tandem.

Introduction

Whether the tissue of cured grasses, the dry and vulnerable tinder of Canada's forests, or even the bodies of animals unable to escape the largest and most unwieldy wildland fires, the burn is a happening entangled with many bodies and bodies to be (Myers, 2017; Sutherland, 2019). But these burns are also entangled with humans and how we reorder and transform the planet in our wake, challenging any distinction between nature and culture (Pyne, 2012; Haraway, 2015). As this dissertation explores, attempts to reintroduce fire are embedded in many political-economic entanglements. Much like vegetation's role in articulations of fire risk and hazard (discussed in Chapter 4), this chapter focuses on a set of more-than-humans who are entangled in the policies and practices of biodiversity as enacted by Parks Canada. This chapter echoes the work of others who frame biodiversity and conservation as a kind of biopolitics whereby efforts are made to secure some lives over others (Foucault, 2003, 2007; Youatt, 2008; Biermann & Mansfield, 2014). As Biermann and Anderson (2017) suggest, there are multiple modes of conservation biopolitics and they unfold in diverse settings. This chapter argues that an attention to the entanglements between species conservation and wildland fire show how the Species at Risk Act has prompted a multiplication of biopolitical projects that are not always compatible (Hodgetts, 2016).

In this way, I highlight a well-known tension between species-based conservation and ecosystem-based conservation by identifying the challenges faced by those attempting to reintroduce fire to national park landscapes while also weighing the interests of species at risk who may be negatively or positively impacted by this kind of disturbance event. Depending on the species, fire can be considered a benefit or a detriment to their success. While some may flourish in the wake of a fire, others may lose access to habitats that are already considered rare. As such, Parks Canada staff are challenged to enact make live projects for species with different

needs. Further, they must carry out this species-specific work while attending to broader ecosystem-wide processes like wildland fire. This chapter asks: What happens when these different biopolitical projects collide? What can a focus on species at risk policy, fire-use, and fire suppression teach us about what is made to live and what is left to die in protected areas like Canadian national parks? Based on an institutional analysis of the Parks Canada fire bureau and the staff that design and enact prescribed burn plans, this chapter looks at one step in the reintroduction of fire to Canadian landscapes: the prescribed burn plan and its complementing environmental assessment. In doing so, this chapter shows how the goals and practices of contemporary species conservation and the reintroduction of fire do not overlap perfectly and considers how species and humans must navigate this complex policy network in order to exercise such attempts to make live.

Much like the revamped National Parks Act of 1988, which I've discussed elsewhere (Chapter 3), the Species at Risk Act (2002) emerged following environmentalist calls for legislation to protect Canada's ecological values (Boyd, 2003:181) and echoed global transitions in environmental policy. Biodiversity as an organizing principle of the environmental movement and scientific community emerged at the international scale via the Convention on Biological Diversity, which was drafted in 1992 and signed in 1993 (Boyd, 2003; Youatt, 2008). In Canada, the Species at Risk Act echoes the concerns outlined in the convention and has a direct impact on management practices within federal jurisdictions, national parks being one. Through a suite of supporting policies and tools, the Species at Risk Act provides varying levels of federal protection to species with dwindling populations.

In this paper, I echo scholars who position species conservation as a biopolitical project with consequences for humans and more-than-humans alike (Youatt, 2008; Rutherford, 2013; Biermann & Mansfield, 2014; Dutkiewicz, 2015; Braverman, 2015; Lorimer, 2015; Biermann,

2016; Büscher, 2018). Wildfire and prescribed burns, as a form of rewilding and hazard reduction, are sometimes enlisted to achieve these make live projects. In many ways, species conservation uses death to carry out this make live work (Mbembe, 2003; Dutkiewicz, 2015). What 'lives' and what 'dies' is contingent on how species are oriented in relation to policy, legislation, other species, and human actors in this biopolitical framework. Fire is sometimes used to intervene in the ecological dynamics of various species. For example, it may be used to encourage reproduction or provide habitat, while elsewhere it may be enlisted to clear a site of certain species. Species-fire relations are unique and fire's application to landscapes exposes a tension between multiple make live-projects and competing articulations of what biodiversity looks like (Biermann & Anderson, 2017; Fletcher, 2017: 314). Following fire-use into the realm of species conservation teaches us how biopolitics is carried out and interrupted by processes that escape biopolitical control. In following fire-use through the Canadian park system, engagement with this process (or tool) exposes how Parks Canada staff are forced to reckon with multiple attempts to make live and let die.

This chapter's focus on fire pushes the biopolitics of conservation literature in new directions by turning our attention towards a process that challenges distinctions between life and death. Fire as a key mechanism in reproduction cycles, landscape change, and the consumption of flammable bodies ignites a diversity of more-than-human entanglements. Further, as a process that simultaneously allows some species to flourish while leading others to die, fire shows how ecological processes can be absorbed in to the work of biopolitics but can also trouble human authority over the governance of life. When put to work in the context of species recovery, fire can be positioned as both an important tool and absolute threat.

This chapter begins with an overview of emerging work on species conservation as biopolitics. I consider how scholars have put Foucault's theory to work in this emerging literature and identify key contributions made to the more-than-human dimensions of biopolitics. Here, I speak to a specific set of more-than-humans, namely animals, plants, and other organisms made legible by the Species at Risk Act. Next, I review the methods and data that inform this chapter. My multi-sited analyses of the fire bureau at the Parks Canada Agency along with a review of the prescribed burn plans from four national parks in British Columbia and Alberta provide the empirical basis for this discussion. I argue that the Species at Risk Act, along with other pieces of legislation and supporting policy, prompt a set of competing make live projects in Canadian national parks that must also unfold alongside attempts to return fire to the landscape in an effort to ensure so-called 'ecological integrity'. I focus on two specific species entangled with the Species at Risk Act to make this point: whitebark pine and woodland caribou (southern mountain ecotype). Through these two species I discuss how species conservation is enacted, how these species and others become entangled, or enrolled, in the enactment of species conservation, how these multiple projects interact, and how this work prompts a particular geographic challenge to national park staff. I do so by meditating on how fire-use, as a tool in these attempts to make live and let die, comes to expose these distinct articulations of biopolitics. Beyond theory, this chapter discusses the challenges of enacting Parks Canada's mandate to restore ecological integrity and shines a light on how fire-use requires an attention to competing articulations of biodiversity.

Theoretical Framework: Biopolitics and Species Conservation

Biopolitics has been used to analyze diverse contexts, including: the refugee camp (Agamben, 1998), the national park (Lunstrum, 2014), laboratories (Braverman, 2015), and invasive species conservation schemes (Dutkiewicz, 2015). Critical conservation scholars in particular have

pushed the threshold of who and where biopolitics might exist, challenging Foucault's specification that this theory should apply only to human subjects (Biermann & Mansfield, 2014; Braverman, 2015:13). Instead, these scholars apply Foucault's work to a new set of subjects: animals (*See* Shukin, 2009; Collard 2013; Rutherford 2013; Lorimer 2015). While most of this research has focused on animals, plants (particularly trees) are increasingly gaining the attention of this sub-set of critical conservation scholarship (*See* Biermann, 2016). These authors note that to make sense of biopolitics in contemporary times there is a wider world of creatures that need to be attended to. Haraway reminds us that we are surrounded by a 'crowd of other' worthy of our attention as we make the world together and this crowd is more than animal (Haraway, 2008; Biermann & Mansfield, 2014).

Biopolitics concerns the "power to foster life or disallow it to the point of death" (Foucault, 1990: 138). This power is embedded within an apparatus that articulates what it means to foster life, and what lives should live. Lorimer reminds us that when we see the movement from sovereign power to biopower, we see "the concern shift from the behavior of individuals to the management of life at the scale of the (often unruly and unpredictable) population" (2015: 13). Indeed, in the context of species conservation the concern is not with the individual but with the species writ-large. For Braverman, biopower, the power over human and more-than-human bodies, is often articulated through the fluxing and throbbing 'Institution of Nature' which she describes as a wide range of conservation practices, policies, and people entangled with the near global project to secure life at the scale of the species (2017).

Biodiversity, a concept that emerged in the late 1980s and early 1990s, has become an important means of articulating conservation (*See* Paul and Guyer, 1996) and is embedded within conservation biology and the ecology literature more broadly (Youatt, 2008). As an organizing principle relevant to all life,

> "Biodiversity conservation is informed by a desire for panoptic knowledge, comprehensive, and efficient, instrumental management. It seeks to rationalize existing practice through the development and dissemination of standardized criteria and modes of interacting. This involves extensive and diverse knowledge practices, material instruments, and practical, skilled interventions. Efforts to secure and enhance life inevitably involve letting other life die, especially at a time of accelerated extinction" (Lorimer, 2015: 58-59).

This is a project in governmentality, it is about securing the population, articulated here as species, from the threat of extinction (Foucault, 2007, 2008; Braverman, 2015). For Fletcher, biodiversity conservation is one example of an "environmentality," a way of narrating the governance of nature (2010, 2016). Biodiversity is a project where humans are not the only species of concern, rather, "[here], biodiversity comes to inform contested environmentalities geared toward shaping good conservation subjects" (Lorimer, 2015:59) but also specific attempts to make live. Endangered species, as expressions of this orientation towards a specific articulation of life and death, are of particular interest to those exploring how more-than-humans become entangled in forms of biopolitics as either killable or worth saving (Dutkiewicz, 2015; Fredriksen, 2016). The return of fire on the other hand nods to a different articulation of biodiversity, one where the return of ecological processes, rather than specific species, is the goal. In the context of Parks Canada, fire can be enlisted to achieve a wide set of goals, including returning the ecological process in its own right, but also for its role in benefiting specific species recovery projects.[60]

How the lives of various species are entangled in species conservation is not even; biopolitics is not flat, rather, "Biodiversity happens in an assemblage, it inherits and is haunted by particular knowledges, habits, instruments, territories and practices" (Lorimer, 2015:58). In

[60] This is not to mention the major role prescribed fire plays in hazard reduction, see Chapter 4.

the context of Parks Canada, this is embodied by changing federal legislation, park borders and shifting authority, flexible mandates, and an incredibly diverse set of ecological processes and creatures. Further, the knowledges that inform species conservation, ecology and conservation biology, are not set in stone, rather, they are subject to change and have done so over the last two centuries (Youatt, 2008; Anker & Anker, 2009). In Canada, species conservation has had many chapters and distinct geographies (Sandlos, 2009; Loo, 2011). How these knowledges have been articulated in conservation practices have changed and continue to do so, but the focus on species is one that is only beginning to change within the organization.

