

SUSTAINABLE MANAGEMENT OF BACKCOUNTRY TRAIL NETWORKS IN
BRITISH COLUMBIA: TOURISM, TECHNOLOGY AND CLIMATE CHANGE

BY

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ABSTRACT

Sensitive backcountry environments are more accessible than ever before due to technological innovation, the effects of climate change, continued resource extraction and a growing tourism sector in Western Canada. Current regulations and management practices must be adapted to protect these ecologically sensitive areas. While existing academic literature discusses the ecological impacts of nature based tourism, there are limited resources available that provide insight into holistic land management solutions specific to remote backcountry trails in British Columbia (B.C.). This research examines the relevance of current industry standards, best practices and policies of trail management, design, construction and access and in their application to backcountry environments. A community-based participatory research (CPBR) methodology provided the foundation for this study. Twenty-one semi-structured interviews were completed between September 1st and December 13th, 2018 with key industry stakeholders who currently use or manage trails in backcountry environments. The interviews identified gaps in existing knowledge and assisted in the creation of an online survey tool used to gain insight from trail user communities. The survey was sent out using *Survey Monkey* to various social media platforms, primarily targeting backcountry recreation media outlets. In total, there were 400 survey respondents from across B.C. This research provides insight into the contemporary challenges trail managers face related to technological innovation and shifting environmental conditions. This study identifies opportunities for further trail user education and encourages a more collaborative land management strategy for summer use of sensitive backcountry environments. The multiple overlapping interests that compete for control of public land in B.C. adds a layer of complexity that is a critical aspect in discussions of backcountry recreation management. While focusing on sustainable management of a growing industry, this research provides additional insight to better understand the effects that climate change is having on tourism economies in Western Canada.

Keywords: backcountry recreation, sustainability, environmental practices, community-based research, land use management, parks and protected areas, policy development, conflict resolution

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CHAPTER 1

Introduction

Technological innovations, a growth in trail based tourism, continued resource extraction and climate change are having a direct impact on the way recreationalists are accessing backcountry trail networks in the province of British Columbia (B.C.). Access to ecologically sensitive backcountry environments is becoming easier and industry regulation and management practices must be adapted to protect these critically important spaces. Within the province of B.C., “Supernatural British Columbia” has been the marketing campaign run through Destination British Columbia for the last 30 years (Destination B.C., 2017). B.C.’s unique environmental, cultural and political landscapes have made it a leader among nature based tourism destinations in North America (Freeman & Thomlinson, 2014). With 944,735 square kilometers of land mass, 27,000 kilometers of coast line and a variety of temperate rainforests, glaciated peaks, alpine tundra, arid grasslands, and freshwater lakes and rivers, there are many ecosystems to experience within the province (B.C. Ministry of Forests, 2003). Two thirds of Canada’s wildlife can be found in B.C. and this incredible biodiversity further adds to the province’s appeal to both residents and visitors (B.C. Ministry of Forests, 2003). One third of the total land mass in B.C. is above treeline, and consists of alpine terrain, subalpine wildflower meadows, rocky peaks, icefields and glaciers (B.C. Ministry of Forests, 2003). An estimated half of the province’s land mass is described as “wilderness” or “backcountry” lands by government organizations. These regions are defined as “unroaded primitive and semi-primitive lands that represent the bulk of British Columbia's wilderness resources” (B.C. Ministry of Forests, 2003). While road infrastructure is expanded each year, these primitive and semi-primitive lands are the location in which many tourism businesses operate. They are where resource extraction such as forestry, mining, and oil and gas exploration occur, and they are also the location in which this study has been conducted. Most importantly however, these lands are the home, the lifeblood, and the facilitator of deep cultural meanings and connections for diverse Indigenous communities who have been living on what has been redefined as “Crown land” since time immemorial (Mason, 2014).

There are multiple competing economic, social and historical interests for land use within the province. Forestry, mining, oil and gas exploration, agriculture, tourism, and

conservation initiatives continue to grapple for access and control of B.C.'s natural resources (Frame, Gunton & Day, 2004). The legacy of colonization further complicates the matter with ongoing treaty negotiations surrounding unextinguished Indigenous title to the land (Harris, 2002). With an inherently complex political landscape, the additional pressure of technological innovation and climate change in the context of trail based tourism have presented new challenges that land managers must address.

The key objectives of this study are to examine the appropriateness of industry standards, best practices and policies related to the management of backcountry environments from a recreation context. Current literature focuses on the management of multi-use recreation trails specific to low elevation, front-country trail networks (Davies & Newsome, 2009; Freeman & Thomlinson, 2014; Marion & Wimpey, 2016; Newsome et al., 2016; Quinn & Chernoff, 2010). While important contributions to the field of recreation management literature, these studies have two distinct gaps. They focus primarily on the ecological effects of recreation trails, offering little insight into management solutions and they are not specific to the unique cultural, environmental or political landscape of B.C. The histories of land-use policies, the development of multiple layers of parks or protected areas, and the conflicts between trail users, tourism and natural resource extraction industries, make B.C. a fascinating location for this study. In addition, the assertion of Indigenous traditional rights on unceded territories adds a layer of complication that is a critical aspect to the discussion of backcountry recreation management (Cruikshank, 2005; Palmer, 2005). Existing front-country trail management practices are not appropriate for the sustainable management of backcountry multi-use trail networks. This research project demonstrates that new land management best practices, specific to backcountry environments, need to be developed in order to manage a growing trail based tourism sector, rapid technological innovation and the compounding effects of climate change on sensitive backcountry trails.

This research aims to assist land managers, government policy makers, regional Indigenous communities, business owners and community planners with the adaptation and further development of sustainable tourism strategies for backcountry environments. While centering on sustainable management, this study develops a better understanding of the effects that technology and climate change are having on tourism economies, and profiles a growing sector that will bring alternative value to resource dependant communities in Western Canada.

The following key questions have been addressed in this study: 1) What management tactics are businesses and land managers in the province of B.C. employing to sustainably manage their backcountry trail networks in the face of technological innovation, a growth in trail based tourism and climate change?; 2) To what extent is climate change having an effect on the timing, availability and overall experience of backcountry trail users; 3) Are trail users connecting their experiences on the trail to climate change?; 4) What opportunities do backcountry trails provide as a tool for education and climate action?; 5) How can the capacity of trail managers within the province be augmented to better manage the growth and increased access to backcountry environments?

Contextualizing Backcountry Trail Use

A backcountry region is often considered to be a remote, sparsely inhabited rural area that is difficult to access. The definition of what constitutes a backcountry trail is often subjective. Variables such as the difficulty of access, the proximity to large populations, trail infrastructure, the number of people using the trail, the physical characteristics of the trail itself, the feeling of remoteness and the objectives of the trail users factor into the definition. A review of existing trail design and management literature has shown that there are no standardized or consistent definitions of a backcountry trail or where the transition occurs between frontcountry and backcountry trails (B.C. Recreation Manual, 2001; Parks Canada 2006; Webber, 2004, 2007). For the purpose of this study, I will define a backcountry trail as: a natural surfaced, single track multi-use trail that may be signed and maintained, that travels through remote forested, subalpine and alpine regions. These trails are typically outside of municipal city limits and require more planning and preparation to access. A frontcountry trail will be defined as a heavily managed network of trails, close to communities that are easy to access, require limited planning, have a higher concentration of users, and have a higher level of trail infrastructure, signage and maintenance.

Literature Review

As trail based tourism continues to grow, research on balancing the socio-economic, environmental and political responsibilities of tourism and land use is gaining momentum in

academic circles. In order to fully understand current trail management challenges, it is critical to overview the available academic research on the topic.

Tourism is currently a \$853 billion dollar industry worldwide and is a \$18.4 billion dollar industry in the province of B.C. It has grown 41.3% since 2007 and now contributes more to the province's GDP than oil and gas extraction, mining, forestry and agriculture (DBC, 2017). The value of trails, and trail based tourism to local communities in B.C. have been highly profiled by government and community organizations during the last decade (Destination B.C., 2018; Hassall, 2006). Destination British Columbia (DBC), in partnership with destination marketing organizations have completed multiple impact analysis studies on the socio-economic and health benefits trails bring to local communities (*see Figure 1*).

KEY BENEFITS OF RECREATION TRAILS:

- **Economic** – increased tourism spending, greater business investment, enhanced property values, and higher tax revenues
- **Community** – increased economic development and diversity, increased understanding and respect for heritage and culture
- **Health** – improved health and physical well-being, for both individuals and communities
- **Environment** – enhanced environmental awareness, better understanding of our natural heritage, and better stewardship of the environment
- **Transportation** – greener transportation and commuting use of trails contribute to overall community and regional sustainability

Figure 1 - Key Benefits Of Recreation Trails (B.C. Trails Strategy 2012)

These studies include: The Sea to Ski Mountain Bike Survey, 2016; The Tourism Kamloops Mountain Bike Economic Impact Study, 2015; The Golden and Rossland Visitor Studies, 2011; The Social and Economic Impacts of BC Recreation Sites and Trails, 2011; The Sea to Sky Mountain Biking Economic Impact Study, 2006; as well as numerous master trail planning documents and reports for communities throughout the province.

While there are multiple factors affecting the trail based tourism industry, a large emphasis is being put on the collaborative and meaningful connections made between government organizations, communities, local businesses, individuals and the surrounding environment through the use of trails. As a result, there is significant opportunity for trail associations and local businesses to capitalize on the development of trail based tourism experiences and forms of recreation for the general public.

There are many overlapping interests when it comes to land use in B.C., with unique layers of government jurisdiction and industry regulation. For adventure tourism operators, such as those offering guided hiking and mountain biking in backcountry areas, the Adventure Tourism (AT) Policy regulates commercial use of public land, which makes up roughly 94% of the province (see *Appendix 1*) (B.C. Ministry of Forests, 2003). The AT policy defines adventure tourism operators as:

The commercial recreation/tourism operators and educational institutions who provide outdoor recreation/tourism activities on provincial Crown land including: training, transportation, guiding, accommodations or other commercial recreation/tourism improvements, food services or entertainment for compensation or reward, received or promised, from residents and non-residents of B.C. (FLNRO, 2015, p. 4).

Under this definition, it should be noted that helicopter companies that provide access to backcountry environments for mountain biking, hiking, and skiing fall under the AT policy, and must adhere to corresponding regulations. Within the policy, there is a section outlining compatible use to determine if a tenure application is appropriate given the existing users of the land base, and the likelihood for conflict to occur. The compatibility matrix states that if hiking or wildlife viewing is an existing activity for example, and mountain biking is proposed, it is given a “limited compatibility” ranking, meaning, the proposed activity has the potential to moderately impact the activity of the existing adventure tourism tenure holders operation. In order to be permitted access, a joint use agreement must be met between all existing tenure holders and the proposed tenure applicant (FLNRO, 2015). Due to the constantly evolving nature in which people are using, accessing and traveling through the backcountry, amendments of the AT policy are ongoing. It should also be recognized that the AT policy only governs commercial recreation on Crown land (hereinafter, referred to as public land), and does not currently have a robust mechanism to manage conflict between resource extraction industries and public interests.

The Influence of Technology in Backcountry Recreation

Previous research has found that technology can assist in access to backcountry trail networks. The comfort, safety, exchange of information between managers and trail users, and the amount and type of participation on trails has been improved through technological innovation (Ewert & Shultis, 1999). Technology has brought many advancements to backcountry recreation, the first being the construction of the railroad in Western Canada

during the late 19th century. This facilitated access for tourists and recreationalists with the ability to travel to the more remote regions of southern mountain chains in Western Canada and the newly created national parks (Fluker, 2009). Throughout the 20th century, technology continued to make access to backcountry locations easier, by way of road infrastructureⁱ, vehicle modernization, mapping, signage, and trailhead development. Technology has also influenced the way we travel in the backcountry, with the development of mountain bikes, snowmobiles, all-terrain vehicles, helicopters, float planes and backcountry skis and splitboards (Ewert & Shultis, 1999). Every piece of equipment currently used in the backcountry has benefited from technological innovation. It has been argued in contemporary literature that while some recreationalists use technology to access and travel through the backcountry, an increasing number of people access the backcountry to use their technology (Ewert & Shultis, 1999). There is a growing body of knowledge that highlights the impacts of information technology such as social media, on tourist travel behavior, decision making, marketing, communication and the exchange of information (Leung, Law, Van Hoof & Buhalis, 2013; Munar & Jacobsen, 2014; Zeng & Gerritsen, 2014). While this research adds valuable insight to the conversation in regards to tourism and recreation literature, there is limited information available specific to the effects of technology on backcountry recreation, let alone in the context of B.C. Ewert and Shultis (1999) provide a contribution to the discussion, however, they do not delve into the complexities of management implications or potential solutions to use technology to better assist backcountry trail managers. The rate of technological innovation is advancing much faster than the literature focused on technology in tourism and recreation. Existing literature is outdated and does not capture the modern issues of tourism recreation management. An opportunity exists to provide recent data on the actual effects of technology on trail based recreation specific to backcountry use in B.C. but also in a much broader context.

The most recent technological advancements pertinent to backcountry access within Canada is the 2016 release of a helicopter bike rack from Aero Designs Ltd. It has created an economically viable tourism opportunity for helicopter companies in Western Canada to fly mountain bikers into sensitive backcountry environments. The ease of access and unregulated

ⁱ The development of road infrastructure throughout B.C. is largely a result of resource extraction. There are over 600,000km of resource roads throughout the province that provide extensive access to recreationalists traveling in the backcountry (Government of B.C., 2009)

nature of this new activity, known as heli-biking, is a source of concern among ecologists, existing trail users, business owners and land managers. During the 2017 Mountain Bike Tourism Symposium in Revelstoke, B.C., the impacts of heli-biking in the province were examined. A primary concern was that helicopter companies were offering transportation to mountain bikers on Crown land without the appropriate land use tenure, a direct violation of the AT policy. This has created conflict with existing trail users as well as adventure tourism operators who have spent ample time and financial resources to abide by the AT policy and Land Act, only to have their product compromised by the increased number of mountain bikers on backcountry trails. Due to the relative infancy of the heli-biking industry, government officials have been working diligently in consultation with key stakeholders to develop policy and regulation. These companies are now facing pressure from land managers, business owners and local communities to abide by the rules and apply for a license of occupation and adventure tourism tenure if they wish to continue to provide heli-bike access to remote backcountry trails on public land.

The Compounding Effects of Climate Change on Tourism Economies

While the growing number of trail users is putting added pressure on backcountry ecosystems, climate change is exponentially increasing environmental challenges by limiting the timing, availability, and demand for tourism products (Scott, Jones, & Konopek, 2007). Climate change is projected to intensify visitor related environmental pressures on the land base as we experience more seasonal weather extremes. In addition, climate change is promoting an increase in resource extraction due to wildfires and insect infestation (Amelung, Nicholls, & Viner, 2007). For example, current land use planning completed in the province must take into account the future environmental impact of climate change in order to be relevant a decade from now (Kaján & Saarinen, 2013). Indicators such as mean annual temperature, precipitation, as well as changes in vegetation cover, wildlife movement patterns and increased natural disturbance such as wildfires and floods need to be accounted for when planning and regulating how land will be used in the future (Luckman & Kavanagh, 2000). Amelung et al., (2006) found that climate change will redistribute the spatial and temporal movement of tourists due to climatically ideal conditions moving poleward. Regions at higher latitudes will see shifts in their peak seasons, as well as a lengthening of their overall operating season. One study suggests that visitation to the mountainous regions

of Western Canada could increase by up to 36% by 2050 as the warm weather tourism season is extended (Scott, Jones, & Konopek, 2007). This has the potential to further increase not only the number of people using backcountry trails, but the length of time these trails are being used during the operating season. While a slight increase in temperature could provide more favourable summer weather conditions, extreme weather events such as flood, fire, drought and intense storms have been found to discourage tourist visitation (Kaján & Saarinen, 2013). In addition, scientists have found that treeline regions at higher elevations are advancing up slope in response to climatic warming, thus reducing the amount of open, alpine and subalpine meadows suitable for the desired trail development recreationalists are looking for (Luckman & Kavanagh, 2000). Due to the combination of climate change and human influenced mitigation of natural burns, forest fires are predicted to increase in frequency and severity in mountainous regions of Western Canada (Scott, Jones, & Konopek, 2007). It has been well documented in academic literature that forest fire smoke directly impacts the quality of visitor experience as well as tourist visitation periods (Hystada & Keller, 2006). With increased forest fire severity and a lengthening of the fire season, tourism businesses in B.C. that rely on the natural capital of backcountry environments will experience reduced economic stability. As a result, land use planning in B.C. is becoming more critical. However, it is further complicated by the complexities of the province's land use history and ongoing conflict on the land base. As recreational activities become more accessible in fragile backcountry environments, existing literature suggests that regulation and management practices must be adapted and further developed to manage recreational conflict to foster sustainability.

Conflict Management in Recreational Spaces

When introducing new forms of recreation to a trail, or increasing the number of users on a trail network, conflict is likely to occur if not managed appropriately (Neumann & Mason, 2019). Anecdotal evidence from land managers and recreationalists has shown that increased access to backcountry trails is creating conflict between trail users. Several decades ago, Jacob and Schreyer (1980) found that conflict among outdoor recreationalists can take place when a goal or objective of one user group is interfered with by another user group's physical presence or behaviour. Conflict is likely to occur at the interpersonal level when an individual's physical behaviour alters the desired social or physical components of the

experience. It can also occur in the form of social values conflict, when user groups do not share the same values or culture of respect surrounding an activity (Vaske et al., 1995; Vaske, Needham, & Cline, 2007). An example of this would be conflict between trail users and resource extraction. The knowledge, stimuli, or evidence of a new clear cut in an area a trail goes through can ruin the experience for the trail user, even when no direct contact is been made between the two user groups (Carothers, Vaske, & Donnelly, 2001; Vaske et al., 2007).

Much of the research involving conflict in recreational spaces has focused on interpersonal conflict. Interpersonal conflict has been found to be present between motorized and non-motorized trail users (Vaske et al., 2007), and also between non-mechanized trail users such as hikers, mountain bikers, horseback riders, trail runners and dog walkers (Carothers et al., 2001; Tumes, 2007; Cessford, 2003). Kyle, Graefe, Manning and Bacon (2004) found that as resource and place dependence increase, recreationalists are less likely to rate social and environmental conditions as a problem. If the groups share a common goal, such as outdoor summer recreation, but differ in the mode by which they achieve their goal, hiking vs mountain biking, then both interpersonal and social values conflicts are likely to be present.

Based on previous research, it can be hypothesized that an increase in the number of backcountry trail users will lead to increased conflict on the trail networks. A New Zealand study found that on frontcountry trails the visually distinctive effects of a mountain bike tire on a trail tread surface led 75% of hikers to believe that mountain bikers were the primary cause of trail degradation and erosion (Cessford, 2003). This research found that hikers perceived there to be a safety hazard presented by the mountain bikers due to the speed and quietness at which they traveled. The majority of these concerns however, came from hikers who had never actually had an encounter with a mountain biker and they were basing their judgements on social values and visual references such as tire tracks. Interestingly, hikers who had encountered mountain bikers on the trail system were less likely to report conflict. It was concluded that there were large gaps between the perceptions of conflict and the realities experienced between trail users.

As trail based tourism continues to grow, it is critically important that the human impacts on wildlife and sensitive backcountry ecosystems are managed in a holistic and precautionary manner that puts long term ecological integrity ahead of short term economic

prosperity (Barros & Pickering, 2015). Human-wildlife conflict mitigation is a primary source of concern and one that has the potential to drastically change the way commercial operations and the general public use public land in B.C. (Quinn & Chernoff, 2010). In the spring of 2018, federal Minister of Environment Catherine McKenna declared an imminent threat to the remaining 229 animals in the southern mountain caribou herds. The declaration moved jurisdiction of caribou protection from the provincial level to federal control and brings the potential of an emergency order which could halt further resource development on public land identified as critical habitat for caribou. This has significant implications for logging, mining, oil and gas, and tourism industries, as well as public access to backcountry trails (Dave Bulter, personal communication, 2018; Festa, Bianchet, Ray, Boutin, Côté & Gunn 2011).

