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Advancing Evidence-Based Decision-Making in Large Landscape Conservation Through the Social Sciences: A Research Agenda for the Yellowstone to Yukon Region

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As the world's mountains are significant hotspots of biodiversity and home to hundreds of millions of people, they are ideal locations in which to investigate and develop the conservation social sciences in a systematic way to help inform conservation decision-making and policy. Here, we discuss the development of a social science research agenda for the Yellowstone to Yukon Conservation Initiative, a transboundary environmental organization working in Canada and the United States. We suggest that this process is useful for others to undertake in similar conservation landscapes and mountain systems as we strive to better understand how people live in, play in, benefit from, and visit the globe's mountain regions. We outline an agenda for collaborative social science research in the Yellowstone to Yukon region related to 4 themes and offer 12 priority questions as launching points for interested researchers to explore in more detail. Through a review of relevant literature on the 4 themes, we identify research gaps that, if addressed, could usefully inform decision-making across the Yellowstone to Yukon region. Finally, we call on the research community to focus its curiosity and resources on answering these questions and encourage funders and institutions to support them in doing so.

Keywords: *biodiversity conservation; conservation social sciences; human dimensions; landscape conservation; Yellowstone to Yukon.*

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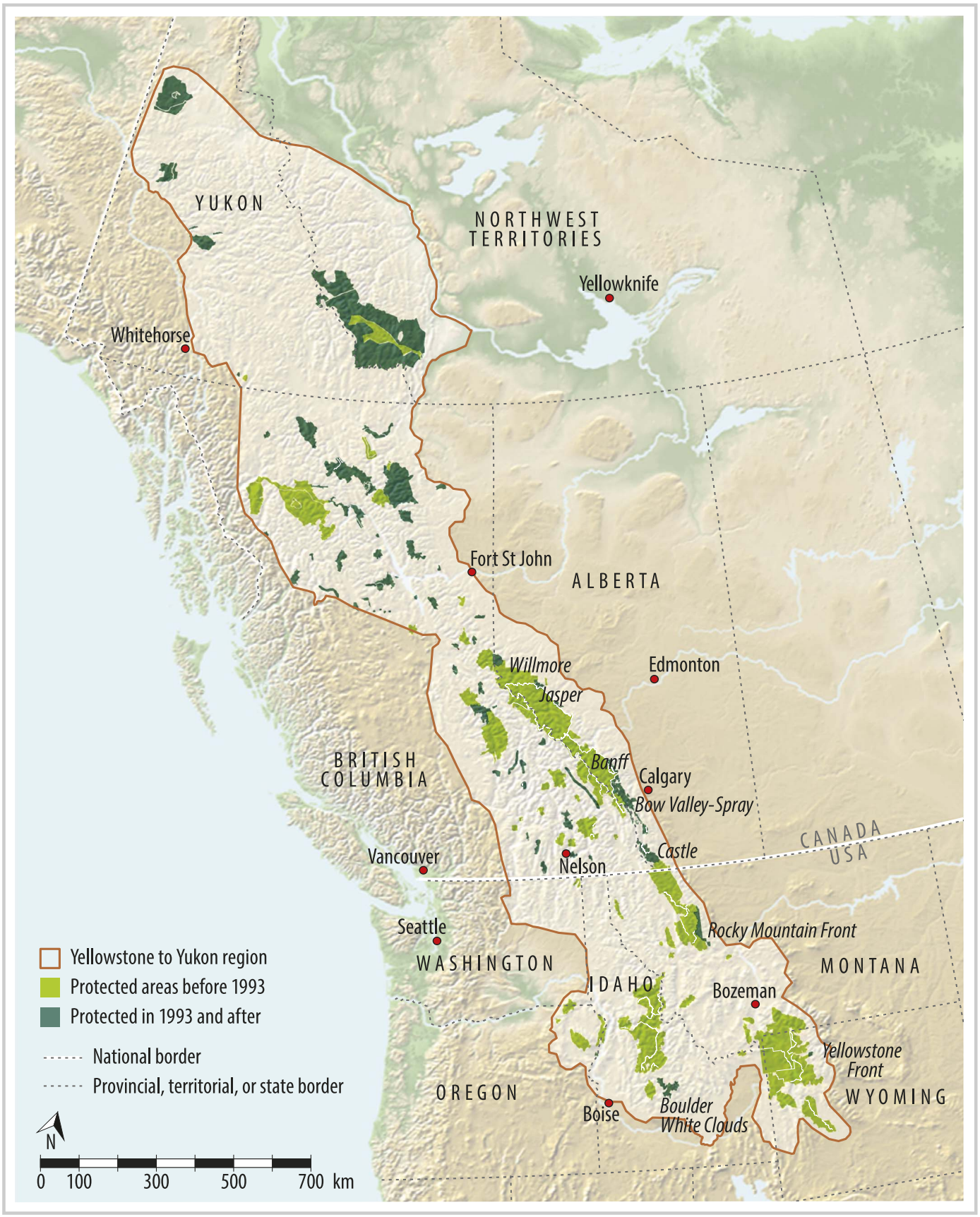
Introduction

Mountains in North America are heavily studied geographies. However, most of this research is ecologically focused, with the social sciences lagging significantly behind. A recent study showed that of the nearly 3000 research articles about mountain research in Canada published since 1960, just 3% were from the social sciences (McDowell and Hanly 2022). This, the authors argue, "limits the scholarly understanding of the human dimensions of life in the mountains" and constrains management decisions seeking to balance development and conservation across Canada's mountain ecosystems (McDowell and Hanly 2022: 3020). Combined with research showing that conservation science is poorly linked to informing decision-making across North America (Lemieux et al 2021), this lack of social science research is more striking. This observation highlights the need to integrate or "mainstream" the social sciences into conservation research, policy, and practice to help improve decision-making and make conservation more effective, just, and durable (Bennett et al 2017). However, mainstreaming the social sciences across conservation has been slow (for notable exceptions, see Bennett et al 2019, 2022; Dayer et al 2020; US Fish and Wildlife Service 2020). As mountain regions are global hotspots of biodiversity, home to hundreds of millions of people, and crucial for adapting to climate change (Graumlich and Francis 2010; Chakraborty 2020), they are ideal locations in which to integrate more interdisciplinary research across conservation. As such, we embarked on a project to advance applied conservation social science research across the Yellowstone to Yukon region.

The Yellowstone to Yukon region (Figure 1) stretches 3400 km from south of the Greater Yellowstone Ecosystem, Wyoming, United States, to north of the Mackenzie Mountains, northern Yukon Territory, Canada, and it includes at least 75 Indigenous territories (Y2Y n.d. a). The region provides important ecosystem services to millions of people within and beyond it (Mitchell et al 2021) and is a mosaic of core protected areas, critical linkages important for ecological connectivity, and urban and working landscapes. Conceptualized as a large landscape conservation vision in the early 1990s, the region has experienced significant growth in multiple conservation metrics, such as protected areas, wildlife-crossing infrastructure, and an expansion of endangered grizzly bear populations (Hebblewhite et al 2022). Despite these successes, the region has long faced threats from human and industrial development, recreation and tourism, resource extraction, and climate change (Harvey 1998; Graumlich and Francis 2010). As such, we see the Yellowstone to Yukon

FIGURE 1 Since its inception in 1993, the Y2Y vision has helped build an interconnected conservation community from Yellowstone to Yukon, which has drawn significant scientific attention to the region (Chester 2015). In addition to protected areas in the region, the map indicates well-known ecosystems (in italics). (Source: Adapted from Hebblewhite et al 2022)



region as an ideal location in which to investigate and develop the conservation social sciences in a systematic way and to contribute to evidence-informed decision-making, programming, and policy (see Niemiec et al 2021).