Braverman explains that the configuration of the species category functions as the central unit of government in this multi-species biopolitics (Braverman, 2015: 228). Her work unpacks how exercises in species conservation are not just static moments of speciation in the past, simple processes of naming, but are continuously evolving and practiced forms of governmentality. Breeding, reintroduction efforts, zoos, and debates around purity, all bear on how species thinking is enacted. She explores how species in labs and zoos are entangled with biopolitics in a different way from their *wild* counterparts. The marker of *wild* has become a means through which lives are given value over others, even within the same species (*ibid.*). The maintenance of 'species' in conservation science thus requires boundary work to define a population not only genetically but also geographically. This all hinges on an attempt to escape a fate worse than death: extinction (*ibid*: 194). Circumventing this *ultimate* death relies on the maintenance and production of the species category and becomes the means through which species stake their worth in relation to other species who continue to flourish.

As such, not all species are ordered equally and there are hierarchies even within the same species. Braverman explains that "[w]hen [species] receive the designation "endangered," *in situ* members of certain species are granted political life, while other—most notably, *ex situ* members

of the same species—often remain biological life. As with *in situ-ex situ*, political-biological is a fluid construction that takes on diverse forms in practice" (228-229). The last wild rhino versus a rhino in a breeding program navigate the same grand biopolitical project, the Institution of Nature, differently, playing different roles in the name of the same species. This isn't to mention those species (and humans) who fail to gain 'at risk' status or those rendered 'invasive' (*See* Sandilands, 2013; Dutkiewicz, 2015).

Braverman explains that "[c]onservation focuses on 'making live.' Less apparent, perhaps, is that within this imperative, conservationists must also determine which life shall be privileged over another, that is then let to die" (230). In the shadow of endangered lives, alien lives, weeds, pests, and domestic lives become rendered killable. As much as species conservation practices are about making live, practitioners are brokers of death (Mbembe, 2003). As such, this chapter explores this theme in greater detail by considering what happens when biopolitical projects overlap and when fire and vegetation challenge normative ideas of what constitutes life and death. Prescribed burning, in its ability to remake ecosystems through combustion, muddies the water of Foucauldian conceptualizations of death.

Putting biopolitics to work in the realm of the animal or vegetal reminds us to remain attuned to the 'significant otherness' of those we come to encounter (Haraway, 2008). Since biopolitics is focused on creatures as a population (as a species) the practice of species conservation becomes focused not on the ecosystem as whole but instead on exercises to allow that particular species to flourish. This prompts a set of practices that are attuned to specifically human attempts to secure, not all species, but those species in crises, and closest to absolute death: extinction. As such, a multiplication of biopolitical projects unfolds when lives are managed at the scale of the species (Hodgetts, 2016). Furthermore, these different projects do not

take place in isolation but, in the context of this project, unfold in discreet spaces like national parks.

While biopolitical projects may rely on the same tools, people, and institutions, to be successful they must adapt themselves to the particularity of specific species, enacting different articulations of what it means to live. While much of the literature on the biopolitics of conservation remains focused on specific species and their entanglement with the Institution of Nature (Braverman, 2015), this chapter describes and analyzes the interaction between a tree, a mammal and an ecological process that escapes speciation. This focus on burning and plants meditates on those who do not fit neatly within the animal category, a set of beings often cited as the opposition to the figure of the human. Plants in their varying abilities to flourish and perish in the wake of fire challenge assumptions about what it means to live and die. In doing so, they call our attention to a vegetal process that often fails to be registered as such (Clark and Yusoff, 2014)

This chapter is an invitation to account for a more nuanced understanding of "the value and significance of multispecies dynamics, and of their interrelations between humans and nonhumans in particular" (Braverman, 231). This chapter adds to this ongoing discussion in the biopolitics of conservation literature by tracing how two specific biopolitical projects unfold, while calling attention to how fire complicates these exercises. As others have shown, paying attention to specific empirical manifestations of biopolitical conservation often highlights not only how more-than-humans are enveloped in relationships of power that privilege some lives over others, but how humans are implicated in these projects as well. For Rutherford, this biopolitical approach invited an analysis of how the hunting and trapping of predators in early Ontario was a means of both controlling species populations while also supporting the lives of early settlers (Rutherford, 2013). Elsewhere, and perhaps at its most extreme, scholars like

Lunstrum have noted how species conservation efforts to curb poaching make humans killable in defence of wildlife (2014; 2017). Like the work of these authors, this research intends to not only identify biopolitical thinking and projects, but to consider the implications of multiple projects, environmentalities, unfolding within the same landscape (Fletcher, 2016; Bluwstein, 2017).

Data and Methods

This chapter is based on my institutional analysis of Canada's national park fire management program. This research took place from 2016 to 2018 with visits to 16 Canadian national parks and is complemented by, in the case of Western Canadian parks, meetings representatives of neighbouring jurisdictions. This fieldwork included site visits to these Canadian national parks, interviews with fire management staff and park ecologists, along with a few former park employees involved in the development of the contemporary fire management program. During preliminary fieldwork in 2016, respondents identified species at risk policy as a key point of friction in using prescribed burns in Canadian national parks. They also cited species at risk recovery as an important entry point for fire's use on the landscape. While some species respond well to fire while others do not. Fire management plans for each national park echo this sentiment.

Access to park staff was made possible through a research permit from Parks Canada. Once granted, this permit included a list of primary contacts in each field unit.[61] I expanded this group of contacts on-site and via email through recommendations from respondents and other park staff. Interviews focused on the work of fire management and species conservation in Canadian national parks. Discussions relevant to this chapter explored the challenges of carrying

[61] Parks Canada's field offices are organized around administrative zones called field units. A field unit is composed of a set of national parks and historic in proximity to one another. While most have a single national park at its centre, others may be composed of more than one park.

out fire management in landscapes where species at risk are a concern. These interviews explored the partnerships and tensions that can arise when carrying out fire reintroduction and species conservation in the same place, including the forms of diplomacy required within the institution to carry out this work. Interviews lasted between one and two hours, in-person and on-site, with few exceptions.

These interviews complemented the analysis of 30 prescribed burn plans and accompanying environmental assessments from the so-called mountain parks: Banff National Park, Glacier National Park, Kootenay National Park, Revelstoke National Park, Waterton Lakes National Park, and Yoho National Park. I supplemented this analysis with a review of fire management plans, park management plans, vegetation management plans, and species recovery strategies for Whitebark Pine and Woodland Caribou (southern mountain caribou). While most documents, such as park management plans, are publicly available, I accessed the prescribed burn plans through an access to information request. Burn plans and environmental assessments identify burns that could impact specific species at risk. These documents are a key point of departure for any discussion of make live projects that are entangled with both fire and a specific species.

This chapter also hinges on an analysis of legislation relevant to species conservation and fire reintroduction. In particular, the Canada National Parks Act (2000), the Species at Risk Act (2002), and the Migratory Birds Convention Act (1994) are of interest. These are pieces of federal legislation that apply to federal land, not to be confused with provincial legislation that apply elsewhere. An oft-cited challenge to species at risk policy in Canada is the pixelated and uneven extent of these interventions. As I've discussed elsewhere, fire and species do not respect jurisdictional borders, but sometimes, managers encourage them to do so.[62]

[62] Recently, Plains Bison (Bison bison bison) were reintroduced to Banff National Park. With no legal protection outside of park borders in Alberta, male bison who have moved beyond park borders have been encouraged to

Enacting Biopolitics

Following the first official prescribed burns in the Parks Canada system in the late 1980s,[63] a series of funding mechanisms were used to finance the relatively experimental encounters with landscapes that burn. Until the early 2000s prescribed burns could be funded in their own right, allowing fire managers to put fire on the landscape to mimic a historical fire regime in Canada's national park forests, parkland, and grasslands. Following the Panel on the Ecological Integrity of Canada's National Parks reports in 2000, this funding required a renewed focus on ecosystems and species in a state of crisis, echoing the earlier Convention on Biological Diversity. Except for funding for hazard reduction, parks would now need to fund more of their prescribed burns through projects that addressed ecosystems and species in a state of crisis specifically. Thus today, besides the reduction of hazard (Chapter 4), the other way in which park managers can put fire back on the landscape is through fire's link with species at risk. Conversely, those carrying out the work of species conservation have to work with their colleagues to ensure their quest to return fire for one species does not contradict recovery strategies for another.

Environment and Climate Change Canada administers the Species at Risk Act with far-reaching impacts for other departments and agencies, including the Parks Canada Agency and the Department of Fisheries and Oceans. The Act (section 6) defines its purpose as:

> the purposes of this Act are to prevent wildlife species from being extirpated or becoming extinct, to provide for the recovery of wildlife species that are extirpated, endangered or

return. One was destroyed. https://www.cbc.ca/news/canada/calgary/bison-killed-banff-1.4790286 (Accessed Nov 29, 2019)

[63] Burns took place before this time but the 1980s marks the beginning of an ecologically-informed approach to fire management techniques within the Canadian national park system. Prior to this burns were used to improve bird habitat for hunting in places like Point Pelee National Park.

> threatened as a result of human activity and to manage species of special concern to prevent them from becoming endangered or threatened.