Regardless of the source, it has been found that conflict in a recreational context can be mitigated through effective two-way communication, the identification of trail user requirements, continuous user education through appropriate signage and outreach and the proper design and construction of both single and multi-purpose trails (Neumann & Mason, 2019). Researchers have demonstrated that the distribution of information to all trail users of best practices, trail etiquette, rules and management decisions is key to ensuring user compliance and reducing overall conflict (Carothers et al., 2001; Cessford, 2003; Jackson & Wong 1982; Kyle et al., 2004; Neumann & Mason, 2019). Understanding the specific needs and desires of new and existing trail users will lead to a more positive experience for people recreating on the trails. Tumes (2007) found that if a recreationalist leaves a trail feeling upset or disappointed after the experience, it may result in that person choosing not to return to the place where the incident occurred, or worse, they may choose not to participate in that recreational activity again. This has serious implications for land managers and business owners who rely on providing exceptional experiences to guests.

Research has shown that a trail designed using sustainable building techniques is one way to reduce environmental impacts to the trail system, as well as conflict between trail users (Parks Canada, 2006; Webber 2004, 2007; Marion & Wimpey, 2010; Marion & Leung 2004). Designing and building trails that are specific to intended users, while considering aspects such as grade, sight lines, trail width, and technical difficulty will help trail users achieve their recreational goals. If a trail is maintained for its original use, there is a higher probability that the intended user group will continue to recreate on the trail. If the trail is

neglected or improperly maintained, an opportunity exists for the intended users to go elsewhere, or for non-intended users to start recreating on the trail (Olive & Marion 2004). Several studies have found that a regularly maintained trail will help prevent potential conflict among trail users (Spence, 2007; Koemle & Morawetz 2016; Newsome et al., 2016). Continued maintenance of a trail network will also ensure that signage is kept in place to promote user compliance, best practices and general trail etiquette. The vast majority of this research has been conducted on front-country trails, and much of it has yet to be applied to backcountry environments.

In addition to conflict with other trail users and wildlife, British Columbia has a history wrought with conflict focused on contested title and rights cases of the occupation of unceded lands, and control over resource extraction industries. Indigenous peoples in Canada were displaced from their territory with the creation of the reserve system, as well as the establishment of National Parks (Mason, 2014). Land was allocated in the form of Indian Reservations that were “owned” by the colonial government and held in trust of the Crown (Curry, Donker & Krehbiel, 2014). Within the province there have been few treaties negotiated between the federal government and First Nations, Inuit and Métis. Treaty making was abandoned by the federal government in the early twentieth century and was not resumed until 1973 when Canada revisited the question of Indigenous title in areas that had not been subject to treaty negotiations (Curry, Donker & Krehbiel, 2014). Coincidentally, in the 1920’s the same technological innovation that brought tourism to Western Canada industrialized the resource extraction industries in the province. Rail, logging trucks, skidders, chainsaws and mechanized equipment revolutionized and increased efficiency to the point where noticeable alterations started to take shape on the land (M'Gonigle, 1988). Control and commodification of B.C.’s natural resources was firmly in the grip of the colonial government and it wasn’t until 1989 that the Province established the Premier's Council on Native Affairs to address the social, economic, and land injustices that have been facing Indigenous peoples in British Columbia since European contact. While exploitation of natural resources continues and shows no signs of slowing, efforts have been made to reconcile historical injustices with Indigenous peoples in Canada (Curry et al., 2014). However, there is still vast opportunity to improve collaborative government to government planning and consultation in the management of natural resources and use of unceded territory (Morton, Gunton & Day, 2012). Control of the landscape has traditionally been

dominated by the natural resource extraction industry. Today the tourism industry is having increasing influence on the development of land use policy within the province (Gooch, 2013). While existing literature highlights proactive change in land use policy and relations with Indigenous groups, there is still an immense need for collaborative planning that accounts for the ongoing effects of climate change, technological innovation, natural resource extraction, and the assertion of Indigenous rights.

The Ecological Impacts of Increased Trail Use

The environmental impacts associated with an increase in trail users, as well as easier access, is a major source of concern among land managers, business owners and government officials. Previous research has shown that both hiking and mountain biking can contribute to the informal creation of trails, and when not managed appropriately, will have negative impacts on soils, surrounding vegetation and wildlife (Ballantyne, Gudes, & Pickering, 2014; Newsome & Davies, 2009; Pickering & Barros, 2015). Thurston and Reader (2001) analyzed the ecological impacts of mountain biking and hiking on vegetation and soil erosion and found there was no significant difference between the trail degradation of mountain bikers and hikers on specific terrain features. However, they did demonstrate that the addition of mountain bikes to an already popular trail network increased trail degradation due to a greater number of people using the trail. Specific to hiking and mountain biking, the mode of transportation had little significance in determining the severity of the trail damage. Similarly, another study investigated the effects of trail design on soil loss and found that the actual design of the trail had the most impact on trail tread erosion and soil loss (Marion & Wimpey, 2010).

With the emphasis from Parks Canada on the joint mandate of bringing Canadians into the natural landscape while at the same time protecting it, it is critical for land managers and business owners to align the sustainability of their trail networks with that of the continued preservation of sensitive ecosystems and the wildlife who depend on them. This research is diverse, and while it covers many intricate topics that have been well documented individually in academic literature, there are very few research projects that tie together aspects of land use, a growing tourism economy, climate change, continued resource extraction, as well as technological innovation to address the issue of sustainable management of backcountry environments. While studies have shown that conflicts in

recreational spaces exist, they also indicate that with proper management practices, the potential for conflict to occur can be greatly reduced, and thus increase overall user satisfaction. An opportunity exists to fill multiple gaps in knowledge related to the development and adaptation of sustainable tourism management strategies for backcountry trails.

Methods and Methodological Approaches

A community-based participatory research (CBPR) approach was used to provide the foundational framework for this study. Over the last two decades there has been an increase in CBPR research and a surge in the development of guiding principles to ensure the integrity of the methodology (O'Fallon & Dearth, 2002). While a CBPR approach is commonly used to understand complex social and health challenges (Wallerstein & Duran, 2010; Frerichs, Lich, Dave, & Corbie-Smith, 2016; Stanley et al., 2015) the guiding principles of the framework suited this study given the complex challenges and adverse effects of land management practices to local communities across B.C. Throughout the research process I sought to incorporate community perspectives and feedback, as well as accurately represent the concerns among trail managers and trail users. The National Institute of Environmental Health Sciences (NIEHS) recognized a number of principles of CBPR that guided the development of this study:

- 1) To promote active collaboration and participation at every stage of research
- 2) To foster co-learning
- 3) To ensure projects are community driven
- 4) To disseminate results in practical terms
- 5) To encourage a research process that is culturally appropriate

The CPBR approach is a collaborative partnership that involves researchers and participants in numerous aspects of the research process (Daley et al., 2010; Israel, Eng, Schulz & Parker, 2005). The focus in this study was to work with local communities and businesses to define research questions that mattered to them within the current landscape of

backcountry trail management in B.C. The guiding principles of the CBPR framework were beneficial to engage with and incorporate community theories surrounding climate change and land use management into the study. Using CBPR ensured that the lived experiences, knowledge and perspectives of land managers, business owners, First Nations participants, government officials and trail users were heard collectively throughout the research. The primary goal of the study was to turn existing community knowledge into positive action. This is a critical step in the process of developing land management policies and best practices that incorporate historical actions, knowledge and competing interests on the land base.

As outlined above, there is very limited existing research specific to the impacts increased trail use, technological innovation and climate change are having on backcountry trail networks in B.C. Therefore, the research conducted relied heavily on community input to help shape and direct research outcomes. A mixed methods approach was utilized to consult as many management and trail user perspectives as possible. Two research methods were used in the data collection process. First, 21 in-depth, semi-structured interviews were conducted with key stakeholders who currently use, manage or are impacted by the increased popularity of trail based tourism in backcountry environments. Stakeholders ranged from business owners, trail designers and builders, to forest ecologists, backcountry guides, executive directors, government officials and operations managers of various trail based organizations across the province (see *Appendix 2*). Stakeholders were selected for interview using a snowball sampling technique initiating with known contacts in the trail management industry. Interviews were between 25 to 120 minutes in length, and wherever possible were done face to face with the researcher. In an effort to represent the broad and diverse nature of trail based tourism within B.C., an extensive effort was made to travel to interview locations in the province which included: Haida Gwaii; Rossland; Nelson; Cranbrook; Clearwater; Revelstoke; Salmon Arm; Kamloops; Vancouver; Squamish; Pemberton; Lillooet; and Chu Chua (see *Appendix 3* for a map of the study area). During the preliminary stages of research planning, initial consultation with stakeholders took place to identify the type of issues present within the backcountry trail management community. Themes of a growing tourism sector, advancements in technology and climate change were identified at this point. As a result, interview questions were then created specific to the intricacies of managing backcountry ecosystems while taking into account the balance of socio-economic,

environmental and political responsibilities surrounding the use of technology and changes to the environment. Interview questions considered the B.C. Adventure Tourism Policy and the current industry standard best practices for frontcountry trail management. Open ended and semi-structured interview questions were used to ensure that interviewees maintained a level of control over the conversation to insure all relevant topics could be discussed specific to their management area. The interviews were recorded, transcribed verbatim and then coded for analysis of common themes.

As profiled in CBPR frameworks, input from the stakeholder interviews was then incorporated into the design of a user survey in an effort to investigate non-motorized, backcountry trail user perspectives. The survey was created using the *Survey Monkey* online tool and was sent out through various social media platforms, primarily targeting backcountry recreation media outlets such as: the West Kootenay Outdoors; South Coast Touring; and, East Kootenay Backcountry Facebook pages. In addition, the survey was shared by numerous individuals on Facebook and Instagram to assist in capturing as many trail user perspectives as possible. The goal of the survey was to reach hikers, mountain bikers, trail runners, dog walkers, bird watchers, horseback riders, and any other trail user concerned with the current management of backcountry trails and eager to share their experiences. In total, 400 people responded to the survey from across the province between February 4th and March 1st 2019 (see Appendix 4 for summary table of survey respondent data). A mixture of closed and open-ended questions were used to capture as much detail as possible from the survey respondents. The age of respondents ranged from 16 to 76, with a mean age of 39. When considering gender, 52% of respondents identified as male and 48% as female. It must be recognized that the survey results are representative of the age range and evolving gender demographic of backcountry trail users in B.C. The survey results further complement the interviews with trail managers by profiling the perspectives of a more diverse population of the province to share their experiences with the primarily middle aged, Euro-Canadian, male dominated trail manager community. All interview and survey questions were reviewed by the Thompson Rivers University Research Ethics for Human Subjects Board, protocol no. 101875, prior to being conducted. For the interview guide and the trail user survey questions, see *Appendices 5* and *6* respectively.

Analysis of both the interviews and trail user surveys was ongoing and was achieved by creating separate documents to organize data based on themes that emerged throughout

the research period. While it was not a surprise to see themes of a growth in trail users, new forms of technology and the effects of climate change in the trail manager interviews, the overall level of trail user knowledge regarding land management practises was remarkable. There was an incredibly rich amount of data that came through the surveys that highlighted the passion and concerns of trail users regarding the state of trail management in B.C. Additionally, the complementary nature of both the interviews and trail user perspectives created a robust data set that offered well rounded insight to the contemporary challenges and barriers facing both communities.

Researcher Positionality

There are many factors that are important to understand the development of this research project and the methodological approach used to conduct the research. I am a middleclass male in my early thirties, who has had the privileged opportunity to recreate and travel through backcountry environments in Western Canada. I spent my late teens and early twenties training and competing internationally as a cross-country ski racer. The vast amount of time I spent traveling and training on recreation trails, in both summer and winter months, has given me the ability to understand of the importance of access to these areas, as well as what appropriate management strategies could be applied. I have personally felt the connection to these recreational spaces and understand their significance in affording the quality of lifestyle many British Columbians view as vitally important to their happiness. Once I stopped traveling and racing as a cross-country skier, I began my post-secondary education with a diploma in the Adventure Studies program at Thompson Rivers University. That was followed by an undergraduate degree in Interdisciplinary Studies with a focus on adventure business and entrepreneurship. Throughout my undergraduate degree, I pursued employment in the field of guiding and trail design, gaining industry certification and experience working as a canoe, hiking, and mountain bike guide as well as a practicum ski touring and helicopter ski guide. I worked for Alberta Parks as a trail builder and my grounded understanding of different trail user goals and objectives assisted in the design and maintenance of multi-use recreational trails that provided unique experience to trail users. The combination of academic education and industry experience has given me insight to the challenges business owners, trail managers, tourists, and employees are facing in the outdoor recreation industries. It has also built up my credibility in the industry and allowed me to

establish relationships with key stakeholders. The desire to further combine my academic pursuits with practical, grounded and applicable understanding and solutions led me to participate in the Undergraduate Research Experience Awards Program. I conducted research in the field of conflict resolution on multi-use trails, looking at the opportunities and challenges associated with the integration of fat bikes into cross-country ski areas in Western Canada. This research offered the foundational knowledge needed to conduct semi-structured interviews with trail managers, and also create and implement a survey tool to gather information from trail users. The completion of this undergraduate research opened my eyes to the challenges and complexities of land use histories in the province and the importance of collaboration when trying to solve conflicts on the land base. This research has been recently published in the *Journal of Outdoor Recreation and Tourism* (Neumann & Mason, 2019). The transition to graduate research furthered my understanding of how technology, climate change, a growth in tourism, and continued resource extraction are affecting the management, experience and opportunity to access backcountry recreational trails. I feel my background as an industry professional and my experience as an avid trail user has fostered trust, appreciation and a willingness to participate and share insight among trail managers and trail users alike. My ability to communicate shared values, be up-to-date on current issues and challenges, and demonstrate a shared investment in sustainable tourism industries, beyond that of just an academic researcher, has been critical to create space for open and in-depth dialogue. Throughout the research process, I have used my background and previous experience to interpret and present the dialogue, opinions and knowledge gathered from stakeholder interviews and survey respondents. Despite this recognition, the findings in this study are based solely on the perspectives of research participants, with little reference to my own ideas on the issues discussed.

Overview of Thesis

This thesis is divided into four individual chapters. This chapter provided a summary of the existing literature surrounding backcountry trail management and the influence of tourism, technology, resource extraction and climate change on backcountry trail management. An overview of the methods and methodological approach utilized in the data collection stage of the research was highlighted. Chapter Two establishes the current challenges being faced by trail managers due to technological innovation and a growth in

tourism. It identifies the capacity issues that technology is presenting to managers and offers potential solutions to redistribute trail users to reduce environmental pressures on backcountry ecosystems. Chapter Three uncovers the challenges climate change is presenting to both backcountry trail users and managers. This section utilizes the trail manager interviews and the user surveys to present insight into the realities of modern day backcountry recreation. It explores the trail user connection to the impacts of climate change and discusses the effective use of technology and collaborative approaches to trail management. Chapter Four presents further opportunities that trail based tourism offers for resource protection and education on the history and the injustices faced by Indigenous peoples in Western Canada. It highlights the importance of resource conservation initiatives and identifies trails as a catalyst to transition from consumptive resource based industries to more sustainable and environmentally conscious economies. This chapter identifies future backcountry trail management challenges and opportunities for further research.

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CHAPTER 2

Rethinking Capacity: The Influence of Technology on Backcountry Recreation

It is accepted in academic literature that trail management strategies must integrate a balance of environmental protection and opportunity for recreational use (Lynn & Brown, 2003). As demand for trail based recreational experiences continues to grow in B.C., trail managers are being challenged to limit the negative environmental effects of human traffic. Trail management research has historically focused on the ecological impacts of increased trail use and there is limited research that has identified an explanation for the surge in backcountry trail use (Crandall, 1990; Ewert & Shultis, 1999). Some researchers suggest that technology can aid in access and transportation to backcountry trails. In addition, the comfort, safety, and exchange of information between managers and backcountry trail users has been stimulated by technological innovation (Ewert & Shultis, 1999). The exchange of information has been greatly enhanced by the introduction and rapid uptake of social media technology (Mayer-Schönberger & Cukier, 2013). There are now millions of people using platforms such as Instagram, Facebook and Twitter to produce billions of social media posts each year (Han, McCabe, Wang & Chong, 2018). In the context of backcountry recreation, trail users now have multiple avenues available to share experiences, photos and information to access the locations in which they recreate. Web based sharing applications meant to connect trail users such as *Trailforks*, a way finding application, and *Strava*, an activity tracking and analysis software, are providing new channels of communication (Aaron Cooperman, personal communication, 2018).

Technology has led to advancements in the way recreationalists access and travel on backcountry trails. The creation of the electric bicycle, the development of lightweight materials, innovative frame geometry and intelligent suspension has created ultra-capable bicycles that can climb and descend with exceptional efficiency (Weinert, Burke & Wei, 2007). Technology has produced the Aero Designs helicopter bike rack that gives recreationalists in Canada the ability to use a helicopter to access remote backcountry locations. With few sources of academic literature available, there is abundant anecdotal evidence to suggest that these innovations have added to the increased number of people recreating on backcountry trails in B.C.

The question must be asked: how much growth can our backcountry trails sustain before we lose capacity to manage negative environmental effects of trail use? Trail management research has attempted to establish a formula to determine appropriate capacity of trail networks to reduce human disturbance (Marion, 2016). The term “carrying capacity” has been borrowed from biology to determine the population of trail users that can be sustained based on the ecology, trail design, available resources and desired visitor experience for a specific trail. The goal of previous research has been to establish a numeric limit to the number of users on a trail to reduce the impacts of visitation on both user experience and ecological integrity (Cole, 1993; Lynn & Brown, 2003). However, a simple numeric limit has proven too difficult to define given the complexity and variability of environmental and social conditions of trails and trail managers are moving away from the term carrying capacity (Lyle Wilson, personal communication, 2018). Vegetation, soil type, trail design, construction and maintenance, trail user type, climatic conditions, amount of use, and management capacity can change drastically region to region, even within the same trail network. Trail management literature has begun using the term “Visitor Use Management” to describe the process to determine the management conditions put on a trail to limit ecological degradation. Marion (2016) defines visitor use management as a “proactive and adaptive process for managing characteristics of visitor use and the natural and managerial setting using a variety of strategies and tools to achieve and maintain desired resource conditions and visitor experiences” (p. 340). Regardless of the terminology used to describe the problem, trail managers across the province are facing similar challenges in reducing environmental impacts of human use while maintaining access to trail networks (Marion & Wimpey, 2010; Redding, 2018).

The research conducted in this study has found that the influences of technology are contributing to the unsustainable growth of trail based recreation in specific areas of B.C. In addition, the growth has increased the potential for conflict to occur between trail users if not managed appropriately. Trail managers have had to develop innovative methods to manage people, the landscape and relationships with other stakeholders to mitigate conflict. This chapter outlines the challenges trail managers are experiencing as we approach capacity on popular backcountry trail networks. Guided by the CPBR framework, 21 industry stakeholder interviews and results from 400 trail user surveys have been analysed to provide further insight into the significance of continued growth of backcountry recreation. The

following key questions are addressed in this chapter: 1) How is technology contributing to the growth and popularity of recreational use of B.C.’s backcountry?; 2) What are the preferred methods to communicate with and distribute trail users?; and 3) Can technology be adapted to better serve the efforts of trail managers?

A Growing Population of Trail Users

There is unanimous agreement among the trail managers interviewed for this study that the province of B.C. has been experiencing an increase in the recreational use of backcountry trails. Matt Yaki, owner and operator of Wandering Wheels, a mountain bike guiding, tour and vacation company based in Revelstoke B.C. states: “all trails in general have been seeing significant growth in traffic” (2018). Dale Douglas, owner and operator of Tyax Adventures, a backcountry based tour operator specializing in providing multi-day hiking, mountain biking, trail running and horseback riding adventures in the South Chilcotin region of B.C., has witnessed steady increases in people wanting to experience backcountry trails to the point where he has limited growth to retain the integrity of the product he is offering. He describes here:

We have seen consistent growth up until about three or four years ago when we started curtailing the numbers because we don’t want to over saturate our product. We aren’t really trying to grow anymore, just be more efficient if anything. And we realize we have an impact, everyone has an impact, and we feel that everything is pretty good up there right now and we don’t want to spoil it (2018).