In this article, we discuss the development of a social science research agenda for the Yellowstone to Yukon Conservation Initiative (Y2Y), a Canada–US environmental nonprofit organization with a mission to "connect and protect habitat from Yellowstone to Yukon so that people and nature can thrive" (Y2Y n.d. b). The agenda identifies 4 research themes and several priority research questions (Box 1) that will help guide Y2Y's social science priorities over the coming years as the organization looks to focus more on the human side of its mission. We suggest this process is useful for others to undertake in landscape conservation initiatives and mountain regions that face similar threats.

We are inspired by those advancing the social sciences in marine and working landscapes (Bennett et al 2022), landscape conservation efforts in Europe (Blicharska et al 2016), and marine protected areas (Gruby et al 2016). We echo calls to governments and organizations alike to increase engagement with, and funding of, conservation social science research and, by way of such, the pursuit of interdisciplinary science and knowledge in landscape conservation initiatives and mountain regions. Further, we call on the social science research community to focus their curiosity on the Yellowstone to Yukon region by highlighting its importance, encouraging funders and governance bodies to support research efforts, and helping to answer the most pressing questions affecting these places and the people who live there.

Methods

From March to June 2022, we conducted a single-question survey with external experts, practitioners, and past and present partners of Y2Y. We asked:

> *What are the important social science/human dimensions research questions that, if addressed, would lead to more just and equitable conservation outcomes in the Yellowstone to Yukon region?*

The survey was inspired by recent horizon scan research (Sutherland et al 2020; Dietz et al 2021) and was effective in reaching a range of people with social science expertise across the Yellowstone to Yukon region. Experts with active research or known interests in the region, along with practitioners, and Y2Y partners were asked to participate. Of the 130 invitations, 67 people responded, and 40 completed the survey in full. Demographic details are provided in Figures S1 and S2 (see the *Supplemental material*, https://doi.org/10.1659/mrd.2023.00008.S1). Survey participants could respond multiple times within the survey, which led to a total of 153 responses framed, for the most part, as research questions (examples shared in Boxes 2–5 on the following pages). Survey data were supplemented by 3 focus groups with Y2Y staff (including a total of 16 people), recent horizon scan studies (Sutherland et al 2020; Dietz et al 2021; Moola and Youdelis n.d.), and several 1-on-1 discussions with experts about research gaps throughout the region.

We coded responses using Nvivo and analyzed emerging themes based on key categories of organizational importance, including potential project focus, relevance to Y2Y, research feasibility and scope, and linkages to existing research or conservation in the region. Together, this process identified the research themes and priority research questions discussed herein. After coding, we searched Google Scholar, Web of Science, and Connected Papers for insights into the state of knowledge for each theme. Rather than serving as an exhaustive literature review, the subsequent sections offer an entry point into our initial thinking about these themes for the region and act as launching points for Y2Y and researchers to explore in an applied way.

Results: Four research themes

Below, we focus on 4 research themes that would benefit from further primary research. The guiding questions within these themes capture crucial areas of concern for the region and form the basis of the research agenda seen in Box 1. Nearly one quarter of expert responses (34) emphasized elements of diversity, equity, inclusion, and justice (DEIJ) and/or Indigenous-led conservation efforts, engagement, or collaboration with Indigenous Peoples toward effective conservation outcomes. Although the extent to which participants understood or were implementing DEIJ practices is hard to grasp from these responses, collectively, they suggest that respondents saw DEIJ and reconciliation with Indigenous Peoples as crucial

BOX 1: Four research themes

The 4 research themes highlighted here represent a synthesis of the concerns raised by experts throughout the Yellowstone to Yukon region. Researchers can further refine the questions for place-specific locations and studies.

Theme 1: Institutional barriers to conservation action

1. What are the institutional barriers obstructing conservation action in the Yellowstone to Yukon region?
2. What are the most effective strategies for persuading decision-makers to take action for nature and conservation?

Theme 2: Mobilizing support for conservation

3. What motivates people to take action for nature and conservation?
4. What barriers do people face in taking action for nature and conservation?
5. How can conservation groups retain those who engage in conservation actions *and* build a more durable and inclusive movement?

Theme 3: Adaptive capacity in the Yellowstone to Yukon region

6. What perceptions of vulnerability and resilience do groups in the Yellowstone to Yukon region have?
7. What is the adaptive capacity of these groups, and how are they readying themselves to adapt to environmental change?
8. How does the level of readiness and resilience impact the capacity of people within the group to engage in more pro-environmental actions or behaviors?

Theme 4: Human dimensions of outdoor recreation and tourism

9. How can human wellbeing be improved while effectively managing the increase in recreationists across the Yellowstone to Yukon region?
10. What barriers prevent decision-makers from taking action to curb the harmful impacts related to increased recreation?
11. How can the resistance to restrictions on recreation be reduced to limit impacts?
12. How does increased recreation use impact the quality of visitors' recreational experiences?

to conservation. Instead of confining DEIJ issues to a specific research theme, we urge those advancing all of the questions from this agenda to center DEIJ principles and practices and work to coproduce knowledge across disciplines that include a diversity of knowledge systems.

Theme 1: Institutional barriers to action

The institutional barriers referred to here are the conditions that constrain or upend conservation decision-making across different levels of governance. This is a synthesis of key ideas that expert and focus group participants noted, such as "a lack of political will," "polarization and divisiveness," and the impacts on conservation. As seen in Box 2, experts stated long-standing "issues" involved with informing conservation decision-making with interdisciplinary and traditional forms of knowledge. The institutions that structure social norms and behaviors, such as law and policy, were also emphasized. Below, we highlight relevant research on these topics for the Yellowstone to Yukon region.

Social scientists have largely focused on conservation decision-making from a reform-oriented approach. Most prominently, this research focuses on assessing and improving the extent to which conservation decisions are informed by Western science and Indigenous and local knowledges. Scientists have studied conservation-related knowledge mobilization in Australia (Cook et al 2012), Brazil (Giehl et al 2017), Canada (Lemieux et al 2018, 2021), the United Kingdom (Pullin and Knight 2001; Pullin et al 2004), and South Africa (Wilhelm-Rechmann and Cowling 2011), among others. These studies show that several dynamics, not simply an absence of knowledge, contribute to a lack of evidence-based decision-making. The literature emphasizes both institutional and behavioral barriers that challenge knowledge mobilization, such as managers favoring internally created knowledge over external knowledge (Lemieux et al 2018). A lack of support for Indigenous engagement due to a favoring of Western traditions in land management has also been observed, as well as limited involvement of managers in research, weak accessibility to raw data, and human capacity and resource constraints (Wilhelm-Rechmann and Cowling 2011; Cook et al 2012; Giehl et al 2017; Lemieux et al 2018, 2021).