The act does not just apply to animals but to a wider net of wildlife species:

> Wildlife species means a species, subspecies, variety or geographically or genetically distinct population of animal, plant or other organism, other than a bacterium or virus, that is wild by nature and
> (a) is native to Canada; or
> (b) has extended its range into Canada without human intervention and has been present in Canada for at least 50 years.

It is in this context that the biopolitical regime of the Species at Risk Act (SARA) is articulated. For species to be legible, they must be within Canada, ideally within federal jurisdiction, native (or close to), and an organism that is not a bacterium or virus. These are specifically biological, living things. There are also tiers of species at risk, each with implications for how the act can be applied. These tiers and strategies are enacted by an arm's reach scientific body and a federal government body charged with carrying out their recommendations (See Boyd, 2003 for a more detailed exploration of these two bodies). The category of species at risk includes species that are extirpated, endangered or threatened (Schedule 1), while species of concern are those that "may become a threatened or an endangered species because of a combination of biological characteristics and identified threats." (Schedule 2) (Species at Risk Act, 2002, Sec. 2). The focus of this paper is on those species that are already Schedule 1.

If a species is rendered "species at risk" by the federal government, a series of documents, research, and protocol follows. This network of policy and documents and their articulation constitute the enactment of an Institution of Nature concerned with ensuring the success of the species (Braverman, 2015). The recovery strategy is one document of particular importance as it highlights the key threats to the species, summarizes research relevant to its current status, and identifies ways forward. In some cases, these documents might go so far as to identify critical habitat, protected spaces that hinge on the presence (or potential presence) of the species at risk. This geography of critical habitat overlaps with other enactments of 'at risk' spaces. Except for some early national parks, parks constructed after the 1970s, under the National Park System Plan devised in the early part of that decade, were crafted to represent specific Canadian natural regions. In this quest to safeguard ecosystems, several Canadian national parks embody some last remnants of these representative samples. Grasslands National Park in southern Saskatchewan, for example, is the 'Prairie Grassland' natural region and is home to 12 species at risk (Endangered and Threatened) and 7 species of special concern. In places like Grasslands National Park it is possible to see two different articulations and enactments of conservation, where the possibilities of species-centric and ecosystem-centric interventions play out.

Species conservation is an interagency form of conservation work on the part of the federal government. Parks Canada works within the architecture designed to protect these species as administered by Environment and Climate Change Canada but does so in a specifically *in situ* conservation setting. While some partnerships exist between Parks Canada and the likes of the Calgary or Toronto Zoos, most species conservation efforts take place in the *wild*.[64] Species Recovery Plans, which may be written in partnership with Parks Canada staff, come to bear on

[64] This paper does not do justice to the multiplicity of projects taking place. There are partnerships with zoos to reintroduce individuals raised in captivity, breeding programs at park sites like Elk Island National Park, species at risk "gardens" in parks and historic sites and attempts to safeguard species against the threat of disease.

Park Management Plans, park-specific ecosystem action plans, but also any sort of development within park borders. This said, their occurrence does not always guarantee their protection.

Species are not only articulated in this policy through their physical presence, but also through their habitat. SARA understands that species are not distinct units abstracted from their context and takes steps to identify what it calls critical habitat. The act defines this as:

> the habitat that is necessary for the survival or recovery of a listed wildlife species and that is identified as the species' critical habitat in the recovery strategy or in an action plan for the species." (Species at Risk Act, Sec. 2)

Thus, each species has a particular habitat that may require protection. Once 'critical habitat' is identified it receives special protection, challenging the definition of species as a category defining only animal bodies to one that also includes other components of an ecosystem. This said, the species as the core of that definition, occasionally obscures how other more-than-human relationships unfold within that ecosystem. Though an important piece of policy for its role in keeping the likes of Parks Canada accountable to its mandate of ecological integrity, orchestrating this policy in the real world is difficult. In situating species as the unit of governance, rather than the ecosystem, the Species at Risk Act prompts a multiplication of biopolitical projects. [65] As Fletcher suggests, citing Carrier and West (2009), "it is clear that there is frequently a significant gap between "vision" and "execution" in environmental governance" (2017:314).

As discussed elsewhere (Chapter 3, 4 & 5), fire reintroduction gains its institutional foothold through Parks Canada's legislated mandate to maintain and encourage ecological

[65] Though this is beginning to change with advent of Multi-species action plans and Ecosystem management plans which attempt to account for this multiplicity.

integrity (EI). EI is defined as: "a condition that is determined to be characteristic of its natural region..." (Canada National Parks Act). Or “In plain language, ecosystems have integrity when they have their native components intact” including living and non-living components and processes like fire, floods, and predation (Parks Canada, 2019b). In the last decades, Parks Canada with the help of fire management staff have interpreted EI to include the maintenance of ecological processes. This transition challenges attempts by earlier manifestations of the Canadian parks service to restrict what are now understood as disturbance events. This said, disturbance events such as avalanches, floods and fires also fail to fit neatly within the bounds of categories like species. Rather, such disturbance events and their introduction (if such a decision is possible) hinge on their relationship to the species in question. As such, fires, avalanches, floods, and droughts are entangled with species that thrive in their wake along with those that do not.

The Parks Canada Wildland Fire Management Directive (2017), along with park and fire management plans specific to Parks Canada’s network, have positioned fire as a process ‘in-place’ in Canadian national parks. In articulating how fire fits into the grander narrative of park management, fire management plans are forced to come to terms with other documents such as species recovery plans. Here, these quests to maintain ecological integrity through species conservation efforts can sometimes conflict with other articulations of the quest for ecological integrity. In particular, the SARA poses a challenge to the reintroduction of fire. As the Interim Fire Management Plan for Banff, Yoho, and Kootenay National Park stresses:

> Despite restoration efforts over the past 30 years, monitoring shows that ecosystem health within the parks continues to decline due to previous fire exclusion policies resulting in significant fire cycle deficits. A continued emphasis on fire suppression also continues to heighten socio-economic vulnerability over the long term in the absence of management

> actions to offset these negative impacts. The PCA wildland fire zoning approach with a focus on a landscape that is tolerant of as many intermediate and extensive zones as possible is a step towards a more fire resilient landscape. In recent years, application of the federal Species at Risk Act (SARA) has further constrained the application of fire. While land managers understand that natural events such as predation are clearly excluded in the act, the legislation can make it challenging to facilitate natural processes such as fire, floods, and avalanches, as these activities may constitute destruction of critical habitat. However, because these natural forces are often managed (within the natural range of variability) to strategically protect the public and park infrastructure, they must be formally permitted (via a SARA authorization) if we are to retain the very diversity of structure and resulting biodiversity that is so critical for the persistence of many of these species at risk. — Parks Canada, 2019:7

The frustration identified in this excerpt from the interim management plan nods to a point of friction imposed by contemporary approaches to species conservation. Parks Canada remains a fire suppression agency. While known for their use of fire to achieve hazard reduction goals, scientific inquiry and species recovery, wildland fire is still extinguished in most scenarios. While most of this suppression is informed by a concern for the risk fire poses to infrastructure, human safety, and neighbours, ecological values can also matter.

While SARA species and critical habitat may prompt certain responses to wildland fire (such as an attempt to protect a few remaining species or special habitat), suppression is more focused on containing fire and the legislation is less restrictive. It is less restrictive because wildland fires, unlike prescribed burns, are not considered mechanical intervention on the landscape, a distinction that signals the still ‘unnatural’ categorization of this form of resource management. In order for prescribed burns to unfold, like other manipulations of the

environment (building sites, etc.), park staff must complete an environmental assessment. SARA is one component of this review process. In these cases, SARA can limit or possibly instigate the use of fire under this framework.

While prescribed burn plans map out the goal of the fire and how it fits into institutional objectives, environmental assessments (EA) articulate how this tool will impact SARA species but also sites of cultural importance, infrastructure, and neighbours. Where SAR are present, an EA may outline how a fire will not endanger them, how the changes will be negligible, or how some species may need to die in order for the work to take place. For example, two species I highlight later in this chapter, whitebark pine and southern mountain caribou, have different relationships to fire, the former thrives and even depends on fire to flourish, while the latter depends on habitat uninterrupted by wildland fire. Since my Access to Information Request focused on burns that took place, it is difficult to determine the frequency with which SARA might prevent burns altogether. This said, managers are not ignorant of the relevance of this policy and have a sense of where they can and cannot burn. As one vegetation ecologist explained, when planning a prescribed burn, success lies in attuning oneself to the needs of different species but also the staff tasked with their flourishing:

> And I think having an early conversation with the different individuals responsible for those portfolios is important and then coordinating with national office. So, we have species at risk folk at national office that we need to consult and then the people who have the portfolio on their desk. So […] our wildlife ecologist and she has the caribou portfolio, I have whitebark pine, and then [the fire manager] kind of runs the fire program. So, I think the best success that I've seen is when they've engaged all of us right off the beginning. And we sit in a place like this and we look at some maps, and we overlay those different habitat sensitivities, so what species at risk might be there, what

> the implications might be and then take a step back and I think that's when it has worked really well.

Thus, species influences whether a fire may proceed and how it will do so. Besides a series of reports and decision tools, prescribed burn planning also includes a kind of careful diplomacy in the office and on the ground whereby burns become tailored to species, their needs, and their protection.

Sometimes, managers may use fire as a tool to address the scarcity of a species. For example, fire plays an important role in the life cycle of many species such as black spruce and pitch pine. Fire may also prevent competing species from choking-out species at risk or may be used for the creation of habitat suitable for the reintroduction of certain species, as with Plains Bison in Banff National Park. Because of the division of labour in most national parks, fire managers may attempt to work with their colleagues to introduce fire through SAR, treating them as a vehicle through which to both access funding, and gain the institutional support for conducting a burn (or vice versa where fire is considered a threat). While the ecological value of species at risk is articulated through policies and funding (albeit through a network of resources that must be shared among hundreds of species), the ecological value of fire is more difficult to articulate even within an organization that has had relative success reintroducing fire. We can contrast this with how the economic value of fire has been a key point of departure for prescribed burns focused on reducing hazard (Chapter 4).