Brad Harrison (2018), Executive Director of the Backcountry Lodges of B.C. Association, further acknowledges rise in trail use, stating that many of the lodges that are part of the association have been running at maximum capacity, with some fully booked to 2022. The insights from the managers interviewed are further supported by statistics from B.C. Parks, that highlight the steady growth of park visits increasing by almost 5 million unique visitors between 2012 to 2017 (see *Table 2.1*).

Recorded Park Visits	2012/13	2013/14	2014/15	2015/16	2016/17
Camping	2,436,000	2,448,300	2,572,600	2,738,900	2,923,700
Day-Use	18,215,700	18,692,200	18,573,800	20,998,600	21,838,700
Marine Visits	150,300	166,500	204,400	186,100	181,000
Total Visits	20,802,000	21,307,100	21,350,800	23,923,600	24,943,300

Table 2.1 - Total Number of Recorded Park Visits Per Year (BC Parks, 2019)

It has been observed that the demographic of people using backcountry spaces is changing. Douglas (2018) elaborates:

In our area, as far as numbers go, let's say in our particular area there were 2000 horseback riders a summer, well now it is 1500 mountain bikers and only 500 horseback riders. The demographic in the backcountry has changed for sure.

Martin Littlejohn, Executive Director of the Western Canadian Mountain Bike Tourism Association has experienced a similar transformation:

Mountain biking is hitting the mainstream so to speak. Look at the North Shore...before it was only the core riding community you would see there and now it is parents dropping off kids with their bikes...there are a lot more female riders too... which is fantastic to see. It speaks to the long term establishment of mountain biking as a legitimate form of recreation (2018).

While there is evidence that strongly supports the growth, there are few sources available that speak to the cause even though trail managers have reported similar explanations. Sutra Brent, technical trails specialist with the Shuswap Trails Alliance, offers his insight:

I think it is a lot of factors. One is just...I think population growth is part of it, for a lot of it, and it just doesn't go for mountain biking in the alpine...it goes for everything in the alpine. People use trails because it is their escape from whatever they are doing, or their day to day job, it is their reconnection with something higher and bigger than themselves. It is more a spiritual type journey and whether it is biking or hiking, whatever, it is the same thing...we go to wilderness places because we are seeking...in essence a connection with something greater than ourselves. It is not going to go away, I can say that it is just going to become more sought after...the experience in the alpine and those wilderness places...(2018).

Population growth is undeniably a contributing factor to the rising number of people on all trails in BC, not just in the backcountry. Studies show that the provinces population has steadily grown since 2001 and has recently surpassed 5 million people (Government of B.C., 2019). Projections estimate that by 2038 there will be over 6 million people living in the province. Sutra Brent identifies "the escape" as motivation for traveling in the backcountry. Douglas elaborates further on this concept:

I think it is getting away from the hustle and bustle of regular life, getting closer to nature, scenic views, wildlife, peace and quiet. It varies a little bit between the user groups...I think that the horseback riders are a little more nostalgic than perhaps the mountain biking crew, and the trail running crew. I mean those people are a little bit more on the explorer type mentality, they want to challenge themselves a little bit more. Whereas if you are parking your butt on a horse and cruising through the

mountains, you have this romantic vision in your mind that... I'm a cowboy or what have you (2018).

B.C.'s diverse and breathtaking physical geography provides a unique experience for backcountry trail users. Responses from the 400 trail user surveys offer similar insight to that of Brent and Douglas. A list of the most common motivations to travel on backcountry trails is as follows: connecting with intact ecosystems; getting away from people; the views; the opportunity to see wildlife; disconnecting from everyday life; the freedom to explore; creating relationships with the land; being present; having a chance to reflect in solitude; the peace and quiet; the shared experiences with friends and family. It is evident that survey respondents view backcountry environments as a key facilitator to achieve these experiences.

When asked about technology and its contribution to increased growth, Brent identifies two types of technology that have come to his attention over the last five years:

There is technology that creates awareness, there is technology that creates access. So on the access end we are looking at e-bikes, we are looking at helicopters or other things that actually take people out of their seat and put them in these experiences. Then there is the media, social media and all the ones that create the awareness, that is the thing that tells them that the experience is there and that they can do it...and it is always going to grow, I think it needs to be done responsibly and that is where getting at the forefront and creating standards is important (2018).

An increasing provincial population, a diverse environment with infrastructure that facilitates access and exploration, and a global surge in the popularity and use of technologies such as social media, has created concern regarding how this multi-faceted growth will be managed in the province. Littlejohn pinpoints some of the primary apprehensions among trail managers:

There is a concern that increased use is going to amplify some of the issues that are starting to be seen. One of the big problems of course is the proximity to large city centres. Vancouver for example...people are going up to Whistler to ride the bike park, they have the bigger bikes and bigger travel and while they are up there they hear about the South Chilcotins and many are trying to get up into that area. They have seen images of people shredding down the talus slopes and things like that and they are thinking, you know, that would be such a great adventure, let's go do that. But obviously you can't just do that...if we continue to allow that to happen it is going to end pretty quickly. This is a growing concern around the province and especially with more heli companies now getting involved and providing a shuttle service to the top of some of these alpine areas that are sensitive (2018).

In order to fully understand the far reaching effects of technology on backcountry trail use, it is important to highlight the avenues in which technological innovation is contributing to increased trail use.

Technology in Recreational Spaces

Through discussion with trail managers, it is evident that Trailforks, bicycle technology, electric bicycles, helicopter bike racks, industry marketing campaigns, and the influence of social media are increasing the number of people recreating in the backcountry.

Harrison explains:

I think technology is contributing to over use of different areas and we are not sure how to control those things. I know Destination B.C. has made a deliberate effort to under market known areas that have reached their capacity. So they won't post anything about Joffre Lakes (2018).

Matt Hadley (2018), trails technologist and professional trail builder with McElhannay

Consulting echo's Harrison's statement:

People are just so aware of any experience. Like, you don't have to spend time where you need a guide book, you just flick through some form of social media and it's like, "oh look... here's this blog about a trail here and it looks really cool, let's go do it."

Throughout the interviews, managers identified that many trail associations, marketing agencies and trail based businesses actively utilize technology to promote the backcountry trail experience. Littlejohn refers to some of the communication benefits that are enabled through the use of technology:

It has become an important medium for marketing, there is no question about that. I think it is one of the things that has driven the growth of mountain biking and awareness for what B.C. has to offer. And things like Trailforks, those have been total game changers really. It has become the go to resource for finding mountain bike trails and finding trails that are appropriate for people's skill levels or the type of trails they are interested in. There is even visual content there related to each of the trails. There is some great opportunity, I mean, before we were struggling with the idea of how do we get this information into the hands of those who are interested in coming here...and it was kind of a fragmented world of locally produced maps... some of them were hand drawn on a satellite image and within a few years we now have all of this new technology that totally demystifies a lot of the things that before were driven by word of mouth or, again, someone describing how to get to a trailhead. So it is the rapid pace of technology that is really changing everything for us these days and it's having a huge impact (2018).

Trailforks was introduced to trail users in the fall of 2014 as a community driven trail database and management system primarily aimed at mountain bikers, trail builders and trail managers. Trailforks relies on user generated GPS data to help map, maintain and moderate information about specific trails. Users can use the application as a georeferenced means of way-finding and can also contribute new route data to local trail associations. Trails that are unsanctioned or illegal can be removed from the database by trail administrators. Trail users can submit reports on trail conditions and areas that require maintenance or attention and ties in aspects of social media content sharing as photos and videos can be uploaded and shared. This data can assist trail managers in monitoring trail usage and gives them the ability to track the popularity of specific trails (May, 2019). While Trailforks has seen tremendous growth since its introduction, results from the trail user surveys indicate that a paper map, a GPS, and trail signage are still the preferred methods of wayfinding while in the backcountry. This is likely due to the familiarity of using these navigational tools and the reliable nature of a paper map. As new technology is adopted and battery life of smart phones is improved, it is likely that Trailforks will become more widely used. The easily updatable platform and the ability to provide current information to trail users is welcomed by the trail management community. Geoff Playfair, guide and trails activist with Tyax Adventures describes how Trailforks has assisted in communicating the importance of responsible backcountry travel, and how trail users must take a different approach when traveling through sensitive backcountry trails:

I think Trailforks will be helpful because it will provide an avenue hopefully, to solve some of these problems. I have been able to use Trailforks to help get that message across and then so, as part of managing that area, you will notice there is a specific line in [the app] about riding in the bike park vs. the backcountry (2018).

Below is an example of the information trail users are presented with while looking at the South Chilcotin Mountains Provincial Park Trailforks page:

A visually spectacular area with mid elevation grasslands, sub alpine and alpine meadows, lakes and mountains. There are over 200 km's of trails through broad valleys, alpine meadows and ridges, offer an excellent variety of loop trips of varying difficulty and distances for hikers, horse riders and mountain bikers.

These trails are rugged, wilderness trails. They are not regularly maintained. Signage rarely exists. Be prepared, and be self-sufficient. Carry a folding saw, and be prepared to use it. Ride, don't slide, unless you're coming back to fix the corner, because no one else is.

NOTE: All trails are multi-use, in both directions. Bikers give way to hikers and horses. Ride with respect for the trail, the wilderness and other users. Please do not post times to the leader board - race safely against friends in bike parks, not Provincial Parks.

Region Details

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14

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31

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● Caution on Jan 8, 2019

Local Trail Association

Figure 2.2 - South Chilcotin Provincial Park Trailforks Information (Trailforks, 2019)

The communication of key information, such as being prepared and altering travel habits while moving through sensitive backcountry environments is being achieved through technologies such as Trailforks. However, it has been identified that the images, content and information being portrayed in the media, while promoting the sometimes inappropriate use of backcountry trails, is making it difficult for trail managers to get the message of sustainable trail use across, specifically within the mountain bike community. Yaki speaks about the circumstances around Revelstoke:

[bicycle manufacturing companies] come in and they film and they promote these trails and they release the names, like Frisbee Ridge and all the others, and it reaches millions of people that see this new bike, riding on this awesome trail and then they are going to be “I am going to Revelstoke and I am going to ride Frisbee Ridge” (2018).

While the spectacular backcountry vistas of B.C. may be the perfect environment to showcase the capabilities of these new mountain bikes, Hadley (2018) identifies the problem with the content: “we have all the marketing showing us to ride scree lines... schralp and do a roosts in every corner.” It has been identified by Karen Playfair, a director of the Lillooet Off-road Cycling Association, accountant and operations manager for Tyax Adventures that: “sadly, responsible riding does not make for compelling film footage” (2018). In an effort to combat the negative images cast by the industry, Tyax Adventures partnered with the Western Canadian Mountain Bike Tourism Association to create a video titled “*Respect: A Call to Action for Sustainable Mountain Biking.*” The video addressed the environmental, cultural and behavioural aspects of sustainable trail use, while educating trail users on the complexities of traveling through sensitive backcountry environments (Naheed Henderson, personal communication, 2018). Littlejohn is cautious of the image being portrayed by the mountain bike industry and wants to ensure that riders, trail managers and industry

organizations are doing their part to capitalize on media opportunities to showcase a commitment to sustainable riding practises:

We have to be careful on how mountain biking is viewed by the other users of the backcountry, especially those that are more established, and I do hear that kind of stuff all the time. And that was also part of the motivation for the video with Tyax, to demonstrate that we have fairly similar values to other backcountry users and we have to use it responsibly. So I think if we can continue to demonstrate that we are responsible users of the backcountry we will be allowed to stay there and that has to be our primary goal, demonstrating that responsibility with our actions... not just a video (2018).

In this example, Tyax and the Western Canadian Mountain Bike Tourism Association were able to leverage the far reaching impacts of technology to help spread awareness. Additionally, they were able to partner with a bike manufacturer, Norco Bicycles, to help showcase what responsible marketing looks like. The *Respect* video has over 90,000 views since it was released in the spring of 2018 and will surely be promoted annually to remind trail users of the sustainable travel practices that must be employed when moving through the backcountry.

While web applications such as Trailforks and media outreach have contributed to the growth of backcountry trail use, the evolution of mountain bikes has also seen incredible progress in recent years (Collins, Leen & Gibson, 2016; Rosen, 1993). Trail managers have observed changes in the capability of mountain bikes and have had to adapt management practices in response. Advancements in frame materials, suspension, gearing, geometry, components and reliability mean that riders are now able to travel further, ride longer and navigate through technical climbs and descents with ease. Perhaps the biggest change is the ability to use the same bike for both the steepest climbing trails and the longest of technical decent routes. A rider can change from ‘climb mode’, into ‘descend mode’ with the flick of a switch, without dismounting their bike. Stewart Spooner, Trails Operations Manager for the Kootenay Columbia Trails Society in the Kootenay Region, has been building, designing and using trails in the area for over 25 years. He has experienced first-hand the changes in bicycle technology:

Well I mean technology has brought us this constant improvement in bikes and how we ride, you know. Bikes have become...I mean the bike you ride now compared to the bike you rode in 2000 is vastly different. The capabilities they might as well have a motor because they are so much lighter and easier to pedal, smoother on rough terrain, and they stop so much easier, and they are so much more reliable. I do understand people’s expectation that things are going to keep getting easier and easier because

technology in every aspect of bike design has been making them easier and easier and easier. And that has opened [mountain biking] up to all sorts of people. I mean, it's amazing how 18 years ago mountain biking was pretty much really motivated by risk-taking young men. And the bikes are so good now, and the gears so fancy, that you know it's pretty mainstream, there's the cost of entry that has got more and more problematic, but you know, [...] mountain biking is something everyone seems to do now, because the bikes have just made it that much more possible (2018)

While mountain bike technology is making the sport more accessible, it is also changing its ecological impact. Hadley (2018) notes that because of the capabilities of bikes, riders are looking for steeper lines which erode more easily, they are going faster which means they are braking harder and they have bigger more aggressive tires which both lead to the displacement of more dirt and increased erosion. The evolution of a more technical desired experience has meant that Hadley has had to change the way he designs and builds trails:

Personally, I try to design trails on bedrock slab wherever I can to get that adrenalin rush, having something that is not disturbable, or truly design the trails so that you don't need to brake and, yeah, it's definitely something that is challenging. I think that's part of the reason you heard the general maintenance discussion last year, everybody is struggling with the required level of maintenance currently (2018).

Hadley's experience is further supported in academic literature. Marion and Wimpey (2015) investigated the effects of trail design on soil loss and found that the actual design of the trail had the most impact on trail tread erosion and soil displacement. A trail that is designed and maintained based on the number of users, the motivations of those users and the different modes of travel will be the most sustainable and will therefore reduce conflict and related accusations of trail damage.

In addition to traditional mountain bike technology, it must be acknowledged that the rapid expansion of the electric bike market has been changing the way recreationalists are traveling on trails. Ted Morton, owner of the B.C. Enduro Series, Canadian National Enduro Series and founder of the Revelstoke 3-Day helicopter supported Enduro race, notes his observations:

E-bikes are a whole other story where now you are seeing people ride multiple laps. I heard a real funny story in Penticton...that a trail builder just finishes his day of building and he's down at the bottom of the trail and these guys come down and say [...] "yeah we just did three laps, we're gonna try and get five today", and the builder is like "what? That's an hour and a half climb... oh right, an e-bike gets you to the top in 30 minutes" So, they are riding more which is putting more impact on the trails (2018).

AJ Strawson, Executive Director of the International Mountain Biking Association (IMBA) Canada, highlights that previous techniques to limit the number of people using a trail are not sufficient in the face of modern and electric bicycles. Trail managers have historically relied on the difficulty to access, or the remote nature of a trail to limit the number of people that would use it. This simplifies the associated design and maintenance to control erosion.

Strawson shares his thoughts:

Distance is a filter that we've relied on a lot in the past. Distance tends to filter people out and those distance filters are totally changing. We need to rethink what they look like. What we also need to think about, aside from e-bikes, what are the anticipated future impacts on the trails when we're planning some of these epic experiences?
(2018)

While e-bike technologies continue to develop, policy has been created around the issue to help control use. Recreation Sites and Trails B.C. (RSTBC) has stated that the electric motor in an e-bike is considered a motor. However, the technical functions of how the bike operates determine whether it is permitted on non-motorized recreation trails (RSTBC, 2019). If the trail is designated as a non-motorized trail, then only Class 1ⁱⁱ e-bikes are permitted unless otherwise specified. Despite this policy implementation, the challenge lies in the enforcement of this regulation with such limited capacity to monitor the immense number of trails on public lands. Industry operator, Tyax Adventures, has been able to assist in the enforcement by having some control over access to the area they operate in. The business uses trails in the South Chilcotin Provincial Park, which is designated as a non-motorized recreation area and does not permit e-bikes. Most guests are flown into the park by float plane, meaning that Tyax is able to enforce a “no e-bikes on the plane” policy (Geoff Playfair, 2018).

While e-bikes present a complex set of challenges for trail managers and policy makers, the Transport Canada approval of the six bike helicopter rack by Aero Designs Ltd., further confounds the issue of access to uncontrolled backcountry trail networks. Depending on the helicopter and the rack configuration, mountain bikers now have the ability to securely mount three to six bikes on the outside of the helicopter, while still traveling inside the machine to the riding destination. The ability to fly the bikes and riders in one flight greatly

ⁱⁱ A Class 1 e-bike is a bicycle equipped with a motor that provides assistance only when the rider is pedaling. The motor stops providing assistance when the bicycle reaches 32 kilometers per hour and has a maximum continuous wattage output of 500 watts (RSTBC, 2019).

reduces the cost and makes heli-biking a more economically accessible activity. Strawson discusses the impact:

The problem with heli-biking is the same problem that we see with e-biking, it changes our scale. We're currently using a lot of tools that are related to the scale of human power. We are only able to ride so far in a given day, and we are changing the scale and bringing in a number of people that wouldn't otherwise be capable of accessing these places. What does that mean for long-term management?

Yaki describes the recent growth of heli-biking on a specific trail in Revelstoke:

The whole heli drop thing has exploded on Cartier with the new bike rack, so in the two years prior to those racks, there was very little traffic on that trail, like very rarely would I see the occasional, you know, hard core local hiking or biking up there. The trail was seeing almost zero traffic. Now if we go into the last two years since the racks have been around... the traffic on that trail has exploded (2018).

Within the province, RSTBC is currently implementing policy to manage the rapid growth. Helicopter companies must obtain tenure under the Land Act to legally drop of riders, even if they are not providing a guided service and are only acting as transportation (RSTBC, 2019). The argument has been made that if the helicopter companies are facilitating access, they must also acquire some responsibility for the maintenance, use and resulting conflicts on the trail. The framework and outline of this policy is currently under review and at the time of publication, Rec Sites and Trails B.C., helicopter companies and industry operators have still not finalized a land use policy. However, it is agreed upon by everyone that heli-biking cannot go unmanaged. Morton, who has been spearheading discussions in the Revelstoke region highlights this point:

I can tell you right now that if we didn't manage it, it would be the wild west, but a little bit of education, a little bit of management and all of a sudden you can sort it out, you know, put it in better perspective because everybody knows there's impacts (2018).

Littlejohn speaks to the positive outcomes of industry collaboration and the necessity of robust policy to limit negative impacts:

There is certainly a large body of knowledge within B.C. on how to operate sustainably in the backcountry. I think it is a matter of trying to have that recognized and have it enforced somehow, especially with these new operators who have a helicopter who want to start taking people into the backcountry. There has to be some fairly stringent rules and guidelines to follow to ensure that it is being done properly (2018).

Throughout the trail manager and industry stakeholder interviews it was consistently supported that B.C. is experiencing an increase in use of backcountry trails. It was evident

that various forms of technology, such as Trailforks, social media, industry marketing, bicycle technology, electric bicycles and helicopter bike racks have been contributing to the growth. As Strawson suggests, it is still not known how these changes are going to impact long term management in the province. Perhaps technology, while contributing to the surge in popularity, is also an opportunity for trail managers to communicate effectively with backcountry trail users, providing an avenue for education that would also reduce conflict on the trail network, as well as damage from inappropriate trail use.