Research in Alberta, Canada, shows how management support, capacity, and social and political pressures also impacted the adoption of evidence-based decision-making for conservation (Carruthers Den Hoed et al 2020). This topic highlights fruitful areas for further research, including the various social and political pressures facing conservation today, which include the increasing politicization of conservation (Botchwey and Cunningham 2021) and the challenges presented by deepening society-wide polarization (Ford et al 2021). Identification of these barriers also highlights the need to better understand strategies for overcoming them across a range of conservation spaces, including but not limited to protected areas, which have been the focus of much of this research.

Conservation research and knowledge would also benefit from broadening the scope of research related to social institutions to better understand how they shape formal and informal rules and norms in societies, and therefore structure collective behavior (see Woolaston et al 2021). Although currently a gap, informative examples exist. In environmental law and policy, research has shown how federal and provincial approaches have privileged economic growth over protecting biodiversity, even in the most critical cases, as with endangered species such as woodland caribou (Collard et al 2020; Palm et al 2020). This research asks important questions about how to reform institutions that are largely designed to protect and expand economic growth at the expense of nature. Challenges have also been highlighted in areas where the legacies and uneven power relations of colonialism remain. This includes critiques of "comanagement" arrangements between Indigenous governments and settler states (Sandlos 2014), problematic consultation processes with First Nations on protected area developments (Youdelis 2016), and the conceptual and narrative strength that the wilderness myth and related concepts continue to have in conservation (Youdelis et al 2020; Bernauer and Roth 2021). These are some reasons why researchers have highlighted the need to decolonize or Indigenize conservation (Artelle et al 2019, 2021; Hessami et al 2021), including through the support and expansion of Indigenous-led conservation initiatives in mountain regions and beyond (Tran et al 2020; Mason et al 2022). This is not to say that needed reforms are impossible. The Government of British Columbia's enactment of the *Declaration on the Rights of Indigenous Peoples Act 2019* is a significant milestone in relations between British Columbia and Indigenous Peoples, and it will represent a potential paradigm shift for conservation if it translates into meaningful change (eg provincial laws are consistent with the United Nations Declaration on the Rights of Indigenous Peoples; provincial government supports Indigenous Protected and Conserved Areas). Research that investigates barriers to implementing this legislation may be useful for ensuring it achieves its purposes and genuinely advances reconciliation among Indigenous Peoples and settler governments and communities.

BOX 2: Submissions informing the theme of institutional barriers to action

Many of the issues highlighted by surveyed experts were also referenced as challenges by focus group participants. We captured these challenges as barriers to reflect the language and ideas seen across the research data.

- *How can long-standing issues related to the integration of knowledge across disciplines, and across different ways of knowing, be meaningfully and equitably addressed?*
- *In what ways can different forms of evidence, including Western and traditional knowledge, be more effectively integrated into conservation decision-making within the Yellowstone to Yukon region?*
- *What laws, policies, and regulations are undermining conservation efforts in this region?*
- *How will provincial and territorial governments respect and work with unceded Indigenous nations (or nations without a treaty) to define conservation and protected areas on their own terms?*
- *How can land-use planning barriers be overcome to ensure public lands are effectively managed in the years ahead?*
- *How does the continued politicization of the environment coupled with increased polarization affect people's preferences for environmental policy?*

Theme 2: Mobilizing support for conservation

Recent polling data in the United States (Tyson and Kennedy 2020) and Canada (Wright et al 2019; Nanos Research 2022) and the growth in memberships of conservation organizations provide evidence of broad public support for protecting nature (Mertig 2022). Despite this support, challenges remain in building an effective movement for conservation as biodiversity is still "electorally weak" (Jones 2017), because politically we "lack a constituency for nature" (Schwartz 2020). That said, many organizations, groups, and communities are trying to build support for protecting nature. As shown in Box 3, surveyed experts were keen to better understand what mobilizes different groups of people to support nature conservation, the actions that are most effective in doing so, and the role of place in building more inclusive conservation *movements* that reflect environmental priorities on the ground and at the ballot box. These sentiments were expanded by focus group participants, as was the idea for conservation to learn from more effective campaigns and social movements.

There is an extensive body of knowledge, from different disciplines, examining what motivates people to act in environmentally friendly ways. The theory of planned behavior, which links behaviors to individual intention and perceived behavioral control, is useful for trying to understand individual behaviors and developing behavioral interventions (Yuriev et al 2020). This has been applied to the human dimensions of wildlife in different contexts (Miller 2019). Critics have pointed out that the approach tends to privilege economic rationality in planned behavior and overlook broader values that impact behavior. This includes the desire to "live a good life" (Van den Born et al 2018) and the interplay between internal and external factors, such as social context and personal motivations (see Molinario et al 2020). Additional research has investigated how a range of factors contributes to environmental behavior, highlighting the need to study the dynamics of place-based behavior across time and space (Admiraal et al 2017). Investigation of motivational factors in specific environmental and conservation-oriented programs, and with specific social groups, thus remains important in understanding how to stimulate action for nature's protection and/or alternative ways of knowing and living in specific areas (Admiraal et al 2017; Van den Born et al 2018; Mock et al 2022; Blye et al 2023).

Work in social movements theory is also instructive (see Saunders 2013). Research on environmental movements and activism in North America has shown how diverse actors, including Indigenous Peoples and settler communities, often align around issues of environmental decline (Clapperton and Piper 2019). In the Yellowstone to Yukon region, research has highlighted how First Nations' collaboration and partnership with environmentalists "can be more constructively comprehended as strategic choices made by astute leaders seeking to retain or regain control of customary lands and thereby promote their peoples' physical, cultural, and political survival" (Willow 2019: 13). Similarly, Grossman (2017) highlighted case studies where diverse coalitions of actors, including Indigenous Peoples and settlers, have gone from long-standing conflict to cooperation when it comes to the environmental threats facing their communities. In Montana, such alliances emerged as Indigenous Peoples and settler agricultural producers "have in common a sense of place that they view as under siege by globalizing forces" (Grossman 2017: 167). According to Grossman (2017), this was crucial in confronting the state's plans for what was deemed harmful industrial development. Similar observations have been made about anti-pipeline movements, such as the No Dakota Access Pipeline mobilization (Steinman 2019), which, when amplified through social media, helped forge connections across scales and stimulate broader discussions about Indigenous rights, water quality, and climate change, creating the potential for the "next Standing Rock" (Steinman 2019; Tysiachniouk et al 2021; Boscarino 2022; Renzi 2022).