Thus, these biopolitical projects are enacted through a network of legislation, policies, and supporting tools. How SARA is articulated is keenly focused on species, the threats posed to their success and the steps required in order to make them live. It is enacted by fire managers, ecologists, volunteers and bureaucrats as they practice species conservation and fire management programs. These human actors are the brokers of nested articulations of life and death and are

instruments to their success and failure. Although this work is practiced by humans, it is entangled with those species these projects seek to protect and those who do not qualify. Further, the death wrought by burning, tests our notion of what life and death mean in the context of species that depend on, or are harmed by, this volatile process. A burn can be one species' saving grace and another's apocalypse. In the next section, I illustrate how this work unfolds through two Schedule 1 species at risk: whitebark pine and woodland caribou, two species with a distinct relationship to wildland fire.

Entangled Species

Woodland Caribou

In 2009, the last of Banff's woodland caribou (southern mountain ecotype) perished at the hand of an avalanche. Following this death by disturbance event, any apprehension towards wildland fire is understandable from the point of view of those interested in the recovery of this species. While the avalanche may have been the final straw for Banff's caribou, a wide range of variables have brought this distinct population to the brink of extinction (Hebblewhite et al., 2010). Extensive habitat destruction and widespread landscape change in the Canadian Rockies have made the old-growth forests on which these charismatic members of the deer family depend nearly cease to exist (Hebblewhite, 2017). Where this habitat exists, extensive human trail networks have made it easier for their major predators, wolves, to penetrate areas normally characterized by restrictively deep snow, areas that caribou are adapted to traverse (Apps & McLellan, 2006; Environment Canada, 2014).

In Canada and the northern US only 6000 southern mountain caribou remain (Environment Canada, 2014:iii). The peril of these caribou echo challenges facing other caribou populations

around Canada (Festa-Bianchet et al., 2011). Canadian national parks have been positioned as important sites not only for the maintenance of critical habitat, this old growth forest the deer depend on, but for the weight of federal policies that apply here. Critical habitat for southern mountain caribou has been identified in Banff, Jasper, Revelstoke, Glacier, Yoho and Kootenay National Parks. Jasper, Revelstoke and Glacier are the only Canadian national parks where these southern mountain caribou remain.[66] Parks Canada thus has a legal obligation to not only protect the caribou themselves, but the habitat as well. The reach of SARA in the case of caribou not only orbits the bodies of these creatures, but their potential home as well.

The plight of the southern mountain caribou has received incredible public reaction but with rather limited attention and action against the threats posed to the species; namely resource extraction in the already limited old-growth forests of BC and Alberta. Fire and wolves, much like logging and mining, have been shown to put these species at further risk (Environment Canada, 2014; Hervieux et al., 2014). Rather than calls to end extraction in their shrinking habitat, the BC government in 2018 was more focused on the destruction of wolves (The Narwhal, 2018). In this sea of hazards to species success, fire, a process with a historical presence on the landscape, *can* pose further risk to the species and their shrinking habitat, as the avalanche, another form of disturbance in mountain ecosystems, had to the last of the Banff heard.[67] This said, it is worth noting that these disturbance events and predators existed prior to Canadian settlement and are not considered the *cause* of the species' decline but remain a threat to the limited habitat left in the wake of extraction activities.

Critical habitat is defined as "the habitat that is necessary for the survival or recovery of a listed wildlife species and that is identified as the species' critical habitat in the recovery strategy

[66] Though as of 2011, the herd associated with Revelstoke and Glacier National Parks numbered only 6-7.
[67] John Sandlos, 2007, notes in his environmental history of caribou conservation that this focus on fire and wolves, as opposed to other factors, was also true for those concerned with the state of Barren Ground Caribou.

or in an action plan for the species" (SARA s.2(1)). Protecting this habitat becomes an important point of tension in the recovery effort of many species. Caribou depend on old growth forest for food and shelter from predators (Environment Canada, 2018). If wildland fire burns down old growth, the already limited extent of old growth deteriorates and with it, the potential success of caribou. A wildland fire 'naturally' burning down critical habitat is positioned as out of the control of PCA managers, but actively attempting to erode this already precious habitat through prescribed burns activates a network of policy and tools that *wild* fire might not.

Southern mountain caribou numbers are at an all-time low in western Canada (Ray et al., 2015). While mostly absent from the national park landscape, southern mountain caribou remain present in other ways. The Species at Risk Act ensures that critical habitat is treated as an extension of the species, interrupting (if not completing disrupting) attempts to put fire back on the landscape. This is not to say that establishing critical habitat is not important, especially in relation to preventing other threats to habitat, but without critical habitat establishment in provincial contexts where SARA only applies in 'emergencies,' critical habitat designations create challenges for those carrying out other forms of conservation work. While this mechanism acknowledges the ecosystems in which species live their lives, they do so by putting the species at risk at the center of that articulation of ecosystem.

Whitebark Pine

While fire threatens the likes of southern mountain caribou, other species depend on it. Whitebark pines are one of the first species to appear following a fire in the Canadian Rockies and adjacent mountain ecosystems. This subalpine pine comes in many shapes and sizes depending on its environment (Environment Canada, 2017). Whitebark pines have traditionally

depended on another species at risk, the Clark's nutcracker[68], for its seed dispersal. In return, the tree provides sustenance for the likes of nutcrackers, grizzly bears, and other animals. The tree also depends on fire to create the open fertile spaces where seeds can germinate and thrive (*See also* Campbell & Antos, 2003; Moody, 2006; Murray, 2008;). Following the introduction of white pine blister rust, a fungus whose lineage can be traced to a shipment of white pines to New York City in the late 19th century, whitebark pine populations have been decimated (Smith et al., 2008). As the *Whitebark Pine Recovery Report* describes:

> There are four main range-wide threats to Whitebark Pine: White Pine Blister Rust, climate change, fire and fire suppression, and Mountain Pine Beetle. These factors also interact, often compounding or accelerating impacts. White Pine Blister Rust alone is projected to lead to a decline in Whitebark Pine of more than 50% over a 100-year time period. The impacts of Mountain Pine Beetle, altered fire management regimes, and climate change will increase the rate of decline. Additional human-activity related threats also affect Whitebark Pine populations at local scales. These threats should be considered in the context of cumulative effects when examining local population impacts. — Environment and Climate Change Canada, 2017

Rust, like the other factors listed above, remain a threat with a high impact to Whitebark Pine. Researchers and park officials in places such as Waterton Lakes National Park have identified immune individuals. Seeds from these individuals fuel breeding programs with their partners in Glacier National Park in the United States.[69] Climate change is also a threat (Environment and Climate Change, 2017), with implications for other challenges such as drought and temperature extremes:

> Shifts in climatically suitable habitat to more northerly latitudes and higher elevations are anticipated (Hamann and Wang 2006, Hamann and Aitken 2013). There are knowledge

[68] In some ways securing habitat and resources for the Clark's Nutcracker is also folded into this project, they are both species at risk and the nutcracker's success depends on that of the pine. In some ways this is another way in which biopolitical projects multiply.
[69] Though beyond the scope of this paper, see Braverman (2015) and Biermann (2016) for more on breeding programs.

> gaps regarding the degree to which Whitebark Pine morphological or physiological plasticity can permit adaptation to climate change in situ. The ability of Whitebark Pine to migrate/establish in newly suitable climates is projected to be slower than the predicted rate of change.
>
> — Environment and Climate Change Canada, 2017: 13

Unlike caribou, the project of making live in the case of whitebark pine is taking place in a variety of spaces. Labs, greenhouses, and hillsides are all entangled in this project of making live. Nutcrackers and other species are replaced with volunteers and park staff who might go in search of immune individuals or take part in plantings following a prescribed burn.

Fires, like volunteers, are enlisted to make park landscapes more livable for whitebark pine. This said, fire has a complex relationship with contemporary whitebark pine on the landscape. In describing the threat posed by fire and fire suppression to species recovery as 'medium-low', the whitebark pine's recovery strategy states:

> Trees can be destroyed by severe forest fires, and depending on site-specific factors, trees stressed by fire may be more susceptible to Mountain Pine Beetle. Fire suppression may facilitate successional replacement by other tree species and reduce abundance of suitable regeneration sites. Mixed severity fires may create regeneration sites and retain mature trees. Fire requirements for recruitment are variable across the range and need to be considered within local contexts.
>
> — Environment and Climate Change Canada, 2017:12

The pine requires the open ground provided by surface fires and the sunny patches provided by the removal of trees (Environment and Climate Change, 2017). But fires can also pose a threat to the remaining individuals immune to the white pine blister rust and high severity fire can destroy available soil. Reintroducing fire is a balancing act. These species are often flagged and may

even receive individual attention during prescribed burning. The species recovery plan identifies specific research and management approaches that apply to the threat of fire:

> • Include Whitebark Pine in Fire Management Plans
>
> • Identify and protect Whitebark Pine critical habitat in the vicinity of planned prescribed fire
>
> • Identify and protect other high-value individuals and habitats, particularly areas with local high densities of healthy, putatively resistant trees, and/or high elevation (treeline) stands with low competition from other species
>
> • Minimize damage in these areas by: completing pre-burn fuel reduction work (e.g. thinning); using water delivery systems to protect stands/individuals; developing prescriptions to take advantage of naturally occurring moisture differentials, pre-identifying stand configuration to inform ignition pattern
>
> • Plant Whitebark Pine seedlings post-burn
>
> — Environment and Climate Change Canada, 2017

Thus, fire's presence in Canadian national parks is entangled with the recovery strategies for species at risk, the presence or absence of the species on the landscape, and human intervention (in addition to concerns for human safety and valuable assets, as described in Chapter 3 &4). This said, all of this work can go up in smoke if unmanaged fires take place, as Parks Canada staff learned in Waterton Lakes National Park following the Kenow wildfire in 2017 when the fire destroyed newly planted trees.