The Contemporary Challenges of Managing Growth

The rise in the number of people recreating on backcountry trails is welcomed by many trail managers, community development organizations and business owners who have been working tirelessly to solidify trail based tourism as a sustainable economic driver in the province. However, previous research has shown that as trails become more popular there is a higher likelihood that conflict will occur due to overcrowding, trail erosion, and a lack of understanding of trail etiquette (Carothers et al., 2001). Trail managers must have the capacity to effectively manage the increased growth to reduce conflict from occurring. Research suggests that the communication of rules and best practises, an understanding of trail user motivations, the design and maintenance of trail infrastructure will alleviate environmental impacts and further reduce conflict (Cessford, 2003; Neumann & Mason, 2019). In the context of backcountry trail use, it is important to identify that the effects of technology have created opportunities for new, inexperienced trail users to find themselves in situations they do not have the appropriate knowledge or training for. This highlights the critical importance to maintain effective communication with trail users to promote best practises, awareness and education. Geoff Playfair (2018) reflects on the process that lead to his backcountry awareness education:

Growing up in the 60s and the 70s, in those days I was part of an outdoor club at school, as part of that you learn skill in a somewhat safe environment in terms of, you were with a group and there was a group leader and it was a bit organized but, you spent pretty much every second weekend through the course of the school year out somewhere and probably staying overnight, and you [...] built up a skill set and at some point you felt comfortable going out on your own, and you did, and your friends joined you and so on and you made some mistakes but you survived, and then you got more experience. But, that whole process took a number of years.

Technology has created an avenue for recreationalists to access remote, backcountry trails without going through the apprenticeship stage of building backcountry skills and experiences. Playfair continues:

Of course, at some point it all changed, and so now if I was 13 or 14 years old, I would be looking at a YouTube going, “oh that looks pretty cool, let’s go and do it”. And, maybe grabbing a back pack, even if it doesn’t hold nearly everything you need to do the trip safely, and away I go and maybe I survive, maybe I don’t, maybe I get in trouble, maybe I don’t, but that is what I see. When I am out there now I see these guys, and Lord of the Squirrels [a trail near Whistler] is a great example because it is easy access to backcountry, who are in way over their head. To me that is part of the problem. In the old days it was just more difficult. Today with better equipment we have the ability to access places that we just couldn’t 25 or 35 years ago.

Strawson has seen a similar evolution, and believes that it is the job of trail managers, trail associations, guides, business owners and the trail using community to support the cultural growth and education of new users. He describes the responsibility:

It used to be that the backcountry and the alpine zones were reserved for a certain type of person, a person who you would say is an outdoor enthusiast and that person would usually have a culture of respect for those places and an understanding of what it means to be out in those spaces. Today the culture isn’t growing as fast as the user base is growing so there’s places that are just absolutely blowing up and maybe we’re not doing a good enough job of telling people the best way to experience those places. I’m not at all suggesting that they should not be there. I’m saying that what we should be trying to do is help the culture of using those spaces and the respect for those spaces grow at the rate as the growth that we’re seeing (2018).

It must be recognized that the concept of environmentally "respectful" trail use that Strawson speaks of is culturally specific. Managers identified that the idea surrounding respect and privilege to recreate in the backcountry is missing from the increasingly diverse communities of new trail users. Morton has noticed that it is not just new trail users, but also the younger generation of users. He has been made aware of this through observations from the B.C.

Enduro Series events he organizes and hosts throughout the province:

I see this in the series, the next generation of kids don’t have that culture of trail building, of volunteerism even. What they see is every year a new trail, so in their perception in their mind, those facilities will continue to get better every year and they will continue to have more. They don’t care about the land management, they don’t care if there is a club behind it, they just physically don’t care because they don’t have the education, and they don’t have the culture, but the culture that they do have is to consume.

Historically there has been significant focus for trail organizations to legalize, sanction and develop more trails in B.C. However, we must critically ask ourselves: do we have enough

backcountry trails already?; Do we need to continuously develop more at the risk of exceeding capacity to manage what we currently have? Morton believes we have enough:

Personally, I would say we have enough trails, and I would say that from a management side [...] I don't know any club or management organization in B.C. including resorts, that have the ability to sustain what they have right now (2018).

When trail users were asked the same question, the results were surprisingly even. After analyzing the survey results, it was clear that 51% (n = 187) of survey respondents indicated that *yes* they feel there are enough trails in the province, while 49% (n = 176) stated that *no* we still require more backcountry trails. It is evident that the main concern among trail user is not the number of trails, but the current level of management and maintenance. A selection of survey respondent statements are as follows:

“I think there are enough trails now. I think we need to learn how to manage what we have before we expand more trails to manage” (survey respondent 17, 2019)

“This is difficult to answer. Yes, in the sense that we are not able to adequately manage what we have and creating more is not the solution to this. But exploration and overuse/searching for respite from crowds will inevitably expand use of the backcountry and create new access. It would be best if we could act pre-emptively to ensure that expansion does not equal destruction.” (survey respondent 24, 2019)

“We have enough trails, but we do not have enough education for people about how they must treat them” (survey respondent 286, 2019)

“You can never have too much singletrack! I should temper that statement by recognizing that promoting healthy, resilient ecosystems that may be affected by new trails must be a prerequisite for any new trail development, and the precautionary principal should be used when there is concern that a trail may cause unnecessary harm, even if the evidence to refute the concern is not definitive.” (survey respondent 154, 2019)

“I'd say we could build more if there is the local members or trail groups with the interest and capacity to maintain them to the same standard. That's the main point is... maintenance capacity is the limiting factor.” (survey respondent 382, 2019)

While the current state of management is a main concern as indicated above by the user surveys, past research has shown that conflict is likely to occur if an increase in users is not managed properly (Spence, 2007; Moore, 2004; Carothers et al., 2001; Chavez et al., 1993). When asked if trail users have experienced conflict with other trail users while traveling in the backcountry, 63% of survey respondents indicated that they have not experienced conflict. Of the 37% (n = 140) that had, 23 reported cases of

conflict between hikers and mountain bikers, where speed, surprise and misunderstanding of right-of-way were factors. The most common source of conflict reported (n = 35) was that of trail users with a lack of understanding of outdoor etiquette and leave-no-trace principles, or what managers described earlier as a lack of the culture surrounding the respectful use backcountry environments. Other reported cases included off leash dogs, motorized trail users and conflict with horses. During the trail manager interviews, it was acknowledged that while conflict is currently present on backcountry trails, it is generally the perception of conflict that instigates the majority of confrontation. Both Brent and Douglas believe there is a lot of misinformation, misunderstanding among trail users that must be addressed, especially with continued growth in multi-use traffic. Michael Roycroft, Area Manager for specialized facilities and trails in Kananaskis, believes that user compliance can be fostered through a variety of means. A combination of clear, positive trail signage, trail ratings, social outreach through educational information, social media platforms, and trail association websites are the most effective in his experience. He explains further:

Sometimes it is simply a matter of education, and more often than not, once they understand the bigger picture the conflict isn't as intense and... for instance if they know that we are aware of the particular issue and we are actively working on resolving the issue, sometimes that conflict or issue will go away (Roycroft, 2018).

Douglas recognizes the problem, and adds to the growing number of trail managers who believe the solution is in education and instilling a shift in awareness and understanding:

I don't really think the backcountry responsibility varies any different then whether you are on skis or on a bicycle or whether you are hiking or on a horseback. You know? It is the same thing...it is respect the wildlife...respect other trail users...respect the trails themselves, don't damage the trails, you know...it is all the same. I have found that in our operation, in our area, that 95% or greater of people are getting along just fine out there whether they are hikers, bikers, horseback riders, hunters, what have you. It is a very small, and unfortunately vocal group of people that don't like to see other people recreating in a different form than them (2018).

Throughout the interview process trail managers indicated that they are facing a puzzling dichotomy of overuse and underuse in specific areas. Trails that are typically easier to access, in close proximity to a large population, offer the sought after backcountry experience, and have received abundant media attention, have reached capacity. The experience on the trails has changed, conflict has escalated and the trail tread itself is no

longer able to sustain the amount of use, resulting in significant erosion and environmental degradation. It must be noted that these trails make up only a small percentage of backcountry trails in the province, however, due to their popularity, they receive the greatest media attention and as a result are the trails users are most aware of. Elsewhere, managers are struggling to keep the trails open due to limited traffic. If a trail is not used, it begins to grow in and becomes more challenging to travel. Tom Eustache, a Simp'cw First Nations band member and maintenance manager for infrastructure in the Simp'cw territories, describes the balance between under and over use of the trails near Chu Chua, an hour north of Kamloops B.C.:

More traffic is a good thing for us because in the summer it helps maintain the trails, it actually keeps all the weeds down. If we have just that right amount of use, it keeps the trails good and we don't have to do a lot of maintenance on them and on the other hand, if you get too many people, you have to go and rake out all the bumps and stuff like that. We don't get a lot of that, we just go and repair any features and stuff that gets worn down. So to this point, it has been pretty good, we have just the right amount of people that come out (2018).

The challenge is to identify the under populated trail based backcountry experiences in the province that are managed and well positioned for growth and encourage trail users to visit these locations.

While new trail users, a changing demographic, and over populated trails are contributing to conflict in recreation spaces, the question of access to First Nations' unceded territory within the province has created much uncertainty regarding the security of future use of these locations. This is especially problematic when trail managers are already operating at maximum capacity due to the current growth of backcountry recreation. In addition to this barrier, the power, control and influence the resource extraction industry has over land use decisions has made it difficult for tourism based business to negotiate permission to use public land commercially. Douglas states that between treaty negotiations, established parks and the power of forestry industries, tourism does not have significant influence:

With the First Nations situation in the province, we really don't have a good understanding of who is responsible for the land. I am in the tourism industry and the tourism industry really does not have any direct control over our land base. It is either controlled by B.C. Parks with a conservation mandate, or it is controlled by the Ministry of Forestry [FLNRORD], and they have a mandate to log it. So there is no provincial ministry that actually controls the land base. So in our operation we usually fall behind a whole bunch of other user groups whether it is forestry, park agenda, the

guide outfitters association, we fall behind the ranching/cattlemen association... basically associations that have been entrenched in the land management of the province for up to 100 years kind of thing. Put it this way, I had a commercial tourism tenure for close to 20 years, I never even started getting referrals until I bought a range tenure. As soon as I bought a range tenure, all of a sudden I was important because I had cattle and horses, and had a range tenure (2018).

Tennessee Trent, Trails Manager for Recreation Sites B.C., the organization responsible for the management of recreation trails on public land in the province, agrees with Douglas. The current recreation management approach is largely driven by a more integrated look at recreation with resource extraction. Access to backcountry locations for example, that the public and tourism operators rely on, is almost entirely dependent on resource roads. The surveys reported that 74% of trail users travel on resource roads over 50% of the time when accessing the backcountry. The state of disrepair of many of resource roads is a concern that trail users want addressed. The paradox is that industry funds maintenance, and without industry, there is no maintenance. Trent highlights the issue with maintained access to the backcountry:

There's a lot of value that the timber harvesting industry provides [to tourism] mostly through recreational backcountry access. We don't have a framework in B.C. for management of access for recreation or tourism or public values. The framework is really around industrial access only (2018).

It is hard to deny the value that resource extraction delivers in terms of recreation access in the province. It must be acknowledged that it is not completely separate from the conversation regarding technological influence. The advancements in road building efficiency due to technology have resulted in access through very remote and complicated terrain where trail users can now park and begin their backcountry experience. Maintained access results in more user traffic and further pressures the ability of trail managers to maintain trail infrastructure.

While the question of how to best manage maintained access through collaborative industrial and recreation based frameworks is still unanswered, the discussion of who exercises power or control over the land is a more pressing issue. Herb Hammond, forest ecologist and founder of the Silva Forest Foundation, offers some insight into the power imbalance imposed by the tenure system:

I just want to emphasize the real need to move away from the tenure system. Governments can cancel those tenures. They were given to companies and it's a political lobby that maintains them, not a logical and socially responsible well-being.

As long as it exists...then you have an unequal playing field in negotiations. You have people with tenure and even, well let's put it this way, people with tenure that control large areas of land. You can have a recreation tenure or water licence but it's subservient to this big tenure and so, the major tenures that control the land have an unequal legal power and unequal political power. So if you're a tourism operator and I'm a timber company it's certainly good PR for me to say that I want to cooperate with you...let's sit down and talk but, I always have control because I can get up and leave and take all the marbles with me, or most of the marbles with me...but you are not in that kind of a situation (2018).

In an effort to provide a common voice to government over concerns of tenure security and power imbalance among operators, the Adventure Tourism Coalition was formed in 2017. The coalition is made up of eighteen adventure tourism sectors from across the province who want to establish a coordinated approach among the industry to negotiate with government and with resource extraction companies. While the coalition is receiving acknowledgment from both parties, the bureaucratic process of having an active role in land management decisions is not happening as quickly as some would like (Brad Harrison, personal communication, 2018).

The challenges being faced by trail managers are complex. Overuse and underuse of certain trails, a surge in inexperienced trail users who lack an understanding of best practises, and conflicts with resource extraction industries, jeopardize the current capacity of trail managers in the province. In an effort to increase capacity, trail managers have voiced a need to educate new trail users and redistribute highly concentrated use to areas experiencing less traffic. Before new trails in the province are developed, trail managers must regain capacity to sustainably manage the current infrastructure on the land base.

The Redistribution of Trail Users to Increase Capacity

In an effort to address the issue of implementing management capacity, previous research has suggested that dispersal of trail users is an effective way to balance use. It will reduce the negative environmental impacts on certain trails, and redirect users to other, more suitable trails that offer a similar experience (Novatorov, 2016). This is especially important as challenges with resource extraction industries continue to pressure the integrity of the environment and alter the desired experience for trail users. Harrison of the Backcountry Lodges of B.C. Association and chair of the Adventure Tourism Coalition, confirms user distribution is a known tactic in the industry:

How do we get people spread out? B.C. is a big place and it doesn't have to be so crowded. We go to places we know, or talk about, or see posts about. So we need to somehow control that message to get people to spread out. And maybe that will happen organically. Maybe people will say "I don't want to go to Joffre Lakes anymore because there are always 200 cars in the parking lot" (2018).

DBC has stopped marketing trails in specific areas that have reached capacity. For example, the Joffre Lakes hike north of Pemberton, that is referred to above, is no longer used in any marketing or promotional material. The community of Rossland in the West Kootenay region has followed suit in an effort to reduce the number of people traveling to the community to use the trails that have been built by the community, for the community. Stewart Spooner acknowledges that they have established a reputation as a destination trail town, and believes that word of mouth, and social media posts by visitors is bringing in enough user traffic. He also recognizes that other factors, such as a changing climatic conditions, are making it challenging for the Kootenay Columbia Trails Society to maintain management capacity at the current level of use (2018).

Trail managers have indicated that technology can help educate and spread the message of respectful use of backcountry trail networks among trail users. Hadley explains that apps, such as Trailforks, could help distribute visitors to trails that are more appropriately built and managed to sustain increased traffic:

I think Trailforks is doing a lot to be responsible... and a lot of the trails that are typically posted on Trailforks are probably designed or meant to be managed to handle the higher level of use than some of the other trails, like, more of the hikes or the truly remote experiences (2018).

Advancements in technology that facilitate access to backcountry trails, such as helicopters and float planes, can also be managed in collaboration with government policy as a controlled touch point to limit access, or educate trail users on responsible backcountry travel techniques. Tyax Adventures provides access to their guests via float plane and according to Douglas, they have limited the number of people that can be transported into the park each day to control user volume. This is in addition to prohibiting e-bike access. Playfair further indicates that when guests are booking transportation into the park with Tyax, whether it is a guided or self-guided trip, they are asked questions to gauge their experience level, and are presented with documentation to further educate them on best practises when traveling on multi-use backcountry trails (2018). There has been considerable effort among trail associations in the province to develop appropriate signage to help educate trail users. See

Appendix 7 for an effective example of signage that can be found in the Whistler area, developed by the Whistler Off Road Cycling Association.

The same strategy has been implemented with companies providing heli-biking services in the community of Revelstoke. Morton in collaboration with Yaki, Arrow Helicopters, Glacier Helicopters and RSTBC has put a cap on the number of people who can be flown into specific locations surrounding Revelstoke in an effort to manage capacity. They have developed educational materials and adjusted the associated Trailforks pages to highlight best practices, right-of-way protocol, and trail etiquette that needs to be upheld when recreating in the backcountry. In addition, a percentage of revenue generated from heli-bikers from all operators is being put into a fund to help with trail maintenance (Ted Morton, personal communication, 2018; Matt Yaki, personal communication, 2018).

Across the province user education through various technological mediums is gradually gaining momentum. Trail managers must have the capacity to promote best practises, develop functional signage and educational material in order to monitor and administer policy on the trails. Capacity is directly tied to the funding opportunities available to trail managers. Trent recognizes the imbalance of funding between the promotion of tourism products and those who manage the infrastructure the products rely on. He believes that while far from adequate, funding for trail managers has been improving as government acknowledges the value of trail based tourism:

Destination BC funding is around \$50 million a year for promotion of tourism when really, in a lot of cases, that tourism product is the infrastructure that we manage or that B.C. Parks manages and our [RSTBC] total budget in a year is less than \$7 million, and B.C. Parks' budget is even less than that. Again, our budget and parks' budget combined to manage the infrastructure is significantly less than the budget allocated by government to promote tourism upon that infrastructure so there's an issue there. But I think that those things are being heard both by government, who really at the end of the day makes the decisions around where money goes, and also by tourism operators. We see more and more partnerships between tourism operators and public user groups, and extend that to the resource interests as well (2018).

Interestingly, this same sentiment was communicated through the trail user surveys, reinforcing the necessity of increased funding and capacity for trail managers. One survey respondent indicates:

We only have one sandbox and we all need to play - and now more than ever, more people want to play - which is great! Destination BC is also doing a fantastic job at inviting more people into the sandbox with the government funded Destination Development Strategy (50+ million a year). Most trail users want tourism over

resource extraction (such as logging that sometimes destroys trails) so we need to openly accommodate more temporary locals/tourists but ... I feel part of that government Destination Development funding needs to go to trail maintenance. If not, the assets that they're marketing won't last. Currently not-for-profit societies/volunteers are maintaining a majority of these trails ... all trail users need backcountry safety and etiquette insight (survey respondent 93, 2019).

The partnership approach between user groups and public and commercial sectors is increasing capacity for management to educate new and existing trail users. It is also a strategy that is becoming more common in the province, but could be further nurtured to maximize the capacity to manage backcountry trail networks.

Conclusion

Advancements in technology are driving increased use of backcountry trail networks in the province. Specifically, the continued evolution of Trailforks, innovative bicycle technology, electric bicycles, helicopter bike racks, industry marketing campaigns, and the influence of social media are changing many aspects of the backcountry experience in B.C. From gathering and sharing information, communicating with trail users, marketing and promoting trails, accessing the backcountry and the very methods by which recreationalists travel through it, have all been influenced by technological advancements. B.C.'s diverse and breathtaking physical geographies provide a unique and highly sought after experience for backcountry trail users. The ease in which people are able to learn about these experiences and access them is resulting in an increase of inexperienced users who lack the education and awareness trail managers are trying to advocate for. This has contributed to the inappropriate use of trails, increased conflict on trail networks, and has further challenged trail managers in their capacity to manage both over and under used trails.

The same forms of technology that have contributed to the growth of backcountry recreation have been recognized by trail managers as opportunities to communicate educational information and instill knowledge of sustainable use among recreationalists. Providing key information such as best practises of backcountry travel, right-of-way, and leave-no-trace-principles through technological mediums while currently being practised, has still not reached its full potential. In order to maintain capacity to manage trails effectively, managers must embrace new technologies and work together with other operators, marketing organizations, industries, trail associations and government organizations to advocate for the

sustainable use of backcountry trail networks. Strawson, of IMBA Canada, summarizes the opportunity:

I think there's an opportunity for us to build a social pressure of the respectful way to be using these outdoor spaces. So everybody who's using those areas becomes an ambassador. I think if you were to ride Lord of Squirrels in a really kind poor, turn slapping, skidding kind of way and a local saw you, you would hear about it. That's something that was built by the people for the people. It was a really excellent piece of advocacy...just the amount of work that they had to put into that. It was really impressive and I think the locals understand that and there's a strong culture surrounding it (2018).