Researchers, from various disciplines, investigating the dynamics of place have long been concerned with understanding the emotional bond that develops between a person, or group of people, and a specific locale (Smith 2018; Fornara et al 2021). Some of this research has attempted to understand when people's attachment to place may lead them to behave in pro-environmental ways (Fornara et al 2021). For example, place attachment is important for people who take actions that mitigate environmental harm in places such as protected areas, recreational settings, and rural communities (Halpenny 2010; Buta et al 2014; Takahashi and Selfa 2015; Wilkins and de Urioste-Stone 2018). Place attachment is also important for people who behave in ways that might appear anti-environmental, such as opposing the construction of renewable energy infrastructure or the establishment of protected areas (Devine-Wright 2009; Huber and Arnberger 2016; Fornara et al 2021). Taken together, this literature shows that place attachment factors significantly into people's willingness to participate in civic engagement and activism (Fornara et al 2021). Having a stronger sense of *which* characteristics of place different social groups are attached to and how different places across the Yellowstone to Yukon region give meaning to people's lives could help cultivate a deeper attachment or "sense of place" and build stronger conservation movements (see Youngs' [2018] study of seasonal employees and guides in Grand Teton National Park).

BOX 3: Submissions informing the theme of mobilizing support for conservation

Survey responses reflected concerns raised in focus group discussions, especially in terms of conservation's need to learn from seemingly more effective social movements and a keenness to better understand the effectiveness of campaigns and the types of actions used to mobilize existing supporters.

- *How can tradition, heritage, religion, and sense of place in rural areas be harnessed to support conservation?*
- *How does a sense of place develop in folks even if they don't visit an area? How do we facilitate that? What is the connection between sense of place and action, particularly when comparing places folks don't visit versus places folks do visit?*
- *Are there activities, experiences, or settings that help people develop stronger feelings of nature connectedness? Where and how does that lead to involvement or action (and what kinds)? Are there activities, experiences or settings that show the contrary?*
- *What were the conditions that led to the emergence of a broad coalition against coal mining in the Eastern Slopes? What is it about this issue that brought together divergent actors in the name of conservation?*

Research that broadens our understanding of why people get involved in nature conservation, their preferences for doing so, what barriers they face, and how their attitudes and beliefs affect behavior, will help build conservation movements. Insights from social movements can shed light on the role of different actors in organizing and mobilizing conservation supporters and highlight the place-based conditions that cultivate effective partnerships across differences. This will also inform strategy related to decision-maker engagement (ie research from theme 1). Examining existing social movements, and how they embed biodiversity into broader struggles for social and environmental justice, may also offer productive insights for groups looking to organize in the name of biodiversity (see Escobar 1998).

Theme 3: Adaptive capacity in the Yellowstone to Yukon region

As conservation spaces face significant impacts from environmental change, research into "adaptive capacity" is increasing. Here, adaptive capacity is defined as "the ability of a system to adjust to climate change to moderate potential damages, to take advantage of opportunities, or to cope with the consequences" (Intergovernmental Panel on Climate Change 2007). Several expert participants stated concerns about the impacts of climate change on conservation and adjacent sectors and social groups. Questions about the capacity of conservation organizations, management agencies, local communities, and businesses to adapt to change (Box 4) reflected research gaps in the broader literature.

The vulnerability of many conservation spaces to the impacts of environmental change is well known (see Wright 2012). Research is increasingly investigating the vulnerability of adjacent social groups, such as recreationists (Neuvonen et al 2015) and nature-based tourists (Kutzner 2019), and their perceived resilience to environmental change. Additional research has examined the adaptive capacity of conservation organizations and those tasked with managing biodiversity, climate change (Johnson and Becker 2015; Petersen et al 2018), and legislative frameworks overseeing the conservation sector (Pettersson and Keskitalo 2013). This research examined the level to which "tools are in place to facilitate the implementation of management interventions" (Barr and Lemieux 2021: 33) and the collaborative steps taken to improve the resiliency of a socioecological system to the impacts of environmental change (Johnson and Becker 2015). In the United States, researchers have recommended a deeper convening of actors, the coproduction of science and knowledge, and the provision of opportunities for decision-makers to learn from adaptation efforts to "better define and leverage social and ecological adaptive capacity" to support conservation decision-making (Petersen et al 2018). However, because of the focus on developing adaptation strategies, gaps persist in how to implement and monitor these strategies. To address this, researchers have developed a framework to assess the institutional readiness of protected area management organizations to adapt to the socioecological changes linked to climate change (Barr and Lemieux 2021).

Reflecting on insights from both expert input and existing research, a better understanding of the vulnerability of diverse land uses to environmental change, and the readiness of social groups reliant on them to adapt, would aid in decision-making across the Yellowstone to Yukon region. For example, Rushton (2022) studied the impacts of climate change on Canadian mountain ecosystems from an overlooked source of local knowledge—mountain guides—and identified the adaptations that guides and outfitters are making across this changing landscape. Research that pays attention to the uneven power relations embedded within adaptive capacity frameworks would also be insightful in a region with many competing land uses, jurisdictional frameworks, and a legacy of settler-colonialism (see Ingalls and Stedman 2016). Such research would help to identify adaptation barriers specific to the region and its social groups and shed light on areas where advocacy efforts, relationship building, and additional supports are needed.

BOX 4: Submissions informing the theme of adaptive capacity in the Yellowstone to Yukon region

The example responses here, lightly edited for space considerations, highlighted experts' concerns about the long-term adaptation planning for a range of social actors in the face of climate and environmental change. These concerns help to highlight gaps in the research literature.

- *What is the long-term adaptive capacity of conservation organizations amid multiple sources of uncertainty? That is, how are conservation actors considering (and preparing for) future threats to organizational sustainability from climate change, pandemics, mental health crises, etc? Do organizations only focus on their conservation goals, or are they considering strategic sustainability?*
- *How are individual businesses, nongovernmental organizations, and government organizations responding to climate change? What is their readiness and willingness to respond? What factors are contributing to them being engaged on this topic, and what factors are preventing their response?*
- *How climate resilient are our economies, and how can community economies transition in a way that is just?*

Theme 4: Human dimensions of outdoor recreation and tourism

Nature-based recreation and tourism are key drivers of human wellbeing in the Yellowstone to Yukon region with significant economic, social, and health-related benefits (Lemieux et al 2016). Paradoxically, dynamics such as amenity migration (Lynch 2006; Abrams et al 2012), impacts on biodiversity from land-use change and disturbance (Peterson 2019; Doherty et al 2021), poor planning and monitoring of recreation (Loosen et al 2023), controversial developments (Youdelis 2016), and barriers that limit access to and benefits of recreation for minority groups (Scott and Tenneti 2021) illustrate the negative sides of these rapidly growing sectors.

Yet, growing they are. Mirroring other parts of the world, the Yellowstone to Yukon region is experiencing significant recreational growth and related impacts (see Neumann and Mason 2022). Emerging research highlights how this growth impacts protected areas and the matrix of landscapes in between with an expansion of undocumented trails (Loosen et al 2023). Within this context, surveyed experts noted a need to better understand the extent of recreation use on the landscape and ways to balance its impacts with more sustainable use. Several responses listed a need to plan for ongoing transformation across the sectors stemming from environmental change *and* behavior changes of recreationists themselves (Box 5). These concerns are

BOX 5: Submissions informing the theme of human dimensions of outdoor recreation and tourism

As seen in these example responses, survey participants highlighted a concern for the impacts of outdoor recreation and tourism, while also acknowledging the need to better understand the current situation in the region and shifting motivational and behavioral patterns.