What these empirical details suggest is that how make live projects are articulated hinge on the species themselves. Southern mountain caribou and whitebark pine are each entangled with SARA in different ways, and paying attention to fire helps to illustrate these differences. Fire threatens caribou critical habitat; SARA and its supporting mechanisms make planned fire in

these regions difficult (though not impossible). Meanwhile, whitebark pine resistant to blister rust are planted following prescribed and wild burns. Their recovery is also tied to the role they play as a food source for other species at risk, like the Clark's nutcracker. While southern mountain caribou and their status as a species at risk may limit the use of fire on the landscape, whitebark pine may be used to not only justify this work, but pay for it, since some funding for fire is accessed through funds intended for species recovery. Species benefit from a kind of legibility that disturbance events like fire cannot achieve under current mechanisms. Species, rather than processes, can be understood to be at risk. Further, as the next section considers, species at risk policy does not just prompt a multiplication of biopolitical regimes, but in orbiting species as the category of concern, prompt situations where make live projects interrupt one another.

Multiple Projects to Make Live

Prescribed burning is a way of making landscapes more livable for some creatures, but not all. It is used as a tool to open up the canopy for certain species of tree to grow, to clear excess 'fuel' buildup on grasslands and forest floors so that new vegetation can enjoy the rush of nutrients released by fire, to encourage meadows for foraging, and as an agent for combatting invasive species.[70] While some species may flourish, others may perish, not just as a repercussion but as a necessity. Managers find that what is 'good' for one species may be 'bad' for another, and in this form of management the lives that live are specific. Fire in its application to the landscape is not just used for the reduction of hazard, but a means of facilitating make live projects. Burning, as a process of undoing, can also disrupt and even threaten other projects to make live. In the quest to

[70] Though these efforts can in fact improve habitat for invasive species or needs to be coupled with aggressive herbicides.

restore ecological integrity by returning fire, fire managers rub up against other projects inspired by the same quest. Thus, following fire into the realm of species conservation can teach us about the architecture of the policies and tools that have been crafted to carry out this work because it teaches us about the limits of these processes to make live. Further, such observations encourage us to consider how fire itself is entangled in a biopolitical regime of its own, given the restrictions in place to control fire's ability to make live and let die.

The parks in the Canadian Rockies have been at the forefront of fire-use for vegetation and species management. The work completed in Banff, Kootenay and Jasper are of particular interest because of the highly volatile nature of the landscapes staff are tasked to care for. As I've already discussed, species at risk are a means of both gaining approval and funding for prescribed burning projects. While the mountain parks also have a pool of funds for hazard reduction (burns that reduce the threat of fire around communities and infrastructure through the mechanical manipulation or fire used to create fuel breaks), threatened species elsewhere in the national park system are a gateway to funds to support cognate ecological efforts, like the reintroduction of fire. It is through these populations that some fires are made possible. These activities might also allow species which are not at risk, but are fire-adapted, to benefit from the burns.

Interviews with park staff identified that, with some variance, each fire requires diplomacy with wildlife and vegetation ecologists from the local field unit. When burns are carried out, fire managers, along with their colleagues, are tasked with ensuring their plans to return fire to the landscape comply with other park mandates, policies, and legislation. SAR are a particular point of concern. While recovery plans orbit the interests of specific species, park management plans are tasked with considering a wider field of view. In these instances, not only are park staff accounting for the impact burns will have on values at risk, tourism, public health, and

ecosystem health, but they must also navigate the interests of multiple and sometimes several species at risk. An ecologist speaks to this topic:

> Yeah, and there's a lot of really good things to be said for our Species at Risk legislation, in that it does allow us to preserve a lot. Like it gives us a mandate, and a very specific one, to preserve certain habitat types. The deficit in that legislation is that it kind of makes you focus on one species instead of the ecosystem. So, it can be a bit of a, like if you get too wrapped up in it, [and] you have your blinders on thinking about one species, you can kind of forget about the processes that might impact or benefit or be negative for other species as well. […] Whereas species at risk legislation is really good because it maintains a species at risk, […] it really forces you into looking at that one species instead of that multi-species [ecosystem], which I think our ecologists recognize, and so does national office. Like they're starting to. And especially as we get more listed species, for example bats are just being listed and things, […] then all of a sudden you have three competing things that are all legislated. So like bats are different than caribou, which is different than whitebark. And what if it impacts bats but doesn't impact caribou? Or what if it impacts caribou, but not the other two? So, you do, I think overtime, as more things are listed, it will force you to do more of that ecological approach. But especially with new legislation and a new mandate with the critical habitat, it really has kind of made people focus almost a little too much, I think, on specific species instead of an ecosystem as a whole.

From my conversations with park staff, it was clear that they were attuned to different make live projects and the challenges multiple projects had on the ground. Further, they understood that they have a role in these projects and a responsibility to these species in question.

Make live projects are enacted both through policy and civil servants. In carrying out this work, park staff are forced to make sense of these projects, and as a result, build the geographies of where burning is acceptable. This geography is crafted in relation to the descriptions of critical habitat outlined in the Species Recovery Plans and local fire management plans that may already outline some of these species at risk issues while also acknowledging the wider questions of public safety and fire hazard (Chapter 4). In articulating these interests during initial consultations for prescribed burns, an ecologist explains how this work takes place geographically:

> So, if we could identify... well, if we shift the footprint this way then we could maintain some of this more critical habitat […]. If we shift the polygon just a little bit over, we could protect these individuals and create more whitebark pine habitat rather than destroying critical habitat [for another species] at the same time. While we are having those conversations at a field unit level, we also have to be talking to national office because that's kind of where sometimes...there can be a communication breakdown as well, is if we are proceeding with something [where] they don't understand the background and context, and we have to go back and explain everything. It has actually been working out pretty well here; I think we have been engaging the national office, especially caribou folks, and [the wildlife ecologist] will be able to give you her perspective on that, but it seems like [our park] has been a leader in maintaining that connection, so trying to make things work on the landscape for caribou as well as fire and whitebark pine, and allowing that to happen.

In some instances, the species in question does not even need to be present in order for this geography to be articulated. In the case of some mountain parks, this becomes a process of protecting habitat rather than actual members of the species. Here, larger more-than-human

communities are enlisted in the process of making live, even when a member of that species is not present. Single species conservation is a point of tension for some fire managers. While they recognize the role of SARA, it is a difficult pill to swallow for staff dealing with a process that they believe is just as natural and threatened:

> [W]hat drives me crazy is single species management, where we get hung up on the needs of a single species, and that dictates what we can and can't do [for] all the other species that are either fire-adapted or fire-dependent. Aren't we doing detriment to them by focusing on one species, as opposed to being like 'look at the whole landscape as a whole', [shouldn't we be asking] what historically did it do? Because historically caribou moved through here, so ok, we should burn...it would have burned in the past. [In this case we] are guided and strongly influenced with respect to fire for a single species that isn't even on the landscape anymore.

These species with the ability to interrupt prescribed fire can be contrasted with those who might be sacrificed in order to facilitate it, to prop up a make live project for a species that depends on burning of some kind. Lodgepole pine that outcompete whitebark pine, not to mention the individuals that burn in the process, are cut down in order to encourage the flourishing of immune whitebark pine. Though not the case within the borders of Canadian national parks, wolves may also be sacrificed in order to foster the success of southern mountain caribou.[71] Beyond the examples of Whitebark Pine and southern mountain caribou, invasive species may be sacrificed in the name of native species, fish may be culled in order to protect distinct populations of trout, and captive critters may become sacrificial breeding stock for their kin beyond the lab.

[71] Wolf predation is identified as a key threat in the caribou recovery strategy, and in provinces like British Columbia, wolf culls are often articulated as a possible solution to dwindling caribou numbers.

The questions of who lives and who dies, in the context of multiple biopolitical projects, become a key component not just of prescribed burn planning, but species conservation. Further, the different life spans, reproductive contingencies, and species mobilities challenge anthropocentric conceptualizations of life and death, living and dying. Burning as a process premised on the combustion of bodies living and dead in the name of life, muddy the waters of what a successful make live project looks like.

To say these projects are unfolding with even intensity would be a mistake. In this particular case it was pointed out by multiple individuals across park sites [and in documents retrieved from Parks Canada] that quite simply, trees and caribou, though in theory equally important under the Species at Risk Act, were treated differently. As one vegetation ecologist put it, trees are less of a concern:

> If I make a decision that impacts some tree there is a certain portion of the population that will be very vocal but it's very different than what you'd expect from a charismatic megafauna. It shows how our society is built. I personally think whitebark pine are very charismatic.

Jamie Lorimer suggests species conservation as a biopolitical project must also navigate the charisma of certain species (2015). Reflecting on the quote from the vegetation ecologist above, it is easy to imagine the charisma animals might have over their vegetal kin. Charisma as articulated by the weight a species may carry in the imaginations and political will of Canadians or through their interpretation through park staff, come to bear on how negotiations may take place as park staff attempt to navigate species at risk policy. Trees or fungus, while activating the same policy and species conservation tools, may not have access to the same networks of allies and scholars that could contribute to their liveliness.

But there are limits to the implications of this charisma. Human life and livelihood also have currency in the field of species conservation and fire management. As an ecologist speaking to the tools that authorize prescribed burning explains, humans come first:

> So [evaluation a prescribed burn plan is] kind of managing these different values, and ultimately human safety comes first […] you can do something to negatively impact an endangered species so long as it has immediate human safety considerations. Like if a fire is burning and there's a house here, with people in it, and there's a tree here that's species at risk, you don't focus on that tree, you save the house. And that's how our organization runs.

Thus, these make live projects are not just entangled with those of more-than-humans, but humans as well. It isn't to say that these human-centred biopolitical practices negate those that entangle more-than-humans, but to consider how these projects reinforce and trouble one another.