Many backcountry recreationalists have similar values and there is opportunity to unite trail users, regardless of the mode in which they travel, in an effort to maintain and ensure continued access to these backcountry spaces. As land use conflicts continue to threaten recreational use of backcountry environments, it is becoming increasingly important to acknowledge the complexities of land use in B.C. The power, control and influence the resource extraction industry has over land use decisions and the question of access to First Nations' unceded territory, has created much uncertainty regarding the security of future uses of backcountry locations for recreation. With the imminent threat of a changing climate and the cumulative effects of a growing population, proactive measures must be taken to protect the environment and the experiences that make B.C. such a desired place to live. This chapter has been able to identify that technology is contributing to the growth and popularity of recreational use of B.C.'s backcountry. Capacity has been reached and surpassed in certain areas, both from a management and experiential perspectives. The most efficient and effective way to educate, promote best practises and redistribute trail users is by redefining and adapting technological communication mediums to better serve the efforts of trail management communities.

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CHAPTER 3

The Implications of Climate Change: Trail User Experience, Education and Advocacy

“We grieve only for what we know” – Aldo Leopold

Backcountry environments in B.C. are going through rapid and transformative change. Many of the changes to the temperate rain forests, glaciated peaks, alpine tundra, arid grasslands, and freshwater lakes and rivers that B.C. is world renowned for, are a result of industrialized human activity in the province within the last one hundred and fifty years (Najafi, Mahmoudi, Schoeneberg & Schnorbus, 2018). The provincial population continues to increase and access to backcountry spaces is being made easier though technological innovation and on-going resource extraction. The anthropocentric pressures applied to the environment are intensifying (Ritter, Fiebig & Muhar, 2012). As previously discussed, the growing population of backcountry recreationalists in B.C. is a concern among trail managers due to inadequate funding for trail maintenance, as well as insufficient capacity to manage existing trail infrastructure. The addition of a changing climate is predicted to compound the environmental challenges facing land managers across the province. Scott, Jones and Konopek (2007) studied the impacts of climate change on tourism in the Canadian Rocky Mountain parks. They estimate that in the next 30 years, visitation to the mountain regions of Western Canada could grow by up to 36% due to a favourable warming trend in weather conditions. While there are positive economic benefits to increased tourism due to a warming climate, the estimated response cost associated with climate change impacts in the province is \$32 billion, with a further \$10 billion to upgrade infrastructure to handle environmental changes (CBC, 2018). These figures do not account for the social or cultural losses residents of B.C. will experience as a result of climate change. An increase in temperatures, lower snowpack amounts, and a longer warm weather season will extend the period of time that backcountry trails are available to be traveled. While the timing, availability and demand for trail based tourism products are predicted to increase, research demonstrates that the visitor related environmental pressures will become more severe with longer, drier and hotter summers (Amelung, Nicholls, & Viner, 2007). Najafi et al., (2018) found that Canada is warming at a more rapid rate when compared to the global average. In addition, the authors state that increased warming will escalate the intensity and frequency of extreme temperature and precipitation events, such as floods, droughts, heat waves and electrical storms.

Due to such unpredictable climatic patterns, land use planning is becoming increasingly more important, however, the complex and far reaching effects of climate change are further contributing to tensions between governments, First Nations, resource extraction industries, as well as tourism operators. In order to overcome the detrimental effects of climate change in backcountry spaces of B.C., a fundamental shift must take place in how we manage our natural resources. Collective and collaborate action is needed, and this can be partly facilitated through the experiences residents of B.C. are having on backcountry trails. This chapter discusses the current challenges that trail managers are encountering in the face of climate and environmental change and provides insight into how climate change is affecting the trail user experience. In addition, the socio-cultural shifts necessary to reduce the impacts of anthropocentric climate change are identified. Guided by the CBPR framework, 21 industry stakeholder interviews and results from 400 trail user surveys have been analysed to provide further understanding of the significance of climate change and its effects on backcountry trail use in B.C.

This chapter will address the following key questions: 1) What are the environmental challenges and barriers trail managers are currently encountering in the face of climate change?; 2) How is trail user experience being affected by climate change?; and 3) What opportunities do trail based tourism provide for advocacy and education regarding climate change, the state of resource extraction, and ecological protection of sensitive backcountry ecosystems?

Insight from the Trail Management Community

The extreme climatic events we are experiencing in B.C. are more than just regular variation in weather. To further delineate the question of how to define these events and what is responsible for them, the distinction must be made between weather and climate. Weather is the day-to-day state of the atmosphere and it can be predicted to fluctuate within spatial and temporal scale (IPCC, 2017). Climate is how the atmosphere behaves over an extended period of time, and takes the long term variations of weather into account (IPCC, 2017). Researchers continue to prove that the climate warming we are experiencing is compounded by human activity (Najafi et al., 2018; Ritter, Fiebig & Muhar, 2010). In B.C., moderate projections indicate that in the next 30-year period the average temperature will increase by 2.5 degrees over pre industrial levels. To put the significance of this into perspective, from

1900 to 2013, a one-hundred and three year period, the average temperature in B.C. rose by only 1.4 degrees (Government of BC, 2019). The rapid warming of the next thirty years will result in thermal expansion, acidification and a rise in sea level by a predicted 30cm along the B.C. coast (Xu, Smyth, Lemprière, Rampley, & Kurz, 2018). Increased glacier meltⁱⁱⁱ will occur along with more significant flooding and drought events. A lengthened fire season can be expected with warmer winters, less snowfall and a rise in disease and beetle infestation of our forests among other social and ecological transformations. It is known that mountain ecosystems depend on fire for regeneration, however, historically forest fires have been seen as a threat to human infrastructure and economies resulting in large scale prevention of natural wildfire. This has created dense forests rich with natural fuels that have been building up over time. The frequency and severity of forest fires in the mountainous region of western Canada is projected to increase. It is also predicted that the more severe threat of wildfire and increased beetle outbreak will result in a rise in resource extraction (Amelung, Nicholls, & Viner, 2007).

Within academic circles, the effects of climate change across the globe have been receiving significant attention (Amelung, Nicholls, & Viner, 2007; IPCC, 2017; Najafi et al, 2018; Ritter, Fiebig & Muhar, 2010; Scott & McBoyle, 2017; Spittlehouse, 2005; Xu et al., 2018). The socio-economic, political and cultural implications resulting from climate and environmental change are substantial. Within the context of backcountry trail use in B.C., the impacts of climate change on trail management is an under studied topic. It is evident that throughout the province, trail managers, business owners, guides, government agencies and trail users are experiencing new challenges. Flood, fire and smoke, drought and dust control, as well as beetle infestation, tough summer working conditions for trail crews and trail user travel habits have been identified as some of the most common barriers to overcome.

Tennessee Trent, Trails Manager with Recreation Sites and Trails B.C. (RSTBC) speaks about his experiences with a changing climate:

I haven't been around forever, right, I've been in this branch maybe six years now, and certainly in the last two years a difference I see—both years, has been a very heavy freshet where we're dealing with floods and we work with local government to declare

ⁱⁱⁱ Research shows that 25% of B.C.'s glaciers are expected to be gone by 2050. This will significantly reduce the amount of cold water making its way into river systems, placing substantial stress on fish species that are critical to the health and balance of aquatic ecosystems. Fish species, such as salmon, also provide vitally important cultural, economic and traditional value to many First Nations throughout the province.

states of emergency and they're fully preoccupied with sandbagging and evacuations and all that and then the fires start.

A freshet is an increase in stream and river flow as a result of spring thaw, or rapid melt due to warming temperatures or heavy rainfall. In general, they occur in the spring as managers prepare to open up their trails after the winter season. In Trent's experience, the local communities who have declared a state of emergency are still dealing with flood mitigation efforts when the fire season begins. The window between snow melt and freshet and the onset of forest fires is being reduced. The residents of Cache Creek can speak to this directly as the 2017 Elephant Hill fire began while the community was still recovering from spring flooding events. The resources that are being put toward emergency efforts further reduce the capacity of RSTBC staff to focus on managing trails. Trent explains:

We're a branch of the provincial government...the Ministry of Forest, and in the last two years there have been multi-billion dollar efforts in forest firefighting and that's a huge draw on resources both in terms of operational dollars as well as person power. A number of our staff, justifiably, have been requested by the Wildfire Branch to go help out on fires in one way or another...which they do and we're glad to see them do it because those other provincial emergencies in both cases are in an all-hands-on-deck kind of situation. That again takes away from our ability to deliver our core mandate of managing public recreation on Crown land (2018).

The last two fire seasons have been historic in B.C. In 2017, more than 1.2 million hectares of land burned costing the province \$568 million in fire suppression efforts. As a result of the fires, 65,000 residents were evacuated from their homes. It was the worst fire season the province had experienced in recorded history. Then in 2018, 1.3 million hectares burned, costing the province \$350 million and displacing 21,800 residents (Province of BC, 2019). When 2.5 million hectares of land is burned in two consecutive seasons, what are trail managers faced with in the aftermath? Trent explains:

It's definitely impacted our management of trails in a number of ways. Of course, managing the actual emergency around a fire, managing danger tree assessment and management post-fire and other remediation efforts post-fire, whether it's cleaning up fire guards or roads that get built or areas where forest cover just drastically changes or the hydrologic cycle has drastically changed. We're seeing those kinds of things in many trail networks that we're managing around the province (2018).

A change in the hydrologic cycle is a direct result of recent fire on the landscape. Water from spring runoff and intense rain events makes its way into rivers and streams more quickly with limited vegetation to help control flow (Ahmed, Abbas, Khan, Bashir, Tahir & Zafar, 2018).

Sutra Brent, of the Shuswap Trails Alliance, indicates that the biggest challenge is knowing what to expect with such variable weather:

So in the spring we get the wind storms and it is going to bring much more rain and we have more water problems we fix but within two weeks of that rain, the fires start, then you can't even go in to do any repairs, and...you know you get another freaking wind storm and you say "sorry trees are down". You can't go in and cut them out because of the fires, it just throws a big wrench in the works. The climate stuff, it is different and it is random, what you get is bizarre and not the thing you'd expect (2018).

Geoff Playfiar of Tyax Adventures agrees with the above sentiments regarding the challenge of staying on top of maintenance after the fires begin. Both managers noted the significant backcountry closures in the province the last two summers made it increasingly challenging to complete necessary trail work. Once the fires begin and the area is closed, the opportunity is lost to complete planned work. Dale Douglas of Tyax Adventures says that while he has lost the ability to maintain trails, it is also the residents of B.C. who are suffering by losing access to the backcountry due to the closures.

Once the fires are out and access is regained, this is when the significant work begins for trail managers. While in most cases you can rehabilitate a trail so it is useable again, the standing dead trees surrounding the trail are the greatest challenge. Inevitably they come down in the following wind storms and create excessive amounts of work for trail crews. Playfair observes that they are also a safety hazard for trail users:

It's a scary place to go on a windy day because everything is coming down like all around you. So if its 20km of trail that burns over, the ongoing maintenance...would be insane. Like it would require a full time crew all summer with a chain saw being in there every day pretty much, or you send a crew in and literally cut everything down in one go. You are cutting danger trees the whole time because every one of them is burnt. That is a big deal that would be probably a \$100,000 contract for B.C. Parks and they are not going to pay it so who is going to do that work? Or do you just shut down the trail?

While efforts can be made to clear blowdown off the trail, Brent is also experiencing changes in how water is moving through the landscape after a fire. He identifies that the organic material such as trees, shrubs and roots that typically restrict the amount of sheet flow are gone. If you take away the ground's ability to retain water the trail tread surface will get destroyed by trail users. Brent states that it is challenging to preserve the quality of the trail tread until the plant species return to the area burned.

While post fire clean up requires immense resources, the smoke from the fires has been a substantial concern among managers. Stewart Spooner (2018), of the Kootenay Columbia Trails Society, describes what is quickly becoming a common trend in the summer season:

It seems like every summer now you get to the second week of August and you can't see anything, you're sucking in smoke. You know that poses all sorts of challenges but for the backcountry riding because it's a short season to start with, a significant part of that is poor air, you know smoky, that's an issue.

The smoke is having a direct impact on bookings for trail based tourism businesses. Matt Yaki of Wandering Wheels in Revelstoke B.C. speaks to how the smoke is affecting his product offering:

It doesn't really add to the experience, right? The customer experience is going downhill in that smoke. There has definitely been an impact... a fairly significant impact for us, especially in the lack of last minute bookings.

According to Yaki, August is the busiest time of year for guided programs around Revelstoke. Tourists who are traveling to B.C. from out of province typically book their trips well in advance and some are not able to adjust their vacations on short notice due to the smoke. They arrive in Revelstoke and proceed with their vacation regardless, but they do not get the spectacular B.C. backcountry experience they are expecting.

Previous research by Amelung et al. (2006) and Richardson and Loomis (2004) found that tourist visitation is predicted to increase in regions of higher latitude due to warmer weather in the summer seasons. However, what these studies do not address is the negative effects that forest fire smoke has on tourist travel habits. These impacts are being observed across the province by all trail managers interviewed. Tennessee Trent explains:

One of the other impacts from climate change and smoke is the news, people really do change their travel plans even if the emergency isn't what they understand it to be and they could perfectly go ahead with the holiday they planned, they just don't want to have to deal with the headache or the potential smoke or whatever else. So that's certainly something I've heard from tourism operators (2018).

Yaki has felt the effects of lost bookings due to smoke first hand and has been asking business owners, marketing organizations and trail managers to work together and advertise the shoulder seasons, such as June, early July, September and October to guests planning a trip to B.C. He explains his perspective further:

August has always been dependable with weather and snow melt in the alpine, but we are now thinking that August is not as reliable as it once was because of the smoke. We

all know that September is awesome but, you know the rest of the world doesn't necessarily know that (2018).

As outlined, the smoke affects the trail user experience, but it also poses a health risk to both trail users and members of trail crews who are working throughout the summer to keep trails in optimal condition. Both Spooner and Tom Eustache describe concerns over their crews performing physical labour while the air quality is so poor. Generally, if the smoke is prevalent, crews start early in the day. Depending on the fire hazard, the crews must be shut down by 1pm and maintain a fire watch for two consecutive hours to insure they are not posing a threat. The poor working conditions and condensed window of opportunity to complete trail work further reduces the capacity of the trail crews.

While negotiating the smoke is difficult, the actual condition of backcountry trails themselves in extended periods of drought in combination with increased use is creating further capacity challenges. As previously mentioned, when the trail tread surface loses its ability to retain moisture, the trail begins to break down. This can be due to a fire moving through the area, the surrounding forest being clear cut by resource extraction, an extended period of drought, or a combination of all three. Matt Hadley of McElhanney Consulting shares his experience:

The last two summers have been so incredibly dry that our trails have been starting to fall apart a whole lot more than they used to (2018).

All of the managers consulted in this study have experienced an increase in the dusty trails throughout B.C. Yaki states the dust typically is the worst in August and this adds to the challenging aspects of providing guests with the unique B.C. backcountry experience that is being advertised in the marketing material. Instead, trail users are getting smoke in their eyes and dust in their teeth. Not only does it ruin their experience, but it is a significant safety hazard for managers to contend with. In high traffic frontcountry areas such as the Whistler Bike park, trail managers have installed irrigation systems on the trails to insure the trail tread retains enough moisture to handle the user volume. While this results in less work for the trail crew in general maintenance and upkeep, bike park managers have also seen a 50% reduction in the number of injuries on the trails since installing the system (Matt Hadley, personal communication, 2018). This solution may be feasible in frontcountry environments, however, it is not a realistic solution for backcountry trails. It is also recognized by managers that during periods of drought, using water to support recreation activities is problematic and

not an appropriate use of resources (Lyle Wilson, personal communication, 2018). The only solution backcountry trail managers have is to hope for consistent rain events throughout the summer to keep the ground saturated.

Weed, Ayres & Hicke (2013) found that drought and decreased precipitation also facilitate insect outbreaks. The extent and distribution of bark beetle infestation can be intensified by warming temperatures. Evidence suggests that insect and disease also increase carbon efflux from forest ecosystems. This further promotes the global rise in temperature. The large stands of beetle kill trees across B.C. are a concern to trail managers. At Tyax Adventures, the business operates within Big Creek Provincial Park and according to Playfair, the combination of pine beetle kill and human control of wildfire has left large stands of dry, densely populated forest:

It is mostly dead pine and it hasn't burned yet. One lightning strike away and then boom, away she goes. So those valleys are ripe for it and around Bear Paw Camp, same thing, hopefully the camp survives a fire but that is a narrow neck in the valley and it is kind of born to burn (2018).

Douglas believes the answer to protecting the infrastructure within the park lies in prescribed burns:

We could do some controlled burns that would not only improve the habitats for the grizzly bears because we'd get rid of the dense forest and get some fresh berry crops growing, it would also protect the park in the long run because you would have these fire breaks, it would protect the infrastructure of the park, and it would protect the infrastructure of the businesses in the park (2018).

Trail managers are facing multiple challenges as a result of changing climatic conditions. Challenges such as smoke, dust, fire, flood, area closures, beetle outbreak, which have all led to a reduction in bookings during peak season, are further reducing capacity to manage, maintain and provide unique backcountry experiences to trail users.

Trail User Perspectives on Climate Change

The surveys conducted in this study found that trail users are also significantly impacted by climate change. The goal of the survey was to provide insight into the extent of the impacts, and determine if trail users are connecting their experiences in the backcountry to the effects of climate change. The results of the survey were overwhelming: 94% of trail users indicated that flood, fire, smoke, air quality, and access issues have directly altered their backcountry recreation plans during the last two seasons. Respondents described

cancelled trips, undesirable experiences, health issues, altered destinations for recreation, and an evolution in strategy for planning future backcountry excursions.

In the facility manager interviews, Douglas acknowledged that residents of B.C. have lost the ability to access the backcountry at certain times of the summer due to fire closures.

The significance of this is reinforced by the user surveys:

Well, obviously access to the backcountry is restricted during extreme risk periods. In the East Kootenay, that has meant we spent considerably less time in the backcountry over the last two summers (survey respondent 137, 2019).

During the summers of 2017 and 2018, significant areas of B.C.'s backcountry were shut down to both public and commercial access due to elevated fire risk. Results from the user surveys support the fact that many residents of B.C. live here because of the recreational activities they have access to. When floods and fires prevent access, or smoke creates health risks or ruins the view, there is noteworthy disappointment and frustration. It is apparent that even day-to-day outdoor activities around the house were stopped as one survey respondent describes:

Due to our geographical location to the fires we could not even go outdoors due to air quality. We even drove to different areas of the province to get out, but found that driving through the smoke was not healthy. The fires severely hampered our time outside and even our daily activities, gardening, walking, and biking (survey respondent 64, 2019).

Similar to the results from the manager interviews, multiple survey respondents indicated that August has become increasingly unreliable for making plans to go into the backcountry. Users stated they are taking more caution when planning trips, moving them earlier or later in the summer to avoid peak fire season, and are avoiding booking trips that are non-refundable or without travel insurance. One respondent stated the smoke in 2018 was so bad that they left the province completely and traveled north to the Yukon to seek refuge. The frustration of regularly having to cancel planned backcountry trips is pushing trail users to abandon the idea of completing certain types of trips all together:

We had the Rockwall Trail booked in mid-August the past two summers and both years we had to cancel our trip last minute as fires closed the trail. We are not booking any multi-day trips in the Interior this summer, going to Nepal in the fall instead! (survey respondent 316, 2019)

When trails are closed down due to fire hazard, trail users who are trying to achieve a specific experience are then concentrated on the remaining open trails, as was the experience of one survey respondent:

I lived and worked near Williams Lake during the summer. It was pretty burnt so I was limited to three of the usual dozens of trails that would have been open if it didn't burn down (survey respondent 293, 2019).

This leads to an increase in user volume and subsequent issues of erosion, the potential for conflict to occur and additional maintenance for trail crews and managers. It is evident that the area closures apply further pressure on the environment as well as management capacity.

The survey results demonstrate that negative experiences on backcountry trails due to climate related events are changing the way people think about backcountry recreation in the province. Trail users are becoming aware of the potential impacts of a spark, or the improper management of a camping stove, could have on wildfire. There is a feeling of responsibility among survey respondents to be more conscious of their surroundings to understand access and egress options. There is also a fear of putting further pressure on emergency crews by being caught unprepared in the backcountry. This is emphasized below:

It has caused me to research backup routes to get out of an area should a wildfire occur, and has caused me to constantly check the active wildfire map similar to how I check the avalanche bulletin in the winter (survey respondent 93, 2019).