- *What is the state of tourism in the Yellowstone to Yukon region, and how can it shift to more sustainable forms?*
- *How can we provide meaningful experiences to people in nature without negatively impacting the environment?*
- *Is the outward (more remote/widespread) expansion of outdoor recreation into further/deeper areas fueled by crowding, a desire for exploration, merely technological ability, etc?*
- *What messaging/messages/species concerns/ecological impacts are most likely to change the behaviors of recreationists?*

echoed in the literature, where there is an emergent interest in the behaviors and decision-making processes of recreationists, and in planning and visitor use management with special concerns regarding crowding and conflict.

Recently, the focus on the drivers of recreation behavior has turned to the role of digital technologies, including social media and alternative data sources. Studies have shown that social media and innovations in recreational gear and technology may increase the risks recreationists will take to gain acceptance or notoriety in their communities (Isaak 2016; Haegeli et al 2020). Social media and geotagging features have been identified as contributing to increased recreation and environmental damage in outdoor hotspots. For instance, in Jackson Hole, WY, the Travel and Tourism Board has asked visitors to stop geotagging posts on social media, hoping to protect fragile ecosystems (Holson 2018). Similarly, the popularity of technology has led to increased use and impact on remote areas. Land managers and search-and-rescue teams have reported an increase in the number of incidents involving hikers relying on smartphone applications, and false alarms from personal safety devices, raising concerns that backcountry users are becoming less self-reliant (Carlson et al 2016; Martin and Blackwell 2016; Anchan 2022). Research also supports advancements in technology and communications as newfound digital data sources that can inform management decisions by helping estimate visitation, explore the spatial distribution of recreational features and visitors, and provide insights into visitor experiences (Wilkins et al 2021; Loosen et al 2023). The way recreationists communicate about their experiences online has also helped to shape notions of belonging in recreation communities, and such "language practices" may prove useful for promoting more diverse, inclusive, and accessible outdoor spaces (Armstrong et al 2022). Research into the ways technological developments impact and influence visitor use, experiences, and behaviors in protected areas and beyond has just scratched the surface (Miller et al 2019). However, trends are emerging across the Yellowstone to Yukon region, and further research will help to inform management decisions (see Neumann and Mason 2022).

The impacts of crowding and intra- and interuser group conflict on the experience and behaviors of recreationists are also important issues. Reviews show that satisfaction-related consequences of crowding are mixed, highlighting a deterioration and enhancement of experiences for users (Dogru-Dastan 2022). Some research has suggested a negative influence of crowding on the enjoyment of nature-based activities (Ryan and Cessford 2003). However, studies on crowding have also shown that some people *prefer* to see others, based on the assumption that it will help reduce the likelihood of wildlife encounters (Kubo and Shoji 2014). Research into behavioral responses has explained how crowding can result in displacement, leading recreationists and tourists to change locations within an area or to venture to a new location (Arnberger and Haider 2007; Fleishman et al 2007; Rice et al 2019). Crowding can also lead visitors to shift activities to earlier or later times of the day (Manning and Valliere 2001; Kirchgessner and Sewall 2015; Rice et al 2019), an emerging concern in ecosystems with abundant wildlife populations that are active at dawn and dusk, including the Yellowstone to Yukon region. Recent research has hypothesized that similar visitor responses to crowding and overtourism persist in Banff, Alberta, a tourism hub in the region (Pavelka 2019). Investigating crowding outside of national parks could provide useful insights into the behavioral responses of recreationists in different spaces.

As outdoor recreation grows in space and throughout different seasons, and crowding manifests, concerns around conflicts among user groups have also increased. Although limited (Godtman Kling et al 2017, 2019), research has shown that potential conflicts may arise due to scarce resources or capacity issues (Haddock and Quinn 2015), a difference in values among user groups (Vaske et al 2007), and the perceived or actual environmental impacts of different activities (see Switalski 2018).

For example, research focused on public forests in southwestern Alberta has shown that the continuation of passive approaches to management will result in the decline of the recreational experience, degradation of ecosystems, and an increase in potential conflict among users, particularly those engaged in motorized versus nonmotorized activities (Haddock and Quinn 2015). Other research has highlighted how trends in property ownership and the "commercialization" of public wildlife resources have increased conflict between landowners and hunters in Montana, leading to management challenges, including a potential decline of participants in the hunting economy and potential rifts within recreation user groups (Eliason 2016).

To inform management decisions to support shared use of the land in ecologically sensitive ways, there is a need for user group consultation, insights that lead to better understanding of their needs, and effective education and communication tools between groups (Mansfield et al 2008; Haddock and Quinn 2015; Neumann and Mason 2019; Rice et al 2019). Ensuring that access and the benefits of nature and outdoor recreation are shared equitably is also key (Groulx et al 2021). Further examination of the management strategies and tools available to navigate these challenges could usefully inform conservation policy and practice. As outdoor recreation and tourism grow, supported by multiple government initiatives, research investigating ways to equitably balance its positive impacts with its detrimental ecological impacts is urgently needed.

Conclusion

Global mountain regions face unprecedented challenges from direct (ie land conversion, expanding visitation) and

diffuse threats (ie global climate change) (Chakraborty 2020). Addressing these threats, particularly the economic and political elements, requires a deeper grasp of the social realities of mountain regions, as our understanding of how people live in, play in, and visit mountain regions is limited (see Klein et al 2019; McDowell and Hanly 2022). Advancement of interdisciplinary research through landscape conservation initiatives such as Y2Y can help to fill these knowledge gaps and lead to evidence-based decision-making across landscapes. In this way, the research themes described here will be of interest to both the globe's mountain regions and landscape conservation initiatives as they pursue sustainable futures. In addition, the process we undertook to identify these questions can be adapted to different geographies and scales of analysis with regional precision.

In developing this social science research agenda, we have highlighted key areas of research for the Yellowstone to Yukon region. If, as many people argue, large landscape conservation is critical to curbing the biodiversity crisis, it falls to future research and practice to find appropriate strategies that connect knowledge with action at various scales and help to build key relationships between social groups across differences (see Wyborn 2015). Improving our understanding of life in the mountains can help to achieve this, and we offer this tool as a step toward doing so. Our process to set a research agenda also highlights the need to improve interdisciplinary knowledge mobilization between the research and conservation practitioner communities, as noted elsewhere (Carruthers Den Hoed et al 2020; Lemieux et al 2021). Finally, we call on the research community to focus its curiosities and resources on answering these questions and encourage funders and institutions to support them in doing so.

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OPEN PEER REVIEW

This aras reviewed by Don Carruthers Den Hoed and Graham McDowell. The peer review process for all MountainAgenda articles is open. In shaping target knowledge, values are explicitly at stake. The open review process offers authors and reviewers the opportunity to engage in a discussion about these values.

REFERENCES

Abrams J, Gill N, Gosnell H, Klepeis P. 2012. Re-creating the rural, reconstructing nature: An international literature review of the environmental implications of amenity migration. *Conservation and Society* 10(3):270. https://doi.org/10.4103/0972-4923.101837.