Geographies of *Making Live*

SARA applies within federal jurisdictions but may be applied to provincial jurisdictions in 'emergency' situations.[72] In other words, this legislation does not have the same teeth outside of federal jurisdictions. In the case of southern mountain caribou, this is a major hurdle to overcome. A lack of coordinated effort across jurisdictions has been criticized for the failure of states to address declining numbers (Ray et al., 2015). For species that are relatively mobile, like southern mountain caribou, the distinctions between federal and provincial jurisdiction challenge the success of make live projects, not to mention those who might traverse international borders.

[72] Further research should consider this particular action in greater detail as biopolitical projects can essentially be used to widen the grip of federal authority over provincial land.

Just outside parks like Revelstoke National Park and Glacier National Park in BC's interior, park land is adjacent to crown land where extractive industries are prepared to make active use of natural resources at the expense of southern mountain caribou and their habitat. For park staff working within the borders of Canadian national parks, this mosaic of jurisdiction raises the stakes for species within their care.

Similar to enacting tough species at risk policy, fire reintroduction efforts are a somewhat novel mandate for a government institution in Canada.[73] Fire reintroduction requires a great deal of planning, funds, and the often politically volatile task of reintroducing ecosystem disturbance. Reintroducing fire not only threatens values at risk (Chapter 4) but also the lives of species at risk, human lives, and those that might escape the agency's concern. As I've discussed elsewhere, many tools are used in the creation of zones where encounters between fire, more-than-humans, and landscapes that burn can take place (Sutherland, 2019). A closer look at how SARA is implicated in this process shows that in general it has become much easier ***not*** to set fires than it is to set them. Fire, as it does with values at risk, poses a threat that can be avoided. Reintroducing fire requires managers and landscapes to bear the risk. A resource conservation officer explains this through two familiar species:

> The big one we have that has a fire dependency is whitebark pine. […] The biggie though, it's nothing compared to caribou. The woodland caribou is changing how we do business because [..] one of the natural processes that is detrimental to caribou is fire. So, it's an interesting paradox because we know from fire histories and all our science that we're in such fire deficit in a place like [this] National Park where we should have way more fire than we have. But the other side of the coin is my colleagues that are two doors down are saying that we don't want to have fire because fire is really detrimental to the

[73] Fire reintroduction is happening in BC, Alberta, and within Indigenous communities. This said, the scale of these practices is limited.

> dwindling populations of caribou. So, all of a sudden from a fire management point of view it makes it a lot harder for me to get the hectares burned that I'm supposed to do, that I'm supposed to do every year. And it also means that in caribou country we have to try to put fires out in places where not 10 years ago those fire management areas were identified as what we called extensive zones or zones where fire is acceptable, and we just monitor it. So now all of a sudden, we've gone from just monitoring it to- we gotta throw the kitchen sink and everything in between at it, because we don't want to burn out this caribou habitat.

Caribou illustrate how the needs of some species are easier to maintain than others, but also illustrate how the spatial articulations of this work vary. While other species may depend on fire, SARA makes the reintroduction of fire not only difficult in some places but dangerous, often bracketing and even refusing mechanisms that are required for other species to flourish. What is often framed as single-species conservation has wide-ranging implications for the geography and success of conservation efforts within national parks.

Though the above case study does not challenge the category of 'species' it is interested in how this species thinking is put to work. In the context of fire management, as was the case with southern mountain caribou, caribou themselves did not necessarily need to be present in order to disrupt prescribed burn planning. Instead, critical habitat as an articulation of species' presence also came to matter. Here, species came to territorialize parts of the park, thus limiting the use of burning to achieve other goals. In a sense, there is a hierarchy of mattering, ecosystems come to matter first through species at risk, then through their own collective value. This said, some species benefit from piggybacking on the needs of species at risk (for example, fescue grassland in any attempt to improve habitat for plains bison in Banff). As some respondents noted, there is a risk that park management at an ecosystem-level becomes carried out through a kind of

species-centrism. Such points of friction illustrate well-known tensions between species-based and ecosystem-based conservation strategies.

But these challenges have not gone unnoticed. Sites throughout the Parks Canada system have been in the process of creating multi-species action plans. Particularly in regions where many species at risk reside in close proximity, the tools designed to aid single species fail to make sense in small parks that are very biodiverse and home to many species at risk. In places such as Point Pelee National Park in southern Ontario where over 50 species at risk call the national park home (not including those yet to be listed under SARA) (Parks Canada Agency, 2016), park officials have been able to move from the multiplication of make live projects to more nuanced approaches that take the needs and threats to different species seriously through multi-species action plans (*See* Parks Canada Agency 2016). Though limited in number, they are an approach of interest to ecologists and fire managers alike.

For some, it is just a matter of letting the legislation and supporting policy do its work. In some contexts, if species live in the same ecosystem, they likely have similar relationships to disturbances like fire. One ecologist explains:

> Well, there are so many different competing things. Like if you look at one species and you do single species management, umm quite often they can conflict, because what Grizzly Bears need, is different from what Caribou need, which is different from what Whitebark need. But if you look at an ecosystem and you think of the different components and what you could do on the landscape to benefit the ecosystem and the whole, rather than single species, a lot of it is fairly common sense, I guess. You kind of need that natural mosaic, you kind of try to mimic that natural disturbance regime because ultimately that is going to benefit your native species in the area. So, and I think that's why I said it's not as hard as you think, because sometimes we get caught up in our

> little silos and we're like ahh I'm only thinking about Whitebark Pine, I'm only thinking about Caribou, but if you take a step back and you look at the landscape what's best for all those species is the natural disturbance regime that is meant to be here. So, if we can mimic that as closely as possible, then it should theoretically benefit the ecosystem as a whole.

For those who focus on fire management, SAR policy is just one of many components of the landscape to navigate. Seasonality, tourism, the breeding seasons of migratory bird, the impacts of suppression on forest fuels, and funding mechanisms all contribute to how this work is carried out (Sutherland, 2019). What comes out of this case study of two species is a question of how processes like burning fit into an approach to conservation that premises some of its most hard-hitting policy on the category of 'species'. While wildland fire, human induced or otherwise, has made its way into national park legislation and policy, reconciling it with other federal policy can expose the limits and hierarchy of said policies. Though species at risk policy fulfills an important role in creating clear legislation that aims to protect species on the brink of extinction, it restricts processes that do not guarantee life but rather are premised on death. Burning as a process that challenges distinctions between life and death exposes a specific articulation of what life means in the context of federal conservation policy, one that may not be compatible with ecological processes that put this geographically restricted project at risk.

Conclusion

This chapter argues that species at risk legislation and policies are the enactment of a kind of biopolitics. Humans, more-than-humans, and policy all become entangled in the performance of these multiple projects to make live, or what Fletcher would call a set of environmentalities (2016). For woodland caribou and whitebark pine, this is articulated by a focus on the presence

and the number of creatures, but also via the habitat they require. Burning as a make live tool is tangled in competing articulations of life and death which orbit specific species. These needs may provoke conflicts between conservation goals, showing how these projects overlap and interrupt one another. By considering the link between the reintroduction of fire and species at risk policy, I explored how burns both contest and support the needs of various species, and how these species function as important catalysts for the use of fire on landscapes. The definitions of making live and letting die become nested in specific ecological articulations of these concepts. This complements earlier chapters that focus on how specific economic understanding of value restrict fire use and spread (Chapter 3) and how these encounters with fire are also composed of more affective encounters between humans, species and fire (Chapter 4/Sutherland, 2019).

The chapter adds to a growing literature that takes more-than-human biopolitics seriously. In doing so, we learn that some species, in many cases those that are vegetal, may be sacrificed in order to support the conservation of species at risk. The practise of sacrifice can take many forms. For example, in the case of caribou where fire-use is limited, it is species that might flourish in the wake of fire that are forfeited in order for caribou habitat to be maintained. Elsewhere, plants might need to 'die' in a narrow sense of the word, in order for whitebark pine to flourish in their wake. As such, this chapter answers the call of others to take vegetal actors seriously (Head et al., 2014).

This chapter also contributes to a discussion around the geography of biopolitics. The biopolitics of species conservation takes place in many spaces, from mundane office discussions to the fire line of active wildland fires. Further, the biopolitics of *in situ* conservation prompt challenges distinct from those of *ex situ* conservation. The challenges posed by having multiple species in the same place are of particular importance. While research has focused on the how biopolitics operates in the lab or zoo (Braverman, 2015; 2012), or in the context of rewilding

campaigns (Lorimer, 2015), or in the illegal wildlife trade (Collard, 2013) literature exploring how biopolitics operates in the field has some room to grow.

This chapter, though not an evaluation of species at risk policy, flags some important implications of contemporary policy and practice. In part, it offers a critique of single-species conservation efforts through social theory. An approach inspired by Foucault shows how species conservation as make live projects focused squarely on a specific population can hinder the success of wider institutional goals; a limited field of view that may bracket ecologically important species and processes. Further, this chapter shows how 'processes', specifically disturbance processes, escape consideration, particularly those that challenge our notions of life and death. In Chapter 4 I explored how disturbance as an ecologically valuable process is bracketed because of the risk it poses to values at risk. In this chapter I show how fire can become bracketed by the value and authority granted to specific species. Fire, though an important tool for enacting biopolitics, it is not completely legible to biopolitics. While Parks Canada's legislated mandate to protect ecological integrity leaves the window open for maintaining processes like wildland fire, legislation such as the Species at Risk Act maintain a focus on species as an organizing category of conservation thus complicating the effectiveness of fire suppression and fire-use.

While beyond this chapter, it is worth noting how species conservation and settler colonialism are entangled. The wilderness that SARA attempts to guarantee through articulations of critical habitat in some ways props up the maintenance of national parks as sites devoid of people yet also spaces for human consumption. Further, regarding Indigenous peoples and other ways of knowing these places and beings, these policies can have implications for harvesting rights and the co-management of parks premised on shared authority of conservation policy and practice. For those who intend to use biodiversity as an organizing principle in Canadian

conservation, there must be a discussion around what knowledges and forms of power are inherited by this form of environmental care.