The lived experiences of residents who have witnessed the devastation and destruction of environmental extremes has clearly had a lasting impact on some survey respondents. The increased responsibility to act appropriately when recreating is a sign of the effectiveness of trail user education efforts and successful messaging from trail managers and government agencies. This is exactly the desired result managers are looking for, and while present among some trail users, it is evident it is not a widespread mentality. This is especially true among trail users who are new to backcountry recreation (Tennessee Trent, personal communication, 2018).

In addition to the importance of responsible use, survey respondents indicated a heightened awareness to the danger standing burnt trees pose on the trail. Respondents especially noted their concern during wind storms:

Some areas are now dramatically altered and I have avoided some of these. In addition, post-fire there is increased potential for trees falling during strong wind events. This has altered my perceptions of when I may chose not to enter an area (survey respondent 221, 2019).

Survey respondents also shared feelings of appreciation for the opportunities of the past, and described increased motivation to travel in the backcountry while conditions allow and it is safe to do so. Witnessing the destructive forces of flood, fire, landslides and rock fall in the backcountry is providing a sense of privilege among users to access these areas. Respondents shared a “last chance” perspective when they described the rate of change they have experienced. The catastrophic results of environmental change are making it more difficult to achieve the same desired backcountry experience on a specific trail. Respondents communicated a sense of urgency to share these experiences with friends, family and the next generation while they still have the ability to do so.

While it was indicated that the effects of climate change are hampering backcountry travel opportunities, one respondent highlighted how fire mitigation efforts and reforestation post fire have actually improved access to the backcountry:

The replanting of the Elaho fire has opened roads that otherwise would be overgrown. This has provided access to areas that I wouldn't have been able to get to (survey respondent 370, 2019)

A key finding of the user survey is that 96% of respondents feel that the experiences they have witnessed, such as fire, flood and drought, are a direct result of climate change. Trail users are linking these events and are starting to think critically about the interconnectedness of the decisions that are being made on land use management issues. A survey respondent highlights their observations:

I have noticed changes because of pine beetle infestation, creek/river droughts due to loss of glaciers or weather, invasive species presence that takes over natural plants, bear or wildlife changing their feeding patters because some areas were devastated by wildfires...I'm sure climate change will affect the way I recreate in the backcountry more and more (survey respondent 43, 2019).

Another respondent shared similar experiences:

My experiences are a result of many things, yes most certainly climate change is one of them, I do not know that it is any more to blame than 50 years of major fire suppression and the whole bark beetle epidemic (which is not alone a factor of climate change) we fought the fires that generally would have managed them, we also drove trucks and trains province wide while they were flying, we directly created the problem of the bark beetle. So as far as fire and smoke....you make your bed, humans screw up all the time, the problem is not screwing up so much as our lack of ability to admit we did and then fix it. On the topic of flood and drought, one thing that is happening for sure is we get more extremes in fluctuations. Temps swing harder as do winds, maybe even more

so, water levels fluctuate as do snowpack heights in winter (survey respondent 179, 2019).

This information demonstrates the level of awareness some backcountry trail users have when it comes to understanding the realities of climate change. They are seeing and experiencing first-hand how the last one hundred and fifty years of industrialization and land management practises have been impacting the environment. This connection is critical in an effort to instigate change in land management decision processes, to assist in the education of new trail users and to demand collaboration between socio-political levels and resource-based organizations in the province.

Opportunities for Education Through Backcountry Experiences

As climate change and resource extraction continue to challenge tourism economies in B.C., the experience and resulting connection trail users are making with backcountry ecosystems is critical in the education of the greater population on the realities of climate change and the exploitation of natural resources. The solution is not simple and the multifaceted complication of culture as well as relationships, both human and environmental, further obscure the matter. A survey respondent outlines their passion to instigate change:

More public education. More federal dollars. We need more new Canadians to experience our greatest national treasure, to feel its power and beauty. I feel so lucky to live here. The wilderness is such a balm to my spirit and soul. Get more people out, build more trails, make them accessible and educate people on how to share respectfully (survey respondent 309, 2019).

Multiple trail managers have established the importance of building respectful use of our environment into our culture. A similar ideology has been discussed in academic literature since Aldo Leopold introduced the idea of a land ethic in his seminal 1949 publication: *A Sand County Almanac*. Leopold recognized that humans are not independent from their surrounding environments, and identified a lack of land ethic in society. A land ethic is described as a code of conduct that emerges from a recognition of the interconnectedness of the relationships between our self and our surrounding environment. In order to extend our personal ethics beyond our own self-interest, we must develop a relationship with the land. Herb Hammond of the Silva Forest Foundation describes a similar kincentric relationship between human beings and ecosystems where the components and processes of an ecosystem are seen as essential identities to be respected, not as resources to be exploited. Hammond

has spent his career developing the process of holistic management planning that he calls Ecosystem Based Conservation Planning. He explains:

It is built around two really important pieces. One, a hierarchy of hierarchical relationships between economy, societies and ecosystems. So, if you start with ecosystems holding cultures and economies being part of cultures, if you respect that hierarchy, then you automatically do something different on the landscape where you live (2018).

Hammond insists that land management is not simply the management of resources to be exploited, but rather it is the management of humans, our actions and our footprint on the land that sustains us. Without an environment to support our population, we do not have a future. The significance of this is often lost. More than 70 years ago, Leopold identified that there is important societal education available from time spent interacting with our surrounding environment. While these lessons are taking place right in front of us, the value in this education is not always recognized:

Every farm woodland, in addition to yielding lumber, fuel, and posts, should provide its owner a liberal education. This crop of wisdom never fails, but it is not always harvested (p.77, 1949)

Leopold identifies a key element that needs to be present for social change to occur. We must see, experience and develop a relationship with that which we want to preserve in order to truly respect it. He highlights “we only grieve for what we know” (p. 52, 1949). If the residents and visitors of B.C. are not aware of what is going to be lost in the coming years due to climate change, they are less likely to take responsibility and adjust their personal actions to reduce the human impact on the environment. This exemplifies the opportunity that trails provide to establish connection with our surroundings and develop a sense of significant land ethic.

Trail managers identified that in order to build awareness, we need to start the process at the early stages of the education system. Playfair recognised that what led to his personal appreciation for his surrounding environment was outdoor education programs at school that are not as common in our current educational system. He sees an opportunity to rebuild a curriculum that highlights respectful use of our environment, or a land ethic:

It certainly could start in school systems with outdoor clubs and/or outdoor education programs...Whistler had a great one with one of the teachers who is now retired, doing outdoor education and building those skills. You know those sorts of things, if you could build that into our educational system at a basic level it would go a long way (2018).

This sentiment was also shared by trail users who completed the survey:

I would really like to see more education for say high school students. In school you have a mostly captive audience and a large group of people you can teach. Out of school it is up to people to educate themselves, I don't think that people always take the responsibility to do that (survey respondent 327, 2019).

Similar to avalanche education programs that are being introduced in schools across B.C., the opportunity exists to further develop educational programs that highlight leave-no-trace principles, sustainable trail use practices, and instil a respect for the environment that will sustain the economy, the culture and the future of B.C.

Hammond also endorses the idea of early childhood education regarding a sustainable land ethic. He believes the political system needs to change, and the way to do that is through education:

I think the political system is the problem. And I think we have to recognize that...that's another thing that education plays into. As Ivan Illich^{iv} said, "you'll never change the political system until you change the education system" and I think those are wise words (2018).

Education can also take place on the trail. The business owners and guides interviewed during this research strongly believe that there needs to be more consistency and standardization among businesses who are guiding backcountry experiences in the province. There is significant opportunity for collaboration between trail managers, government officials and the guiding community. Commercial businesses that operate on the land have the most to lose, and therefore have added incentive to insure respectful use of the land base by the general public recreating in the backcountry. Hammond concurs:

Well I think that's a very important connection. I have thought for years that naturalists, park naturalist guides, people like you, have a great opportunity to start educating people about how things work and a lot of people are reticent to do that because sometimes they have clients that may come from one of the things that you're talking about that needs to change (2018).

Brad Harrison, Executive Director of the Backcountry Lodges of B.C. Association (BLBCA), believes that in order for commercial operators to maintain access to certain

^{iv} Ivan Illich (1926-2002) was an Austrian born philosopher known most for his 1971 book *Deschooling Society*, a critical examination of the institutionalized mass education system of the industrialized world (Smith, 2011).

regions in the face of increased environmental regulation, they must prove that they are part of the solution. He explains further:

We need to convince government that we are part of the solution, we are not actually part of the problem, and we need to show them things that we can do to be part of the solution, we can't just say we are part of the solution (2018).

Harrison believes that part of that solution is in the education of trail users, specifically new backcountry trail users. Informing guests of best practises and respectful travel principles will go a long way. Tyax Adventures also reiterated this point. As Karen Playfair states, when they hire staff, guides, camp hosts, pilots and wranglers, each interaction with a trail user is identified as an opportunity to lead by example and demonstrate respectful use:

When we hire staff, it is not about, “yeah let's just go out and rip those trails.” It is about going out to have an experience on the land that we have to respect, because otherwise we can't do what we do. And that is actually a conversation that we have as part of the staff training in the spring is getting everyone on that same page, and then that is the message that goes out in camp fire conversations in the evening. It is also a part of the upfront safety talk before heading out on the trip, is all around that whole sustainable riding piece and riding at 70% of your capabilities and it's not about ripping up the trail, you are not in a bike park, you are in a Provincial Park, and those are the pieces of conversation that go into it before you start to roll wheels (Karen Playfair, 2018).

Yaki added that the value of having responsible commercial operators on the land base extends past the opportunity for education. The invested interest of these operators help keep the trails open, many of them contributing both financially and through hours of volunteer trail maintenance to the local trail associations. As emergency crews are further pressured by fire and flood, commercial operators are an additional layer of risk management. Karen Playfair explains how the dissemination of responsible backcountry travel practises and preparedness will benefit the industry as a whole:

It is protecting the experience for people that we are guiding and working with. The paying customers, it is helping them be more responsible and respectful to the trail, and in the long run, it is going to be good for everybody (2018)

A standardization of industry training would ensure that guides, business owners and trail managers advocate a consistent message. The recognition of sustainable trail use can be learned on the trail, and refined with cumulative experience.

When discussing user education, it is critical to acknowledge that B.C. is the most ethnically diverse province in Canada. Research has indicated that 30% of the province's

population base has immigrated from another country and many others are first generation Canadians (Multicultural B.C., 2019). To add to that complexity, international tourism arrivals have been steadily increasing over the last decade (DBC, 2017) and the demographics of where tourists originate from is shifting completely. For example, B.C. has become a significant destination for both Chinese and Indian visitors (DBC, 2017). Both residents and tourists alike are wanting to participate in the diverse outdoor recreation experiences that are becoming more accessible throughout the province. The concept of environmentally "respectful" trail use that the trail managers define throughout the previous two chapters is culturally specific. It must be stated that environmental practices, and in general an environmental consciousness, vary wildly throughout cultures and nation-states. Cultures around the world have their own unique concepts of how trails and the environment should be used and appreciated, and the province of B.C. is no different. In addition, even in B.C. in comparison to Euro-Canadians, Indigenous peoples also have different ways of conceptualizing their role in ecosystems and the environmental practices that they enact (Palmer, 2005). Not only is this important to recognize to situate the evolving demographics of user groups on trails throughout the province, which include various cultural, age and gender components, but also to highlight that the trail managers consulted in this study represent limited perspectives when considering the increasing diversity of the recreationalists wanting to access backcountry spaces. As demonstrated with the surveys, there is a greater representation of woman, as well as a younger, more culturally diverse, and urban demographic in comparison to the group of trail managers in the province. It is crucial for land managers and existing trail users to recognize these changing demographics and be proactive in their efforts to respectfully share the best practises and trail etiquette that is unique to B.C. Tourism operators, guides and trail associations have been identified as key facilitators in the development of this environmental consciousness.

Challenging the Status Quo for Deep Systems Change

In order to practice culturally and ecologically sustainable land use it is important to identify the ways in which the public has historically conceptualized regionalized environments in B.C. The commodification of natural resources since colonization has provided incredible economic value to the country and therein lies the problem. The historical short sightedness on natural resource extraction has been focused entirely on

economic gain at the expense of the environment. It is easy to look at a tree and identify its value if it were to be cut down and trucked to the mill. What if that tree was left standing? Is there any economic value that can be derived from that? Recent studies have revealed that there is significant socio-economic value to local communities in a standing forest through the development of recreation trails and tourism infrastructure (Clawson & Knetsch, 2014; Timothy & Boyd, 2015). As Chair of the Adventure Tourism Coalition, Harrison has been working to showcase the value of trail based tourism in the province to actively engage in land management conversations. He shares an experience from a tourism conference:

I talked to an economist once after a presentation. I said I didn't want to pick on forestry, and that the Adventure Tourism Coalition just wants to be part of the conversation in terms of land management. In some cases in B.C., a standing forest is worth more in terms of the tourism and public recreation value to the community than it is harvested. And the guy came up to me afterwards and said "You know, I have been an economist for 25 years and I never thought of that." It is shocking, he is an economist! And that is the problem. Right there is the problem. There is a professional economist and he has never thought of it for 25 years. How can that be? (2018)

While the economic value of trails through a standing forest is proving to be significant, the ecological services provided by a standing forest are substantial. Some of these ecological services include: flood control, shade resulting in cooling of rivers and streams, water filtration by wet lands, pest control services from birds, stability and resilience offered by biological diversity, and carbon sequestration and storage. If humans were to design, engineer and manage these same services to replace what the boreal forests in Canada provide, the cost to do so would be an estimated \$93.2 billion (Anielski & Wilson, 2005). In contrast, the value of all resource extraction industries in the country combined, including logging, mining, oil and gas production and hydroelectric power generation, is an estimated \$37.8 billion (Anielski & Wilson, 2005). The question then must be asked, why is short term economic gain placed in front of the long term detrimental effects to both the environment and the economy? Even if we examine the current level of resource exploitation through the lens of a traditional economist, it is not financially sustainable. Future generations are going to be left solving the environmental crisis created by their parents and grandparents. Our children will be the ones responsible for paying back the short term loan of economic prosperity the last century of resource extraction has provided.

The boreal forest is the largest carbon reservoir on earth (Anielski & Wilson, 2005). When old growth boreal forests are harvested it takes more than one hundred years for the

second generation of trees to reach the same level of carbon storage as the original forest (Hammond, 2009). In addition, the methods by which we log in B.C. release more than two times the volume of carbon dioxide produced by all the cars in Canada each year. When you subtract the loss of carbon sequestration potential from harvesting old growth forest, and incorporate the carbon adverse methods by which we remove those forests, the net contribution to greenhouse gases is astronomical (Hammond, 2009).

Hammond believes a deep fundamental shift in the human value system is necessary to address the current state of land management in B.C. He identifies two priorities:

- 1) Protect or restore ecological integrity. We must restore natural ecosystem composition, structure and function.
- 2) Provide for balanced ecosystem use across the landscape. This means providing fair, protected land bases for all ecosystem users, both human and non-human.

Hammond recognizes the need for long term land management plans that focus on ecosystem conservation as a priority. He does not recommend a total cessation of logging or mining, but he does imply that we need to be more holistic in our approach, and consider other values before we simply move ahead with extraction. In addition, he urges a shift away from short-sighted management plans that prioritize extractive economic development if climate change is to be mitigated. The trail managers interviewed throughout this research agree with Hammonds views. A cultural shift to rethink where we place value is necessary. However, precaution must be practised in the way we use the environment, especially from a tourism and recreation perspective. It will be impossible to satisfy all vested interests, but there has to be willingness to compromise and put other values of the land before our own. Trent describes the current perspectives of many user groups:

A lot of groups or a lot of people don't like to hear "no," right? Even if there's a huge amount of rationalization behind that "no," they don't like to be told that so that's part of this culture that we're struggling with here. Overall, our trail strategy for B.C. says that we want to create world-class trails for all users and we do, right? But we can't do that for everyone everywhere either and, I guess, part of that is groups being willing to accommodate other, not just users, but other values out there. It might be that they have to give up snowmobiling in a valley around caribou or they have to give up mountain biking in a network near a community because of the First Nations values in that forest or on those lands or whatever else, right? (2018)

Phil McIntyre-Paul is the Executive Director of the Shuswap Trail Alliance and a driving force behind the success of a round table discussion model developed to better manage multiple interests in recreation trails in the Shuswap region. He believes that before we move

forward, we need to first agree that we all have an impact on the environment. If we prioritize the idea that we have to maintain balance and reduce our impact, user groups may be more likely to compromise. He explains further:

I take hope from all of it because I keep coming away going, you know I think we can really do this, we can really pull it off but, it only will work if we actually buy into the idea that we are not going to have a conversation about whether we have an impact on the landscape. We all have to start with the knowledge that we do. So it is not going to help if, buddy is sitting over there and saying “well I am just talking about hiking”. I know... but that is why you are here, because you are going to wreck the landscape. As soon as you take a step out of your vehicle, as soon as you get in your vehicle, you start the process of incurred impacts... we all have to agree on that (2018).

While McIntyre-Paul is having success with this roundtable discussion and planning model in the Shuswap, he still identifies the need to reconsider the values of user groups on the land base:

I think the values we should be thinking about, they are using words like “together” like “reverence.” I think these are words that we should be using more. “Enough” I think it is a word that we should be comfortable using in land management conversations and if I hear someone say “it’s about more trail on the ground”. I am going to bop them, because it can’t be! We’ve got to stop talking about our backyard and our playground...those phrases have to go (2018).

The backcountry cannot be viewed simply as the location in which we recreate, we extract, or we develop. Above all of these values, needs to be the collective knowledge that we are a part of backcountry and frontcountry ecosystems, and that they sustain all forms of life on earth. Humans and human cultures are a part of those ecosystems, we are not separate from them (Hammond, 2009). We can only abuse our relationship with these spaces for so long before we lose the ability to sustain ourselves. This will become very apparent within our lifetime if we do not change our practises. The ecosystems and the sum of their parts have complete control over our economy, our culture and our livelihoods.

A Call for Collaboration

There are many challenges that have been presented to both backcountry trail managers and trail users in the face of climate change. In order to navigate these challenges successfully, researchers recommend a collaborative approach to land and resource management (Selin & Chavez, 1995). A collaborative approach can be a powerful tool for conflict resolution and to develop a shared vision to collectively move forward with an action based plan (Selin & Chavez, 1995). In the field of resource management, a collaborative

approach can be defined as the process of combining tangible resources by multiple stakeholders to solve a set of problems that may not otherwise be solved individually (Grey, 1985). While there are multiple stakeholders with overlapping interests on the land in B.C., it has been identified that there is a gross imbalance of power and control over management decisions. It is clear that of the multiple stakeholder interests involved, none have the power to individually solve the set of problems that shape the current socio-political, environmental and economic challenges being encountered. A collaborative approach is therefore necessary to move ahead with management solutions. This style of approach is not foreign to the managers who participated in this study. Harrison has been working on this strategy with his involvement with the BLBCA and the Adventure Tourism Coalition. He sees the current constraints facing land managers as a catalyst to work more effectively with both government and industry:

You know, the one thing with these land management issues, and it is not just about wildlife, or industry, or tourism, it is everyone involved. It is going to force people to work together. I see a benefit in that. We are going to have to work with forestry and mining to maintain access, the public is going to have to work with commercial, and the government is going to have to work within their ministries in a more effective fashion (2018).

Hammond emphasizes the importance of collaboration on a broader scale:

Without collaboration and cooperation the world is not going to survive if we don't learn how to do that. But learning how to do that means balancing the playing field too and that's a social responsibility of government (2018).

While it might be an overwhelming process with multiple layers of governments and jurisdictions that are constantly changing, McIntyre-Paul believes a lot of the issues land managers are facing, such as capacity to manage the current levels of infrastructure in the province, can be tackled starting with local communities. He believes trail managers and trail associations have to be creative in developing relationships with all users on the land. He speaks to his experiences with the Shuswap Trails Alliance:

The biggest messaging of all was, unless we start to work together regionally, we didn't have the capacity. That's what was missing. We are small, not big. We can either sit here and keep stopping and say "how come we don't have it like those guys have it", or we can start to create capacity and the only way we can do that, given that we don't have money and we are small, would be to start thinking regionally. So that is where the conversation started (2018).