Admiraal JF, Van Den Born RJG, Beringer A, Bonaiuto F, Cicero L, Hiedanpää J, Knights P, Knippenberg LWJ, Molinario E, Musters CJM, et al. 2017. Motivations for committed nature conservation action in Europe. *Environmental Conservation* 44(2):148–157. https://doi.org/10.1017/S037689291700008X.

Anchan M. 2022. Hikers keep getting lost when relying on trail apps. Alberta Parks says better planning is the solution. CBC News. 16 October 2022. https://www.cbc.ca/news/canada/edmonton/alberta-parks-hiking-app-1.6612698.

Armstrong M, Derrien MM, Schaefer-Tibbett H. 2022. The dynamics of trail use and trip reporting: Understanding visitor experiences within social–ecological systems. *Journal of Outdoor Recreation and Tourism* 38:100456. https://doi.org/10.1016/j.jort.2021.100456.

Arnberger A, Haider W. 2007. Would you displace? It depends! A multivariate visual approach to intended displacement from an urban forest trail. *Journal of Leisure Research* 39(2):345–365. https://doi.org/10.1080/00222216.2007.11950111.

Artelle KA, Adams MS, Bryan HM, Darimont CT, Housty J ('Cúagilaákv), Housty WG (Dúqvaíšła), Moody JE, Moody MF, Neasloss D (Muq'vas G), Service CN, et al. 2021. Decolonial model of environmental management and conservation: Insights from Indigenous-led grizzly bear stewardship in the Great Bear Rainforest. *Ethics, Policy and Environment* 24(3):283–323. https://doi.org/10.1080/21550085.2021.2002624.

Artelle KA, Zurba M, Bhattacharyya J, Chan DE, Brown K, Housty J, Moola F. 2019. Supporting resurgent Indigenous-led governance: A nascent mechanism for just and effective conservation. *Biological Conservation* 240:108284. https://doi.org/10.1016/j.biocon.2019.108284.

Barr SL, Lemieux CJ. 2021. Assessing organizational readiness to adapt to climate change in a regional protected areas context: Lessons learned from Canada. *Mitigation and Adaptation Strategies for Global Change* 26(8):34. https://doi.org/10.1007/s11027-021-09972-3.

Bennett D, Barnwell C, Freedman K, Smutko S, Wittman T, Western J. 2019. *Developing a Social Science Research Agenda to Guide Managers in Sagebrush Ecosystems*. Laramie, WY: Ruckelshaus Institute of Environment and Natural Resources, University of Wyoming. https://static1.squarespace.com/static/5889438b893fc0576c2911de/t/5e221e80dd77436f28bce918/1579294367362/UW-sagebrush-social-science-needs-online.pdf; accessed on 10 January 2022.

Bennett NJ, Dodge M, Akre TS, Canty SWJ, Chiaravalloti R, Dayer AA, Deichmann JL, Gill D, McField M, McNamara J, et al. 2022. Social science for conservation in working landscapes and seascapes. *Frontiers in Conservation Science* 3:954930. https://doi.org/10.3389/fcosc.2022.954930.

Bennett NJ, Roth R, Klain SC, Chan KM, Clark DA, Cullman G, Epstein G, Nelson MP, Stedman R, Teel TL. 2017. Mainstreaming the social sciences in conservation. *Conservation Biology* 31(1):56–66.

Bernauer W, Roth R. 2021. Protected areas and extractive hegemony: A case study of marine protected areas in the Qikiqtani (Baffin Island) region of Nunavut, Canada. *Geoforum* 120:208–217. https://doi.org/10.1016/J.GEOFORUM.2021.01.011.

Blicharska M, Orlikowska EH, Roberge J-M, Grodzinska-Jurczak M. 2016. Contribution of social science to large scale biodiversity conservation: A review of research about the Natura 2000 network. *Biological Conservation* 199:110–122. https://doi.org/10.1016/j.biocon.2016.05.007.

Blye C-J, Hvenegaard G, Halpenny E. 2023. Are we creatures of logic or emotions? Investigating the role of attitudes, worldviews, emotions, and knowledge gain from environmental interpretation on behavioural intentions of park visitors. *Journal of Outdoor Recreation, Education, and Leadership* 15(1):9–28. https://doi.org/10.18666/JOREL-2022-11654.

Boscarino JE. 2022. Constructing visual policy narratives in new media: The case of the Dakota Access Pipeline. *Information, Communication and Society* 25(2):278–294. https://doi.org/10.1080/1369118X.2020.1787483.

Botchwey BS, Cunningham C. 2021. The politicization of protected areas establishment in Canada. *FACETS* 6:1146–1167. https://doi.org/10.1139/facets-2020-0069.

Buta N, Holland SM, Kaplanidou K. 2014. Local communities and protected areas: The mediating role of place attachment for pro-environmental civic engagement. *Journal of Outdoor Recreation and Tourism* 5–6:1–10. https://doi.org/10.1016/j.jort.2014.01.001.

Carlson T, Shultis J, Van Horn J. 2016. Technology in wilderness. *International Journal of Wilderness* 22(3). https://ijw.org/technology-in-wilderness/.

Carruthers Den Hoed D, Murphy MN, Halpenny EA, Mucha D. 2020. Grizzly bear management in the Kananaskis Valley: Forty years of figuring it out. *Land* 9(12):501. https://doi.org/10.3390/land9120501.

Chakraborty, A. 2020. Mountains as a global heritage: Arguments for conserving the natural diversity of mountain regions. *Heritage* 3(2):198–207. https://doi.org/10.3390/heritage3020012.

Chester CC. 2015. Yellowstone to Yukon: Transborder conservation across a vast international landscape. *Environmental Science and Policy* 49:75–84. https://doi.org/10.1016/j.envsci.2014.08.009.

***Clapperton J, Piper L*, editors**. 2019. *Environmental Activism on the Ground: Small Green and Indigenous Organizing*. Canadian History and Environment Series. Calgary, Alberta, Canada: University of Calgary Press.

Collard R, Dempsey J, Holmberg M. 2020. Extirpation despite regulation? Environmental assessment and caribou. *Conservation Science and Practice* 2(4):e166. https://doi.org/10.1111/csp2.166.

Cook CN, Carter RW, Fuller RA, Hockings M. 2012. Managers consider multiple lines of evidence important for biodiversity management decisions. *Journal of Environmental Management* 113:341–346. https://doi.org/10.1016/j.jenvman.2012.09.002.

Dayer AA, Barnes JC, Dietsch AM, Keating JM, Naves LC. 2020. Advancing scientific knowledge and conservation of birds through inclusion of conservation social sciences in the American Ornithological Society. *The Condor* 122(4):duaa047. https://doi.org/10.1093/condor/duaa047.

Devine-Wright P. 2009. Rethinking NIMBYism: The role of place attachment and place identity in explaining place-protective action. *Journal of Community and Applied Social Psychology* 19(6):426–441. https://doi.org/10.1002/casp.1004.

Dietz S, Beazley KF, Lemieux CJ, St Clair C, Coristine L, Higgs E, Smith R, Pellatt M, Beaty C, Cheskey E, et al. 2021. Emerging issues for protected and conserved areas in Canada. *FACETS* 6:1892–1921. https://doi.org/10.1139/facets-2021-0072.