All of this said, we cannot lose sight of the fact that this legislation is meant to address a threat we may share with these species: extinction. In the shadow of global environmental change there seems to be an impression that forest fires, limits on economic growth, and losing a few species whose value is difficult to articulate, will be the worst of it. Relative to what *could be,* contemporary species conservation shows how comfortable we are living on the 'edge of extinction' (Van Dooren, 2014). While the Species at Risk Act does important work, it simultaneously prompts and interrupts prescribed burning and does not have relevance in regions where species decline is happening the fastest. As others who have explored the concept of environmentalities, these projects often fail to challenge the primary cause of crisis (Holterman, 2020). There is an irony that disturbance events, however 'natural' they may be, can be bracketed while the leading threats to species at risk remain unchallenged.

Calls to *return* fire and species to the landscape fail to name the processes that have narrated their interruption and extermination. The 'success' of such environmentalities rests in bracketing the threats wrought by the colonialism-capitalism nexus while heralding the relatively small gains made in these parcels of national nature. The march towards extinction for these species was not inevitable, but the result of the transformation of these more-than-human assemblages into a nature that could be consumed and even put to work.

Chapter Seven: Conclusion: Burning for a new future

Fire challenges assumptions in ecology, social theory, and our very idea of what is 'natural'.[74] It defies, or queers, distinctions between material and immaterial, between nature and culture, and between cause and effect (Clark, 2011; Pyne, 2012). In this dissertation I've positioned fire as a happening (Tsing, 2015; Myers, 2017), or as Edwards and Gill might call, a fiery entanglement (2016), a process fuelled by past human-environment histories, entangled with human and more-than-human actors, and embedded in creating *new* socio-natural histories. Fires, through the plants that fuel this process and the landscapes they disrupt, create their own temporalities and demand human attention (Ogden, 2011).

Much like other socio-natural processes that society frames as disasters, wildfires are set to be fanned by the dynamic changes wrought by global climate change (Flannigan et al., 2009; Wotton et al., 2017). The danger is that wildfires, as the spectacular and charismatic processes that they are, will be understood *only* as the result of global climate change and *not* as processes that are firmly in-place. Balancing the recognition of fire's presence in the world, while also recognizing human complicity in its transformation, is a task for both fire practitioners and pyro-scholars alike (Pyne, 2009; Neale, et al., 2019). When we learn to pay attention to *both* the "social" and "natural" components that compose these processes, or better-yet collapse those distinctions all-together, we find that our own vulnerabilities are tied up with those we would rather ignore (Laska & Morrow, 2006).

[74] Much like my focus on ice in my Master's thesis, fire as something that escapes, or troubles, categories prompts some important questions for the enactment of some pieces of policy that rely on static and containable natures.

In this era where wildfires are viewed as an illustration of an angry planet, or used as a metaphor for pandemics and political unrest, it is important to show how fire has been and can be positioned and encountered differently today and, into the future (Neale, et al., 2019). In 'returning' fire to Canadian landscapes, and Canadian national parks in particular, this project has illustrated how this form of "resource management" has been steeped in a long trajectory of changing conceptualizations of what fire management, and "nature" more broadly, is about. An optimistic take on this research is that it has shown how these approaches can change. While fire management remains a project in securing human life and capital, it has also become a process in making sense of how fire is tangled up in other projects and with other beings. In fact, our vulnerability to this process makes change legible, if not necessary. What is troubling is that some of these changing approaches are fuelled by a concern for the sustainability of contemporary capitalist relationships with fire, and not with the incompatibility of these relationships.

During my fieldwork, my interest in fire was excited by a concern with another process that transcends such dualisms of nature and society, the so-called Anthropocene. This epoch framed by some as a time of human domination and destruction (Crutzen, 2006), has received growing attention as the threat of global environmental change is felt, albeit unevenly, across the planet. In the context of this research, locating the Anthropocene in the narrative of Canadian wildland fire management is an exercise in itself. As Chapters 3 & 4 illustrate plainly, the reorganization of landscapes to fit the desires of capitalism is propelling this process, though a concern for a changing climate fuelled by global petro-capitalism is certainly on the radar for Canadian fire managers. As such, the Capitalocene is perhaps a more appropriate name for the period we are in and one that identifies how these changes are a product of specific relationships to the planet *and* to each-other (Moore, 2014). While this name may help make sense of our

current situation, to others, this epoch should not name what has transpired but should name what *could be,* an era punctuated by different and more just ways to live differently together (Collard et al., 2015; Myers, 2016, 2017; Haraway, 2017),

In dwelling on how Canadian national park fire management responds (and sometimes fails) to the changing conditions of wildland fire in Canada, this dissertation shows how this process is capable of pushing back as policy and practices are continuously interrupted and challenged by fires that escape containment and emerge at inconvenient times. As such, these burns and the landscapes that fuel them are not just processes to be witnessed, but like global environmental change, are processes to respond to (Barad, 2007). Through this dissertation's discussion of the limits and possibilities of contemporary policy and practice, it lays out some productive ways for thinking about learning to live-with fire, and thus learning to live-with and *in* an era punctuated by unruly natures changed by the impacts of human exceptionalism. For the next generation of fire managers, the challenge will not only be about confronting the interruptions wrought by land management practices but will also include the challenge of making sense of uncertain climate futures.

As an institutionalized set of practices designed to encounter what has become an unruly Capitalocene process, I want to use this conclusion as a place to identify both the key findings presented in this dissertation and the lessons that can be learned from paying-attention to processes like fire and how they can be used as a means of imagining other ways of living. In asking how fire management might be otherwise, it invites a reflection on how our planetary future might be imagined otherwise (Myers, 2016, 2017).

Learning to Pay Attention

> *"What happens if we begin from the premise not that we know reality because we are separate from it (traditional objectivity), but that we can know the world because we are connected to it?" Katherine Haynes 1995:48*

Ecological thinking within the Canadian park system allows for a set of new registers through which to encounter fire. Chapter 5 provides the reader with a glimpse into the possibilities of taking fire, and thus plants, seriously through both scientific and affective registers. The respect that fire practitioners have for fire's ability to erupt from their control, and for the way this process can transform landscapes and create new futures in its wake, are an illustration of these distinct registers (Neale, 2018; Struzik, 2017; Neale et al., 2019). In an era marked by human encounters and entanglements with the world, the art of paying attention is a lesson to be taken from the work of fire management and brought into new world-making processes. In the experience of Parks Canada fire managers, failing to take the 'flammable futures' (Neale, 2018) of landscapes seriously has resulted in contemporary obstacles, including muddy fire histories and fuel-burdened sectors. Yet, these obstacles have also become key points of reference from which to improve contemporary practices, as fire managers attempt to locate and reduce fire hazard and, in a few cases, bring in Indigenous partners. Broadly speaking, the art of paying attention, or what Barad might refer to as our response-ability (2007), is not just about registering more-than-humans and their own possibilities but seeing ourselves in these processes and encounters.

Fire managers and the bureaucracy they work within (and through) acknowledge some of these registers, while others remain bracketed. In the context of Canadian settler colonialism,

Indigenous fire knowledge is one of these registers that for some time has been actively if not violently extinguished. As Edwards and Gill find in the Australian context,

> "Whilst paying some attention to Aboriginal relationships with fire, […] attempts within wider Australian society to develop new cultures to enable 'co-existence with fire' (Howitt, 2014) have tended to focus on the science of fire and fire management, the logics of planning and response and the building of ever more complex fire resources and institutions. (2016:1081)

Like their Australian colleagues, Canadian national park managers have continued to read the landscape through an ecological register, one firmly embedded within institutional mandates, with only passing engagement with other ways of knowing landscapes that burn. While this ecological register has invited the production of new tools and an alternative way of living-with fire, they remain embedded in the settler resource imaginaries that bore these protected areas in the first place (Bella, 1987; Youdelis, 2016). What is fascinating is that in following these 'fiery entanglements' (Edwards & Gill, 2016:1082) through the process of burning, park managers and critics alike expose the contradictions of their own approach that claims to simultaneously know fire while bracketing the vulnerabilities the state helps to craft (Simon, 2017).

Yet, my interviews with park staff also note an affective register with which fire managers encounter these more-than-human happenings. For those carrying out this work, there are ways of knowing that go beyond scientific instruments and management plans. As I discuss in Chapter 5, these come to light during the prescribed burn. In preparation for the burn, they marry their measurements with their senses of touch and sight as they make sense of the burning conditions. While they decipher the world in anticipation for the act of ignition, they are attempting to use their knowledge gained through experience with other fires as a means of making knowing landscapes that cannot be completely made legible by algorithms and

instruments (*See* Neale, 2016). These experiences not only allow them to make sense of burning conditions and fire behaviour, but to enter these encounters, these contact zones, with a sense of *respect* for what this process can do. It is not only fire's ability to *escape* containment, but the embodied danger such events can pose to their colleagues, the public and the space they are tasked with guarding. While I have been somewhat critical of the decisions that prompt containment strategies, namely the securing of resources or values at risk, one cannot completely bracket the sense that at times the repercussions of fire's volatility can also mean death of a human kind tethered to one's own mortality.

It is by paying attention, and positioning landscapes that burn as companions in the burning process, that there is hope for the possibilities of imagining and practicing the world differently. While conducting interviews with Parks Canada employees I was struck by the enthusiasm some of these managers had for engaging Indigenous people in the fire program. As I've discussed, in places like Point Pelee National Park this has included the presence of Indigenous communities at prescribed burns with some members igniting the fires for themselves. Elsewhere, I was struck by the relative commitment to Indigenous communities who opposed the use of fire, like in Kejimkujik National Park where the wishes of communities *not* to burn in the park were respected despite a desire on the part of some resource management staff to carry out such fires. While there is an enthusiasm to engage such communities, their ways of knowing fire are not completely legible to national park policy and legislation in the same way that ecological knowledge has been made legible (Nadasdy, 2007). While there are tools evolving to carry out this work, and legislation that might guarantee access to park landscapes, these communities do not necessarily have the *authority* to encounter fire on the landscape. Fire management, as I've discussed, is the jurisdiction of the settler colonial state. Further research on fire and questions of sovereignty are needed.