Having a conversation, establishing a set of principles and developing a mutual understanding for the process that must be followed to come to a collective agreement is something that McIntyre-Paul has been striving for since the creation of the Shuswap Trail Alliance. The alliance has had considerable success with its collaborative approach to trail management and has been used as a model for the development of similar trail associations across the province.

Conclusion

As the effects of climate change continue to challenge both trail managers and trail users, collaborative land use planning is becoming increasingly more important. Trail managers are struggling to manage the effects of smoke, dust, fire, flood, area closures, beetle outbreak and a reduction in bookings during peak season. The compounding effects of climate change have further reduced the capacity of trail managers to maintain current levels of trail use and trail infrastructure. The trail user surveys provided insight into how the experiences that trail users are having in the backcountry are being effected by climate change. Flooding events, fire, smoke, air quality and access issues directly altered their backcountry recreation plans. As previously discussed, survey respondents feel the environmental changes they have experienced in the backcountry are a result of climate change. Some respondents further acknowledged that these environmental changes are a direct result of the last one hundred and fifty years of industrialization and consumptive land management practises taking place across the province. Many trail users who participated in the survey have established a connection with their surrounding environment and are aware of what is being lost. The challenge is to encourage more residents and visitors to B.C. to develop this connection in a sustainably manageable way, that will not further exceed management capacity. This is critical to instigate collective action against climate change.

A connection with local environments and ecosystems will develop a more robust land ethic for many residents of, and visitors to, the province. The potential that trail based experiences provide for education is notable. However, as previously discussed the demographics of trail users in B.C. are changing and it must be acknowledged that the concept of environmentally "respectful" trail use that the trail managers have defined in this study, are inherently cultured. Tourism operators, guides and trail associations have been identified as key facilitators in the development and dissemination of this environmental

consciousness. However, it must be recognized that the lack of this education in new, diverse communities of trail users is not a sign of disrespect, but rather a difference in the cultural production of how trails and the environment can be used. Early childhood education programs have also been identified as an opportunity to instill a comprehensive understanding of the environmental changes taking place in the province as well as the potential impacts of sustained recreational use.

Decades ago Leopold acknowledged a word of caution when establishing conservation ethics in society that the tourism industry in B.C. should pay close attention to:

“All conservation of wildness is self-defeating, for to cherish we must see and fondle, and when enough have seen and fondled, there is no wilderness left to cherish” (p. 108, 1949)

This excerpt further signifies the importance of land managers to maintain capacity on the backcountry trail infrastructure in B.C. The shifting environmental conditions driven by climate change will exacerbate the current pressures on management capacity. In order to support management, there is significant opportunity for collaboration between all levels of stakeholders who have an interest in backcountry environments in B.C.

A fundamental principle established throughout this research is the need to move away from the historical short sighted decisions of past natural resource extraction policies that have been focused entirely on economic gain at the expense of the environment. Instead, a kincentric approach must be considered where the components and processes of an ecosystem are seen as essential identities to be respected, not as resources to be exploited. Hammond (2009) uses a concise method to describe the importance of putting ecological values ahead of our own self-interest when he argues that human economies are a part of human cultures, and human cultures are sustained by ecosystems. We must move away from our current industrial approach to resource management in order to preserve the integrity of the ecosystems that represent our homes, our cultures and the livelihoods of future generations.

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CHAPTER 4

The Contemporary Challenges of Land Use Management

As access to sensitive backcountry environments is made easier through technological innovation, climate change and a growing tourism sector in B.C., it is clear that regulation and management practices must be developed to protect these ecologically sensitive environments. Backcountry trails provide important recreation opportunities to residents of B.C. and previous research highlights the socio-economic and health benefits of trails to local communities (Destination BC, 2011, 2015; Freeman & Thomlinson, 2014; RSTBC, 2012; Wang et al., 2005). Throughout the course of this study, it became apparent that trails can offer much more. The effects of climate change are compounding the necessity to transition from consumptive and exploitive resource based economies to more sustainable and environmentally conscious economies such as trail-based tourism. Trails and the way they are used and managed can play a critical role in solving contemporary socio-political and environmental challenges.

Lisa White, or Kuuyang, her Haida name, is an artist, a weaver, a member of the Haida Gwaii Land Protectors and the owner of Gin Kuyaas, a small longhouse style art studio and gift shop in Old Masset on Haida Gwaii. Born and raised in Old Masset, White has witnessed the destructive exploitation of resource extraction economies across the archipelago and has seen what it has done to the land, the culture and the community. Gin Kuyaas is located on the banks of the Masset Inlet, a main water transportation corridor into the heart of Graham Island. White has watched the barges of ancient forests and culturally significant wood that has sustained the Haida people for the last 14,000 years, leave the island and be shipped off to international markets. As the communities of Masset and Old Masset begin to transition to a tourism-based economy, White sees an opportunity to educate visitors on the histories, the cultures, the exploitation, as well as the injustices faced by the Haida since colonization. However, she is concerned over how little control the Haida have of their land, and how clear cutting is still taking place on the island:

How does that bode for tourism? How does that bode for any economic development, for any kind of hope for the future? I feel like our future is leaving on those barges, and it is critical that we change the way that things are being done on our land. People are looking for a nature experience. And we are only in the infancy of tourism here really... in terms of being on the map. More people are coming here and what they expect to see is nature, everyone rushes out to Tow Hill for the beautiful beaches there.

But it is really hard for me to point them to the old growth trees because there really isn't that many that are accessible in our area. The Golden Spruce trail has some old growth there, but they are surrounded by clear cuts. That's probably one of the only areas I can direct them too (2018).

During our conversation, White identified that tourism, and trail based tourism, is seen as an opportunity to protect what is left of the ancient forests. It has the potential to stimulate local economic growth, to provide meaningful work to the Haida people, and to establish the increasingly important connection to our surrounding environment.

To have our old sites connected, and our trails going across to them, and having our people out at all of these places, and to have hiking trails, but you want to be in the trees right? You want to be in nature, you don't want to be surrounded by clear-cuts (2018).

While the term reconciliation has become common place in Canadian media, politics and society, it often represents different meanings to different people (Egan, 2012). White shares her insight:

And everyone is using the buzzword around reconciliation... what is reconciliation? You know it seems to me if healing can happen we have to stop assaulting the land. We have to give back to the land, we have to heal it. And heal the rivers. Let's do some restoration work, and let's give that work to our people who have been oppressed for the last 100 plus years. It is really a hard feeling for us... feeling like we have no control over what they are doing to our land and just having so little opportunity for meaningful work. I think that we could develop an economic cultural plan, that could work for us. That is respectful to the land, that is respectful to our people, and meaningful and not harmful...no further harm. That to me is reconciliation. Stop assaulting our land, let's develop a plan together, where people will have meaningful work, and then we can provide a cultural tourism opportunity for people to come and visit. I feel like Haida Gwaii deserves a break, Haida Gwaii you know, this area is protected and that area is protected but we know reserves don't work. They don't work for people, and they certainly don't work for animals or trees. It isolates and it impoverishes (2018).

White provides vision of the opportunities that tourism, and trail based tourism can offer for resource protection, education, economic stimulation, and even reconciliation. McIntyre-Paul of the Shuswap trail alliance has a similar outlook. While trails may appear to be pathways through our surroundings, they have the potential to be so much more:

All of those layers, reconciliation, collaboration between First Nations, active transportation, economic opportunity through improved and increased tourism infrastructure development, all of those can be addressed through working together to create these crazy linear lines on the ground. It has everything to do with the relationships, with the landscape, and with each other, and how we build these trails has to be indicative of that (2018).

The opportunity to develop relationships, partnerships, co-management plans, and the recent establishment of Indigenous Protected Areas as a new park designation in Canada, is a step in the right direction in taking responsibility for the legacies of colonization (Mason, 2018).

Resource and land management must be holistic in nature, inclusive of humans, and recognize the value of Indigenous approaches to management. If this approach is fostered, trails can be an integral part of the protection, conservation and reconciliation of the relationships of our past.

This study has demonstrated that various technological mediums are impacting backcountry recreation in B.C. from both trail management and trail user perspectives. Access, travel, communication and information sharing have all been advanced by technology. This study identified that the growth in backcountry trail use is creating an influx of new trail users who must be informed of best practices, trail etiquette and leave-no-trace principals required to limit human impact in the backcountry. While technology is responsible for this growth, it has also been identified as an opportunity for trail managers to take proactive measures to further educate new and existing trail users. In addition, tourism operators, guides, business owners, and the education system in B.C. can play a crucial role in the dissemination of this information. The contemporary challenges being faced by trail managers are broad. Pressure from inadequate funding to maintain public trails that are being heavily promoted, but not resourced by tourism marketing organizations, is an issue that has yet to be addressed. Other challenges include the continued evolution of technology, the historical power and control that resource extraction industries have on the environment, the legacies of colonization and the current treaty negotiations surrounding unextinguished Indigenous title to the land, and lastly, the destructive and devastating effects of climate change. These issues are putting significant pressure on trail managers. Ultimately, this reduces their capacity to manage trails and trail users effectively. While these issues are of primary concern of trail managers, many of them are the same conflicting issues that challenge the political and economic stability of the province. Perhaps the experiences of trail managers and the community-based solutions being negotiated can offer insight into the much broader and more significant issues across Canada.

The findings of this research demonstrate that the backcountry trail user community in B.C. is being faced with serious constraints. These include: health risks presented by smoke from wildfire, trail erosion from flooding events, reduced access due to fire closures,

and frustrating and undesirable experiences resulting in cancelled trips. As discussed in Chapter 3, it is critical for residents and visitors of B.C. to be aware of the anthropocentric factors that are contributing to climate change, and connect these changes to the experiences they are having on the trail. This connection is of vital importance to instigate change in policy, regulation and government and industry control over the ecosystems that sustain us. Lastly, this study acknowledges that the barriers currently being encountered by both trail managers and trail users are acting as a catalyst to promote collaboration and cooperation by levels of government, Indigenous peoples, industry sectors, and between public and commercial interests within the province. As Hammond identified, this is crucial step in working toward inclusive and action-based solutions to some of the greatest problems facing our generation.

Limitations of the Research

There are a number of barriers to need to be overcome by both the trail management and trail user communities in B.C. While the topics and the themes discussed in this thesis add new insight into contemporary backcountry recreation issues, the list of findings discussed are certainly not exhaustive. The topic of backcountry recreation management requires a holistic approach to understand the complexities of land management challenges. While there is significant opportunity to provide a more in depth analysis of each area identified, that was beyond the scope of this project. The objective was to provide a high level analysis that identifies current issues, explanations for growth, and captures the lived experiences of land managers and trail users not currently available in academic literature. The two content papers provided insight into the interconnectedness of sustainable land management in relation to a growth in tourism, advancements in technology and climate change. These three thematic areas were recognized in conversation with trail managers prior to the interviews taking place. In addition to consultation with trail managers, the social, environmental, political and historical influences of past land use practises were considered in the development of the research questions.

It must also be acknowledged that this study did not aim to represent the trail management community of B.C. as a whole. A delimitation was put on the study to consult a sample of trail manager perspectives from a variety of regions throughout the province, it should be recognized that management concerns varied from community to community.

Limitations of the trail user surveys must also be identified. A clear limitation was the distribution of the survey to trail users through various social media outlets. This resulted in a survey sample that had active social media accounts and who saw the survey in the four-week period it was available online. As the survey was completely voluntary in nature, the study was reliant on respondents taking the time to fill out the survey and answer the questions honestly. There was limited statistical analysis completed of the survey results as their purpose was to gain a better understanding of the qualitative nature of trail user perceptions. The comment boxes below each question provided an opportunity for respondents to highlight experiences and concerns not directly asked in the survey. The community-based nature of this research also fostered a process where results are disseminated in clear and discernible terms.

Certain delimitations were placed on the study to achieve the research objectives. While the survey did attract a variety of backcountry trail users, the motorized trail user community was intentionally not consulted to keep results specific to non-motorized backcountry recreation. Additionally, the concerns of winter backcountry recreationalists were not gathered in an attempt to narrow the focus of the study to fit with the outlined objectives. This study was also confined to specific locations in B.C. It should be noted that there are many successful backcountry trail associations across Canada who are dealing with their own unique challenges that may, or may not, align with the findings of this research. Data from trail managers and trail users from other provinces could further contribute to the broader discussion of sustainable backcountry trail use.

Pressing Issues in Trail Management Research

This study has provided insight into some of the issues confronting trail managers in B.C. The limited academic research that has been completed to date on contemporary backcountry trail management leaves numerous opportunities for future research. Of primary importance is a need to explore the current funding structure for access and management of recreation trails on public land. Both trail managers and survey respondents identified that the funding framework in B.C. is not sustainable, as many of the trails are managed and maintained by not-for-profit trail societies and organizations. Further research into the options available to restructure how trail development and management is funded would increase the capacity of trail managers and better equip them to address the constraints they

face. Additionally, further investigation into funding recreational access to be less reliant on maintenance provided by resource extraction industries would help alleviate issues of conflict and safety on the 620,000 kilometers of resource roads in the province (Government of B.C., 2019).

While appropriate funding models will support the future success of backcountry trail management, the trail management industry itself could use a great deal of professionalization and standardization. Many of the most knowledgeable trail managers in the province have over twenty years of experience building, maintaining and managing trails. Some are paid professionals and some are long time volunteers of trail associations. The majority of these individuals are self-taught and there are few resources available to disseminate the accumulated knowledge from region to region. With an industry that continues to grow and an identified need for more management capacity, an opportunity exists to develop resources specific to trail management in the unique cultural, environmental and political context of B.C. An industry training program could close the gaps in knowledge among the trail management community and share standards, best practices, and tested processes in the province. With the large volume of volunteer trail builders and managers, different levels of training from semester-based professional courses to evening and weekend programs for volunteers, would address capacity issues. It would also ensure that the incredible wealth of knowledge regarding sustainable backcountry trail management is cultivated and passed on to future generations of trail managers.

The impacts of climate change are largely dependent on the decisions humans make in the immediate future (Amelung et al., 2007; Robinson et al., 2006; Spittlehouse, 2005). The evolving nature of how the environment will respond to anthropocentric actions will require ongoing examination from researchers. This is true in both the global context as well as within the realm of backcountry trail management in B.C. When combined with the continuous innovations of technology, the questions researchers are presented with even ten years from now could be vastly different from today. While previous studies can set a foundation for future work, they will become outdated quickly as new issues arise.

An underlying theme that has been acknowledged, but not explored thoroughly in this research is the ongoing treaty negotiations between the federal government and First Nations, Inuit and Métis. Of all the unanswered questions that will significantly impact land use in B.C., the assertion of Indigenous rights across the province is fundamental (Curry et al.,

2014). Existing policy developed for land use planning, the management of natural resources, and the legislation processes outlined for commercial use of public land, such as the Adventure Tourism Policy, will be rewritten to reflect the Treaty agreements that are currently being negotiated. While this will have implications at the trail based backcountry recreation level, its significance will be broader than that, impacting the entire socio-political and economic structure of the country.

Conclusion

One of the primary reasons many residents choose to live in B.C. is due to the access to unbelievable outdoor recreation opportunities. The effects of climate change in the province will be significant and the last two wildfire seasons indicate that these environmental changes are well under way. While studies suggest that we are now locked in to the current effects of a changing climate over the next 30 years, it is the changes that we make now that will dictate what the future will look like after 2050 (IPCC, 2017). We need to shift our lens from focusing on the disasters, the loss, and the devastation caused by anthropocentric climate change to instead focus on the benefits and the opportunities we have to make a difference. It is key to focus on collective positive action and leave the entrenched mindset of consumption and short-sighted personal gain behind. It is imperative to ask: what kind of world do we want to live in?

While this project has focused on the management of backcountry recreation trails, it provides insight into community-based solutions that can help solve more pressing land use management issues. Recreation and access to trails is a privilege. However, we have to examine all aspects of our lives and determine the opportunities available to help protect the environments that sustain us. Trails provide a significant opportunity to do that. While climate change is a global problem, it must also be addressed on a local scale, through individual actions that collectively work towards a reduction of the human impacts on the environment. The effects of climate change go far beyond the confounds of B.C.'s backcountry, but the problem solving methods we use in backcountry trail management can provide the foundation for the holistic and collaborative relationships needed to solve much more significant problems. Millions of individual actions will bring significant change. What we eat, how we travel, the vehicles we drive, how and where we shop, and most importantly, the way we vote, will all have an impact to reduce our carbon emissions. Access to various

forms of technology can help communicate the importance of our actions against climate change. Opportunities remain to make a difference, but time is of the essence. Hammond (2018) summarizes his perspective of the power that individuals have to effect progressive change:

Whether you do it in a sophisticated way or an unsophisticated way, people need to develop and assert their own plans. And you need to remember, you have as much power as you believe you have and if you don't believe you have any power, that will be a self-fulfilling prophecy, but lots of people have shown that if you use your power wisely, you can change the world.

Land managers, business owners, government organizations and communities across B.C. are experiencing new challenges and external pressures resulting from ongoing environmental change. These contemporary issues are facilitating crucial discussion between stakeholders and are creating necessary partnerships and compromise not previously seen in land and resource management discussions. Perhaps climate change and the associated environmental impacts are the catalyst required to bring cultures, communities and industries together to instigate change in land management practises in B.C. It is time to listen to the surrounding environment, and allow it to educate us on the power of resilience, adaptation and the undisputable benefits of collaboration.

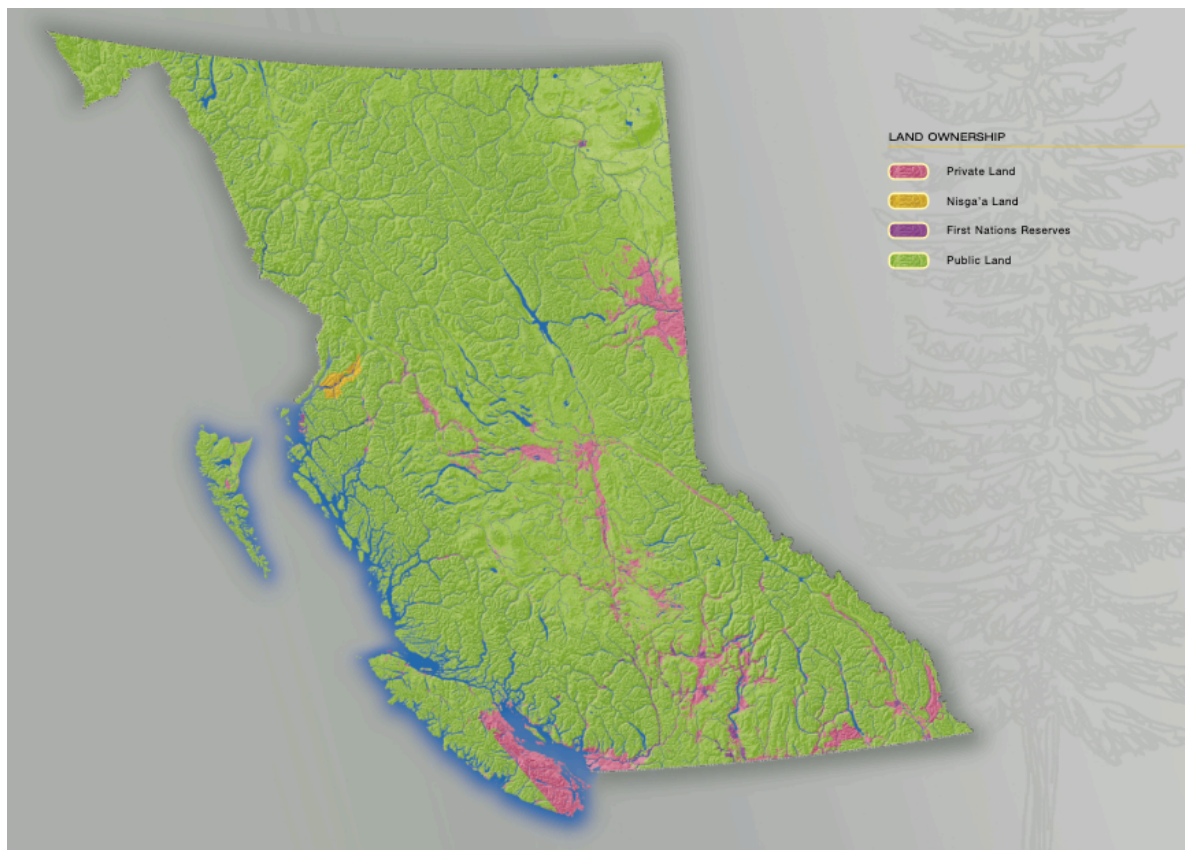
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A Cost-Benefit Analysis of Physical Activity Using Bike/Pedestrian Trails.