Dogru-Dastan H. 2022. A chronological review on perceptions of crowding in tourism and recreation. *Tourism Recreation Research* 47(2):190–210. https://doi.org/10.1080/02508281.2020.1841373.
Doherty TS, Hays GC, Driscoll DA. 2021. Human disturbance causes widespread disruption of animal movement. *Nature Ecology and Evolution* 5(4):513–519. https://doi.org/10.1038/s41559-020-01380-1.
Eliason SL. 2016. Access to public resources on private property: Resident hunter perceptions of the commercialization of wildlife in Montana. *Journal of Outdoor Recreation and Tourism* 16:37–43. https://doi.org/10.1016/j.jort.2016.09.003.
Escobar A. 1998. Whose knowledge, whose nature? Biodiversity, conservation, and the political ecology of social movements. *Journal of Political Ecology* 5(1):53–82. https://doi.org/10.2458/v5i1.21397.
Fleishman L, Feitelson E, Salomon I. 2007. Behavioral adaptations to crowding disturbance: Evidence from nature reserves in Israel. *Leisure Sciences* 29(1):37–52. https://doi.org/10.1080/01490400600983339.
Ford AT, Ali AH, Colla SR, Cooke SJ, Lamb CT, Pittman J, Shiffman DS, Singh NJ. 2021. Understanding and avoiding misplaced efforts in conservation. *FACETS* 6(1):252–271. https://doi.org/10.1139/facets-2020-0058.
Fornara F, Scopelliti M, Carrus G, Bonnes M, Bonaiuto M. 2021. Place attachment and environment-related behavior. *In:* Manzo LC, Devine-Wright P, editors. *Place Attachment: Advances in Theory, Methods and Applications*. 2nd edition (1st edition 2014). London, United Kingdom: Routledge, pp 193–207.
Giehl ELH, Moretti M, Walsh JC, Batalha MA, Cook CN. 2017. Scientific evidence and potential barriers in the management of Brazilian protected areas. *PLoS ONE* 12(1):e0169917. https://doi.org/10.1371/journal.pone.0169917.
Godtman Kling K, Dahlberg A, Wall-Reinius S. 2019. Negotiating improved multifunctional landscape use: Trails as facilitators for collaboration among stakeholders. *Sustainability* 11(13):3511. https://doi.org/10.3390/su11133511.
Godtman Kling K, Fredman P, Wall-Reinius S. 2017. Trails for tourism and outdoor recreation: A systematic literature review. *Tourism* 65(4):488–508.
Graumlich L, Francis W. 2010. *Moving Toward Climate Change Adaptation: The Promise of the Yellowstone to Yukon Conservation Initiative for Addressing the Region's Vulnerabilities*. Canmore, Alberta, Canada: Yellowstone to Yukon Conservation Initiative. https://y2y.net/wp-content/uploads/sites/69/2019/08/963y2yclimchangeweb.pdf; accessed on 17 May 2023.
Grossman Z. 2017. *Unlikely Alliances: Native Nations and White Communities Join to Defend Rural Lands*. Seattle, WA: University of Washington Press.
Groulx M, Lemieux C, Freeman S, Cameron J, Wright PA, Healy T. 2021. Participatory planning for the future of accessible nature. *Local Environment* 26:808–824. https://doi.org/10.1080/13549839.2021.1933405.
Gruby RL, Gray NJ, Campbell LM, Acton L. 2016. Toward a social science research agenda for large marine protected areas: Social science and large MPAs. *Conservation Letters* 9(3):153–163. https://doi.org/10.1111/conl.12194.
Haddock RL, Quinn MS. 2015. Recreational access management planning: Understanding perceptions regarding public forest lands in SW Alberta. *Open Journal of Forestry* 5(4):387–401. https://doi.org/10.4236/ojf.2015.54033.
Haegeli P, Rupf R, Karlen B. 2020. Do avalanche airbags lead to riskier choices among backcountry and out-of-bounds skiers? *Journal of Outdoor Recreation and Tourism* 32:100270. https://doi.org/10.1016/j.jort.2019.100270.
Halpenny EA. 2010. Pro-environmental behaviours and park visitors: The effect of place attachment. *Journal of Environmental Psychology* 30(4):409–421. https://doi.org/10.1016/j.jenvp.2010.04.006.
***Harvey A*, editor**. 1998. *A Sense of Place: Issues, Attitudes and Resources in the Yellowstone to Yukon Ecoregion*. Canmore, Alberta, Canada: Yellowstone to Yukon Conservation Initiative. https://y2y.net/wp-content/uploads/sites/69/2019/08/661asenseofplacethey2yatlas.pdf; accessed on 9 March 2023.
Hebblewhite M, Hilty JA, Williams S, Locke H, Chester C, Johns D, Kehm G, Francis WL. 2022. Can a large landscape conservation vision contribute to achieving biodiversity targets? *Conservation Science and Practice* 4(1):e588. https://doi.org/10.1111/csp2.588.
Hessami MA, Bowles E, Popp JN, Ford AT. 2021. Indigenizing the North American model of wildlife conservation. *FACETS* 6:1285–1306. https://doi.org/10.1139/facets-2020-0088.
Holson LM. 2018. Is geotagging on Instagram ruining natural wonders? Some say yes. *The New York Times*. 29 November 2018. https://www.nytimes.com/2018/11/29/travel/instagram-geotagging-environment.html.
Huber M, Arnberger A. 2016. Opponents, waverers or supporters: The influence of place-attachment dimensions on local residents' acceptance of a planned biosphere reserve in Austria. *Journal of Environmental Planning and Management* 59(9):1610–1628. https://doi.org/10.1080/09640568.2015.1083415.
Ingalls ML, Stedman RC. 2016. The power problematic: Exploring the uncertain terrains of political ecology and the resilience framework. *Ecology and Society* 21(1):6. https://doi.org/10.5751/ES-08124-210106.
Intergovernmental Panel on Climate Change. 2007. *Climate Change 2007: Impacts, Adaptation and Vulnerability: Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*. Cambridge, United Kingdom: Cambridge University Press.
Isaak J. 2016. Social media and decision making in avalanche terrain. *In: International Snow Science Workshop Proceedings Database*. Bozeman, MT: Montana State University Library. https://arc.lib.montana.edu/snow-science/item.php?id=2270; accessed on 12 October 2022.
Johnson BB, Becker ML. 2015. Social–ecological resilience and adaptive capacity in a transboundary ecosystem. *Society and Natural Resources* 28(7):766–780. https://doi.org/10.1080/08941920.2015.1037035.
Jones JS. 2017. A fresh start for conservation. *Stanford Social Innovation Review*. 25 August 2017. https://doi.org/10.48558/WYHR-Q756.
Kirchgessner ML, Sewall BJ. 2015. The impact of environmental, social, and animal factors on visitor stay times at big cat exhibits. *Visitor Studies* 18(2):150–167. https://doi.org/10.1080/10645578.2015.1079091.
Klein JA, Tucker CM, Nolin AW, Hopping KA, Reid RS, Steger C, Gret-Regamey A, Lavorel S, Muller, B, Yeh ET, et al. 2019. Catalyzing transformations to sustainability in the world's mountains. *Earth's Future* 7(5):547–557. https://doi.org/10.1029/2018EF001024.
Kubo T, Shoji Y. 2014. Trade-off between human–wildlife conflict risk and recreation conditions. *European Journal of Wildlife Research* 60(3):501–510. https://doi.org/10.1007/s10344-014-0812-5.
Kutzner D. 2019. Environmental change, resilience, and adaptation in nature-based tourism: Conceptualizing the social–ecological resilience of birdwatching tour operations. *Journal of Sustainable Tourism* 27(8):1142–1166. https://doi.org/10.1080/09669582.2019.1601730.
Lemieux CJ, Doherty ST, Eagles PFJ, Groulx MW, Hvenegaard GT, Gould J, Nisbet E, Romagosa F. 2016. Policy and management recommendations informed by the health benefits of visitor experiences in Alberta's protected areas. *Journal of Park and Recreation Administration* 34(1). https://doi.org/10.18666/JPRA-2016-V34-I1-6800.
Lemieux CJ, Groulx MW, Bocking S, Beechey TJ. 2018. Evidence-based decision-making in Canada's protected areas organizations: Implications for management effectiveness. *FACETS* 3(1):392–414. https://doi.org/10.1139/facets-2017-0107.
Lemieux CJ, Halpenny EA, Swerdfager T, He M, Gould AJ, Carruthers Den Hoed D, Bueddefeld J, Hvenegaard GT, Joubert B, Rollins R. 2021. Free fallin'? The decline in evidence-based decision-making by Canada's protected areas managers. *FACETS* 6(1):640–664. https://doi.org/10.1139/facets-2020-0085.
Loosen A, Vilalta T, Pigeon K, Wright P, Jacob AL. 2023. Understanding the role of traditional and user-created recreation data in the cumulative footprint of recreation. *Journal of Outdoor Recreation and Tourism*, *Articles in press*, 100615. https://doi.org/10.1016/j.jort.2023.100615.
Lynch M. 2006. "Too much love?": The environmental and community impacts of amenity migrants on Jackson Hole, Wyoming. *In:* Moss LAG, editor. *The Amenity Migrants: Seeking and Sustaining Mountains and Their Cultures*. Wallingford, United Kingdom: CABI, pp 94–107.
Manning RE, Valliere WA. 2001. Coping in outdoor recreation: Causes and consequences of crowding and conflict among community residents. *Journal of Leisure Research* 33(4):410–426. https://doi.org/10.1080/00222216.2001.11949952.
Mansfield C, Phaneuf DJ, Johnson FR, Yang JC, Beach R. 2008. Preferences for public lands management under competing uses: The case of Yellowstone National Park. *Land Economics* 84(2):282–305. https://doi.org/10.3368/le.84.2.282.
Martin SR, Blackwell JL. 2016. Personal locator beacons. *International Journal of Wilderness* 22(1):25–31.
Mason CW, Carr A, Vandermale E, Snow B, Philipp L. 2022. Rethinking the role of Indigenous knowledge in sustainable mountain development and protected area management in Canada and Aotearoa/New Zealand. *Mountain Research and Development* 42(4):A1–A9. https://doi.org/10.1659/mrd.2022.00016.
McDowell G, Hanly K. 2022. The state of mountain research in Canada. *Journal of Mountain Science* 19(10):3013–3025. https://doi.org/10.1007/s11629-022-7569-1.
Mertig AG. 2022. Environmental conservation. *In*: Grasso MT, Giugni M, editors. *The Routledge Handbook of Environmental Movements*. London, United Kingdom: Routledge, pp 139–154.
Miller ZD. 2019. A theory of planned behavior approach to developing belief-based communication: Day hikers and bear spray in Yellowstone National Park. *Human Dimensions of Wildlife* 24(6):515–529. https://doi.org/10.1080/10871209.2019.1655682.
Miller ZD, Taff BD, Newman P, Lawhon B. 2019. A proposed research agenda on social media's role in visitor use and experience in parks and protected areas. *Journal of Park and Recreation Administration* 37(3). https://doi.org/10.18666/JPRA-2019-9553.
Mitchell MGE, Schuster R, Jacob AL, Hanna DEL, Dallaire CO, Raudsepp-Hearne C, Bennett EM, Lehner B, Chan KMA. 2021. Identifying key ecosystem service providing areas to inform national-scale conservation planning. *Environmental Research Letters* 16(1):014038. https://doi.org/10.1088/1748-9326/abc121.
Mock SE, Halpenny E, Koroll R, Blye CJ, Eagles PFJ, Flannery D, Lemieux C, Doherty S. 2022. Factors affecting psychological commitment and loyalty to parks and other forms of protected areas in Canada. *Journal of Ecotourism* 22(1):120–143. https://doi.org/10.1080/14724049.2022.2076858.
Molinario E, Kruglanski AW, Bonaiuto F, Bonnes M, Cicero L, Fornara F, Scopelliti M, Admiraal J, Beringer A, Dedeurwaerdere T, et al. 2020. Motivations to act for the protection of nature biodiversity and the environment: A matter of "significance." *Environment and Behavior* 52(10):1133–1163. https://doi.org/10.1177/0013916518824376.
Moola F, Youdelis M. n.d. *Input by the Conservation Through Reconciliation Partnership (CRP) into Parks Canada's Horizon Scan*. Conservation Through Reconciliation Partnership. https://conservation-reconciliation.ca/blog/input-by-the-conservation-through-reconciliation-partnership-crp-into-parks-canadas-horizon-scan; accessed on 11 January 2023.
Nanos Research. 2022. *Majority of Canadians Support Protecting More Land and Sea in Canada; About Eight in Ten Say It Is Important for Canadian Governments to Speed Up Progress on Nature Protection*. Ottawa, Ontario, Canada: CPAWS