There is a sense in emerging policy documents that Indigenous approaches to fire are compatible with ecological modes of encountering wildfire, among other ecological processes and management techniques, but such approaches must be *contained* within the parameters set by Parks Canada. Ecological thinking coupled with the maintenance of contemporary economic and political relationships continue to govern Canadian national parks. And yet, in this 'fiery entanglement' there is an opportunity to see the friction in these relationships and imagine something different (Neale et al., 2019). This is not to say that the onus should be on Indigenous communities to light a path for settlers, but that settler institutions would do well to establish a sense of responsibility that does not re-center colonial authority. As those within fire management circles are already learning, the exercise of paying attention to where institutional approaches fail, or are interrupted, are the spaces in which alternatives can be sought and even demanded.

Decisions that Haunt Us

One of the key components of planning a prescribed burn is making sense of how fires and other processes have unfolded in the past, an exercise in remembering how fire has been encountered and by whom (Sutherland, 2018). As I discuss in Chapter 5, encounters between fire managers and landscapes that burn are not just an encounter with a process contained to a static present, but is instead an encounter with landscapes hundreds, if not thousands, of years in the making (Myers, 2017). For fire managers at Parks Canada, one of their primary tasks is to *remember* how things *used* to be. While this exercise in reading the landscape for ecological clues of fire's past and present is no doubt carried out through an ecological register, staff are also attuned to institutional clues as well. As I discussed in Chapter 3, a century of fire suppression efforts in Banff National Park had to be properly understood and attended to in order for fire managers to find any success with their fire suppression and fire ignition efforts. And yet, these exercises are

tangled up in discourses and archaeologies of an original pre-settlement nature. While there is an Edenic element to these quests to *return* fire to their rightful place on the landscape, it is clear that contemporary managers (along with early proponents of fire-use) understand these landscapes as peopled and as interrupted by colonialism. While I have argued that these exercises in fire management authorized by the federal institution are dominated by attempts to contain and wield fire, it must be said that at least some of the program's success comes from the ability of fire managers to reflect on their present and past encounters with landscapes that burn.

Much of contemporary fire management is not so much about doing something new as it is about quite literally putting out fires fuelled by earlier interventions. These troublesome obstacles to ecological integrity, such as species decline and unburned fuel, are met with bureaucratically narrated combustion. As I discuss in Chapter 4, risk reduction is as much about attending to an era of suppression as it is about protecting values at risk. The uncomfortable irony that attempts to exclude fire have prompted current woes is not lost on those practicing fire management. They understand that what they are dealing with is not an undisturbed and pure wilderness, but the product of diverse human histories on the land. As such, the advent of fire histories and fire management plans that focus squarely on understanding earlier fire dynamics does not necessarily signal an attempt to recreate a lost past (a pre-modern ecology) but can instead be thought of as an attempt to make sense of how colonialism and ecosystem management fail to treat landscapes as dynamic and borderless places. As Neale (2015), suggests, fire practitioners are often forced to work within the confined limits of their institutions' ontological and institutionally mandated assumptions.

In these ways, the legacy of past decisions comes to *haunt* contemporary managers in volatile and unexpected ways. These hauntings, "traces of more-than-human histories through which ecologies are made and unmade" (Tsing et al., 2017: G1), are an opportunity for fire

managers to consider other ways of living. For these practitioners, there is indeed a sense that they are dealing with a kind of ruin, albeit one that is simultaneously flourishing and dying with fire's absence. As such, those hoping to move out of the Anthropocene can learn from their sense of respect for uncertainty; the sense that human dominion is not absolute and that there are multiple futures before us. Much like our inability to imagine a way out of the Anthropocene, institutionalized fire management is restricted by capitalism and an inability to move beyond human (settler) temporalities, but such restraints should only be thought of as obstacles.

In the empirical chapters of this dissertation one can locate the different kinds of hauntings fire managers, and settler bureaucrats at large, must reckon with. In Chapters 3 & 4 I described how even in the wake of the hopeful prospects of ecological thinking, fire management remained focused on risk reduction, containing the burn's threat to values at risk and the resource landscapes parks find themselves in. Where possible, fire use was put to work in order to address earlier encounters with fire. In Chapters 4, 5 and 6 I describe how fire has been used as a tool to meet institutional mandates, namely the reduction of hazard on the landscape so as to maintain operations and the maintenance of ecological integrity (mostly enacted through fire's connection to species at risk). While fire-use is no doubt figured as a tool in policy, in practice, as I discuss in Chapter 5, these burns are better understood as encounters, whereby the institution as embodied by fire practitioners, must navigate an unruly and possibly disastrous more-than-human process. In some instances, these attempts to domesticate fire occasionally flare up when burns escape, fail to transpire, or burn too soon. These kinds of events simultaneously outline the contours of the burn's ability to be more-than-human while instigating attempts to tighten that human grip.

These accounts of encounter document the settler-bureaucratic means of encountering fire, and as such colonialism haunts all such encounters. While many parks and fire management

plans note the relationship between Indigenous people and landscapes that burn, these same parks only rarely engage this kind of Indigenous knowledge. In some places Indigenous partners are brought to witness fire, share knowledge, and share ceremony, but this knowledge does not find its way into burn plans or management plans. There is likely a politics behind this lack of exchange, Indigenous people do not *have to* share their knowledge with federal bureaucracies, and this is certainly an avenue of future research. Yet, these exercises in coming to know landscapes that burn are also exercises in recognizing how much Indigenous knowledge has been harmed in the wake of settler colonialism and how settler colonialism has remade landscapes. As Indigenous scholars, such as Davis & Todd, suggest, what has been labelled the Anthropocene began with colonialism (2017). In so many ways, those learning to live-*with* fire are also grappling with living-*in* colonialism, a kind of haunting we should probably be much more attuned to (See also Whyte, 2016, 2018; Erickson, 2020).

Repair or Care? Learning to Live-With Fire

If park managers are aware of these lively, material and embodied hauntings of mistakes both past and present, what does it mean to carry out fire management? Does it mean repairing past mistakes as though a technical fix can resurrect lost species and ecosystems, or does it mean attempting to live in the ruins of capitalism and colonialism (Tsing, 2015)? In one vein of the critical literature on the Anthropocene, there are calls for finding a way to care for more-than-humans, and each other, in this era marked by violence and dissolving entanglements (Collard et al., 2015; Myers, 2016, 2017). This act of 'making kin' with others is not particularly novel in the context of Indigenous relational ontologies, but it is radical in the context of settler states like Canada where such exercises have the potential to subvert colonial (and humanist) relations (Simpson, 2011; Todd, 2015; Haraway, 2015).

What the case of wildfire management teaches us is that finding ways to care requires paying attention to our ghosts and our monsters (Tsing et al., 2017), the entanglements that emerge as a result of our own mess-making (Tsing, 2015:151), and finding allies and kin. As such, this is no easy task and one must consider if the state is able to carry out such radical work. My discussions with fire management staff at Parks Canada and beyond illustrate that practitioners do not position fire as though it is something separate from the so-called environment, nor is it a process distinct from human affairs. For some, who also happen to be well versed in the work of environmental historian Stephen Pyne, there is an understanding that they are dealing with something that is coproduced, a kind of work that they are called to participate in. For fire managers, while there is certainly an attempt to *repair* landscapes, they are doing so with the agency that the bureaucracy and the institution of fire management allows. Repair simultaneously notes a sense of responsibility and resistance, an interest in repairing something to a given state, and thus an acknowledgement, at the very least, that the current state of affairs is less than desirable.

This frustration with the complexities of repair rings true in Chapter 6, where I describe what happens when multiple attempts to make live overlap and interrupt attempts to return fire and species to the landscape. While these biopolitical approaches to species conservation are perhaps not the kind of care, some scholars have in mind, they are an attempt to secure a kind of life in the face of extinction. This chapter explored how these processes that often treat species in isolation, favouring the species over the ecosystem, create tensions and can limit components of fiery entanglements that fail to be embodied by a "species." Yet, in the presence of these overlapping, multiple environmentalities (Fletcher, 2017), I described how those working within the Parks Canada Agency learn to enact a kind of diplomacy with their colleagues concerned with the impact of fire on *their* species. To get on with the work of fire management, this

diplomacy is extended to several sites as fire managers attempt to put fire back on the landscape while attending to the concerns of colleagues, neighbours and critters.

What all four empirical chapters make note of is how this work of putting fire back on the landscape requires an attention to multiple temporalities. The decisions made in the present, depending on the creatures that will live and die in the wake of a burn, have the potential to impact the lives of others far into the future. Fire making is future making (Neale, 2018; Neale, et al., 2019). For fire practitioners, the kinds of fires they set, or fail to, have the potential to reach into futures that extend beyond their annual budget, career or even lifetime. For those who understand the temporal stakes of fire management, this care for landscapes that burn brings with it an attention to creatures and humans beyond their own present. For those looking to get out of the Anthropocene and into something new, this is a valuable lesson. Rather than an era that wagers the future to fulfill the needs of the present, how might our attempt to care for the planet and for each other be designed to mimic the temporalities of happenings like fire? What fire management teaches us is that the stakes must be made clear and we must learn to see ruin, even if it looks beautiful.

Our relationships with fire *can* and *should* be diverse given that each fire is produced by its socio-natural context. While the case of Canadian national parks offers a glimpse of what can be done when new ways of governing and knowing fire are made possible, it also hints at how our contemporary encounters remain entangled with the past. As Canadians move into a future where fire is set to become a more pronounced feature on the landscape, institutions with the authority to govern this process should consider if contemporary approaches are sustainable in the long term and ask themselves what might need to change. As critics have noted (Roberts, 2013), an important question to ask ourselves regarding the Anthropocene and fire management is: What are we protecting here?

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