Appendices

Appendix 1 – Public Land, Private Land and Reservations in B.C.

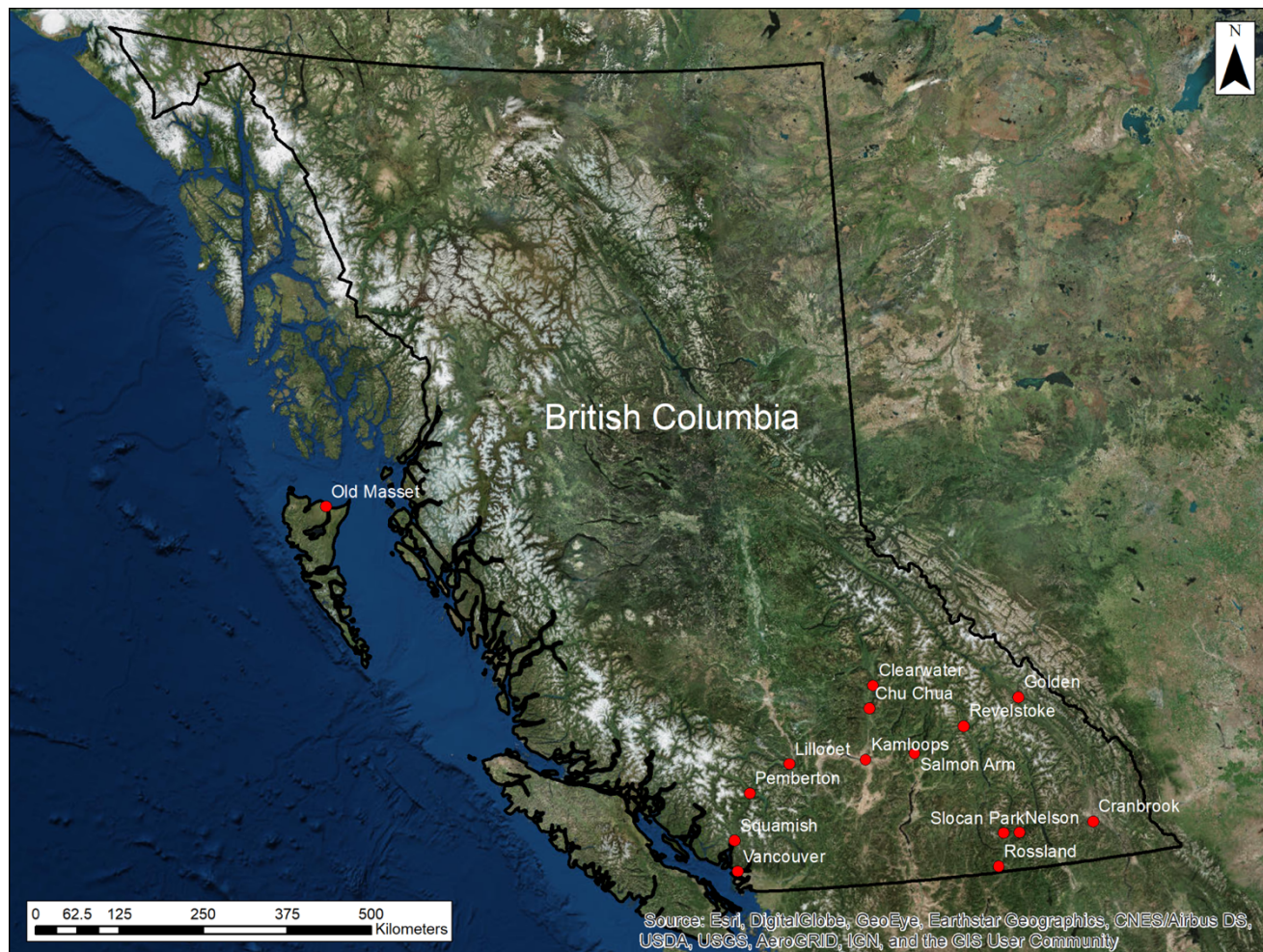


Appendix 1 - Public land, private land and reservations in B.C. (BC Ministry of Forests, 2003)

Appendix 2 – List of Interviewees

Lyle Wilson	Owner/Operator Nipika Mountain Resort	Invermere, B.C.
Michael Roycroft	Area Manager for Specialized Facilities and Trails	Canmore, AB
Stewart Spooner	Kootenay Columbia Trails Society	Rossland, B.C.
Martin Littlejohn	Executive Director of the Western Canadian Mountain Bike Tourism Association	Vancouver, B.C.
Herb Hammond	Forest Ecologist, Silva Forest Foundation	Slocan Park, B.C.
Matt Hadley	Trails Technologist, McElhanney Consulting	Canmore, Ab
AJ Strawson	Executive Director of the International Mountain Bike Association - Canadian Chapter	Squamish, B.C.
Brad Harrison	Executive Director of the Backcountry Lodges of B.C. Association, Chair of the Adventure Tourism Coalition.	Kamloops, B.C.
Ted Morton	Owner, B.C. Enduro Series, Revelstoke 3 Day Heli Assisted mountain bike race	Kamloops, B.C.
Aaron Cooperman	Owner, Sol Mountain Lodge	Clearwater, B.C.
Lisa White	Tourism business owner, activist, Haida Gwaii Land Protectors	Old Masset, B.C.
Matt Yaki	Owner, Wandering Wheels Mountain Bike guiding company	Revelstoke, B.C.
Tennessee Trent	Trails Manager, Recreation Sites and Trails BC	Nelson, B.C.
Phil McIntyre-Paul	Executive Director, Shuswap Trail Alliance	Salmon Arm, B.C.
Naheed Henderson	Director of Communications, Tyax Adventures	Pemberton, B.C.
Tom Eustash	Maintenance Manager, Simp'cw Nation	Chu Chua, B.C.
Sutra Brent	Sustainable Trails Specialist, Shuswap Trails Alliance	Salmon Arm, B.C.
Geoff Playfair	Guide, Tyax Adventures	Lillooet, B.C.
Karen Playfair	Finance and Operations, Tyax Adventures, LORCA	Lillooet, B.C.
Dave Butler	CMH Director of Sustainability	Cranbrook, B.C.
Dale Douglas	Owner/Operator Tyax Adventures	Pemberton, B.C.

Appendix 3 – Map of Study Area



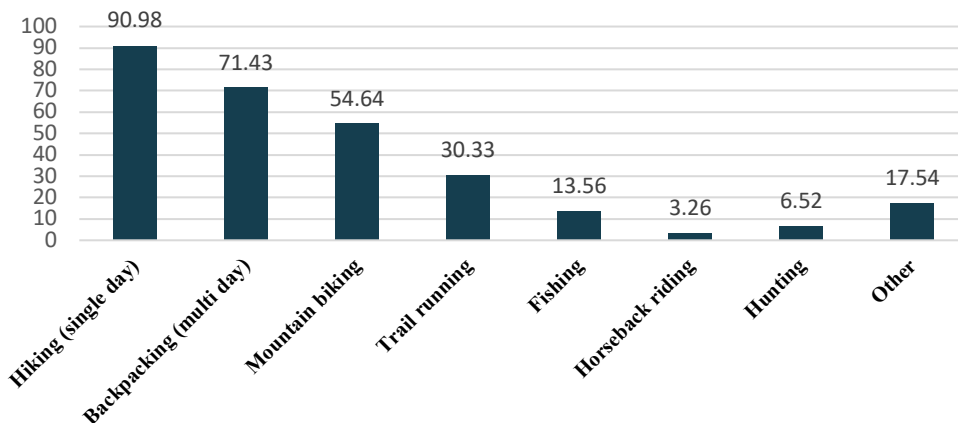
Map created using ArcGIS with assistance from Jackson Baron.

Appendix 4 – Survey Data Summary

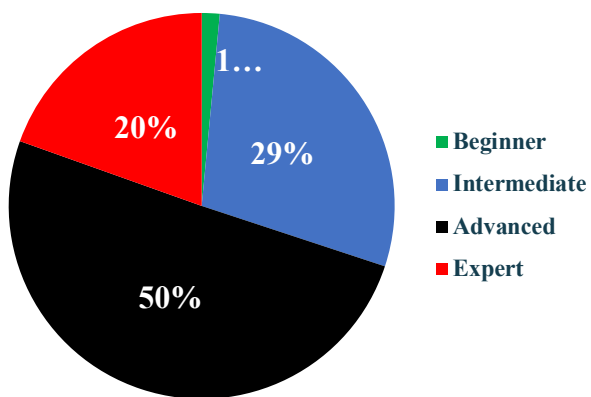
Total Respondents: 400

**Respondent Age:
Range: 16 - 76
Mean: 39**

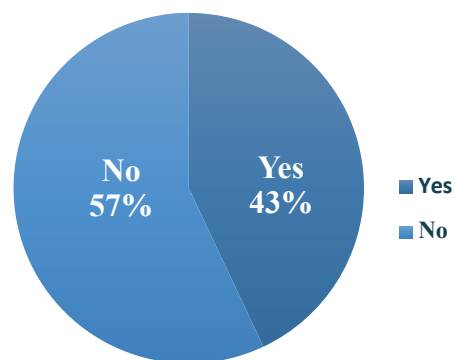
Respondents by Activity Type



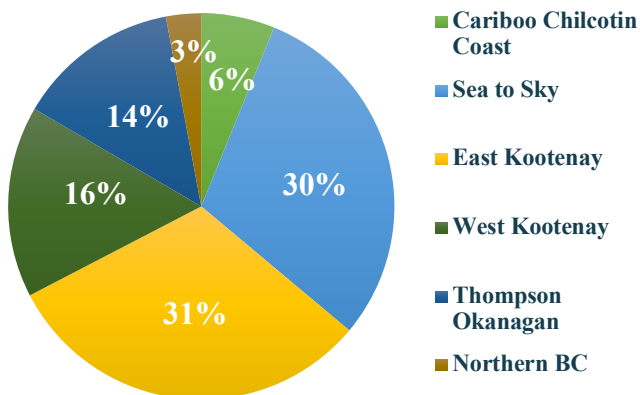
Respondent Experience Level



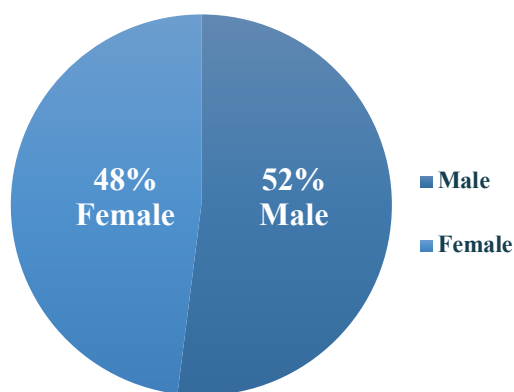
Are You A Member of Your Local Trails Association?



Respondents By Region of B.C.



Gender



Appendix 5 – Interview Guide

Position/Background:

- What position do you hold at your organization?
- How long have you been in this position?
- Are you an avid backcountry trail user?
 - If so, how do you usually recreate on the trails?

Management:

- How do you feel about the state of backcountry trail management within BC?
 - i. Do you feel there are adequate resources available for managing trails in backcountry environments?
- How would you describe the relationship between the local trail society and government agencies in your area?
- What do you think is missing from the recreational trail management community in BC?
- Do you believe we are developing and managing use of our backcountry environments at a sustainable rate?
- What are the emerging issues trail managers have been facing on your local trail network over the last five years?
- In your experience, what are the most effective ways of communicating with trail users on the trails you use/manage? Do you believe this method is also appropriate for backcountry trails?

Sources of Conflict:

- Are you aware of any conflict among trail users on backcountry trail networks in your community? If yes, please describe it.
 - i. What, if any, methods have been implemented to solve issues of conflict between trail users?
 - ii. What methods do you find are most effective at resolving conflict among trail users?

- What do you believe are the motivations and objectives of trail users seeking a backcountry trail experience on the trails you use/manage?
- Have you experienced conflict with resource extraction industries (forestry, mining, oil and gas, etc)?
 - i. If so, has this conflict been resolved in a productive manner?

Climate Change

- To what extent is climate change effecting the access, timing and availability of trail based tourism in your area?
 - ii. Is climate change having implications on the maintenance of the trail network? If yes, how are you overcoming these challenges?
 - iii. Are climate extremes (flooding, drought, wildfire etc) having an impact on visitation to trail networks in your area?

Technology

- How is technology influencing the way you have been managing trails?
- Would you say advancements in technology are having a positive or negative effect on trail management in your experience?
- Please describe some of the challenges or positive outcomes you have experienced while managing technology on the trails.

Wildlife

- What are the key concerns regarding conflict with wildlife in your area?
- What types of wildlife closures have you experienced in your area? (species, duration, mitigation)

General

- What is your favorite part about recreating in the backcountry?
- How would you define “backcountry”?

Mountain Bike Specific Questions:

- Do you believe that there is a place for mountain bikes on backcountry trail networks?
 - i. If yes, would you say this is a common belief among your management team/community?
 - ii. If mountain bikers have been permitted to use backcountry trails in your area, have they been incorporate effectively to reduce the likelihood of conflict occurring with other trail users?
- What are the biggest concerns among mountain bikers in your area?
- What are the motivations and objectives of mountain bikers in your area?

Appendix 6 – Trail User Survey



Sustainable Management of Backcountry Trails: Tourism, Technology and Climate Change

The purpose of this study is to examine the current management challenges associated with summer use of backcountry trails in Western Canada. A growth in tourism, advancements in technology, continued resource extraction and a changing climate are influencing the way we use and access the backcountry. This research will examine the appropriateness of current policies, and will identify common challenges and solutions related to trail management, design, access and conflict mitigation.

Participation in this survey is completely voluntary and you may withdraw from the survey at any time. There is a very low likelihood of any discomforts and/or inconveniences associated with your participation in the study. The information collected is completely anonymous. It is possible that the research will be published, and shared within the trail management community. Any comments, questions, or concerns should be directed towards Pate Neumann who can be contacted by e-mail at pateneumann@gmail.com or by phone at 1-403-688-0562 or to his research supervisor Dr. Courtney Mason who can be reached by e-mail at cmason@tru.ca. For further information, please contact the TRU Research Ethics Board at TRU-REB@tru.ca or 1-250-828-5000.

If you agree to participate in this survey, please click Next below to proceed.

Thank you!



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**1. How do you usually spend your time on backcountry trails?
(select all that apply)**

- Hiking (single day trip)
- Backpacking (multi-day trip)
- Trail running
- Mountain biking
- Horseback riding
- Fishing
- Hunting
- Other (please specify)

2. How would you classify your experience level?

- Beginner
- Intermediate
- Advanced
- Expert

3. How do you usually access backcountry trails?

- I walk/run/ride from home
- I drive from home to the trail head
- By helicopter or plane
- By motorized off-road vehicle (ATV, dirtbike, etc)
- Other (please specify)

4. How often do you use Forest Service Roads to access the backcountry?

- Very frequently (76% - 100% of the time)
- Somewhat frequently (51% - 75% of the time)
- Infrequently (26% - 50% of the time)
- Very infrequently (0% - 25% of the time)

Comments:

5. What words would you use to describe the backcountry?

6. What do you enjoy most about being in the backcountry?



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7. How would you rate the importance of the following when traveling in the backcountry?

	Very Important	Important	Neutral	Somewhat Important	Not at all Important
Non-Motorized Trails	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Limited human caused environmental disturbance	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Trails designated for a specific purpose (e.g. hiking only, mountain biking only, etc.)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ease of access	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Limited number of users	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The potential to view wildlife	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The remoteness of the location	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Cell service	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Interpretative signage (history, flora, fauna, geology)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Acknowledgement of Indigenous territory	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

8. Do you purposefully change the way you travel when on backcountry trails vs. frontcountry trails?

Yes

No

Comments:

9. Have you ever used a helicopter to access a trail?

Yes

No

If Yes, what was the activity?

10. Are you currently a member of your local trail association?

Yes

No

Yes, and when I travel to other areas, I also buy a membership to support their local trail association too.

Comments

11. Please select the number of days a year you spend volunteering with your local trail association?

- 0
- 1-4
- 5 - 9
- 10 - 14
- 15 - 19
- 20 +

Comments



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12. Have you ever experienced conflict with other trail users while in the backcountry?

- No
- Yes

If yes, please describe the conflict(s) you experienced and how/if they were resolved:

13. Are you willing to share backcountry trails with other trail users?

	Yes	No
Hikers	<input type="radio"/>	<input type="radio"/>
Trail runners	<input type="radio"/>	<input type="radio"/>
Mountain bikers	<input type="radio"/>	<input type="radio"/>
Horseback riders	<input type="radio"/>	<input type="radio"/>
Anglers	<input type="radio"/>	<input type="radio"/>
Hunters	<input type="radio"/>	<input type="radio"/>

Comments

14. Would you be more inclined to share certain trails if:

	Yes	No
There were other user specific trails in the area	<input type="radio"/>	<input type="radio"/>
There were specific times for specific use	<input type="radio"/>	<input type="radio"/>
All trail users were supporting and contributing to the local trail association	<input type="radio"/>	<input type="radio"/>

Comments

15. In general, do you feel there is appropriate signage to educate trail users on right of way and trail etiquette in the backcountry?

- Yes
- No
- It could be improved

If it could be improved, please explain how:

16. What is your preferred method of wayfinding on backcountry trails?

- Paper map
- I rely on trailhead maps and trail signage
- Trailforks
- GPS
- Other (please specify)



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17. During the last two summers, BC experienced two of the worst wildfire seasons in recent history. How have the effects of wildfires in the province changed the way you use the backcountry?

18. Do you believe the seasonal extremes we have experienced in the province (flood, fire, drought) are a result of climate change?

Yes

No

Comments

19. Do you feel that climate change is effecting the way you recreate in the backcountry?

Yes

No

Comments:

20. Do you believe we have enough backcountry trails in BC? Yes No**Comments:**



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21. What town do you live in? (normal place of residence)

22. Gender:

23. Age:

24. How likely is it that you will participate in a trail based backcountry trip in the future?

Very Likely

Likely

Unsure


Somewhat Likely


Not Likely

25. If you have any other questions or concerns regarding backcountry trail use and management, please feel free to express them below.


Appendix 7 – Whistler Off Road Cycling Association Trail Signage


BIKE SMART


R **Ride Within Your Ability** 
 Can you stop safely?
 Do you understand the trail classification in our area?
 How strenuous are the climbs?
 What are the risks involved with the feature?


E **Earn Your Turns** 
 Make a trails donation online.
 Volunteer at trail days (worca.com for info).
 Purchase a Trail Supporter pass.

S **Share The Trail** 
 Be Bear Aware, www.bearsmart.com.
 Look out for others especially, when descending.
 Slow down and communicate with others on foot when passing.
 Keep to the side when climbing.


P **Plan Ahead** 
 Have you told anyone where you're heading?
 What are they going to do if you don't make it back on time?
 Have you got any food, water, tools or a first aid kit?
 Is your cell phone charged?

E **Expect The Unexpected** 
 Pre-ride, Re-ride, or even walk away.
 The feature will be there the next time!
 Expect to encounter technical features on expert trails.


C **Closed Means Closed** 
 Obey signage.
 Stay on the designated trails, no shortcuts!
 Avoid trail braiding and ride-arounds in wet areas.

T **Take It Home** 
 You packed it in, you pack it out.
 Dispose of garbage and recycling at appropriate facilities.


**Become
A Whistler
— Trail —
Supporter
It's Easy!**



Purchase a Trail Supporter sticker at the local Bike shops.



Scan here or go online to worca.com to donate.



Help Us Help Our Trails! worca.com

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