[Canadian Parks and Wilderness Society]. https://cpaws.org/wp-content/uploads/2022/10/2022_cpaws_nanos_survey_full_report.pdf; accessed 9 January 2023.
Neumann P, Mason CW. 2019. Managing land use conflict among recreational trail users: A sustainability study of cross-country skiers and fat bikers. *Journal of Outdoor Recreation and Tourism* 28:100220. https://doi.org/10.1016/j.jort.2019.04.002.
Neumann P, Mason CW. 2022. The influence of transportation and digital technologies on backcountry tourism and recreation in British Columbia, Canada. *Tourism Geographies* 25(4):1166–1185. https://doi.org/10.1080/14616688.2022.2098373.
Neuvonen M, Sievänen T, Fronzek S, Lahtinen I, Veijalainen N, Carter TR. 2015. Vulnerability of cross-country skiing to climate change in Finland. An interactive mapping tool. *Journal of Outdoor Recreation and Tourism* 11:64–79. https://doi.org/10.1016/j.jort.2015.06.010.
Niemiec RM, Gruby R, Quartuch M, Cavaliere CT, Teel TL, Crooks K, Salerno J, Solomon JN, Jones KW, Gavin M, et al. 2021. Integrating social science into conservation planning. *Biological Conservation* 262:109298. https://doi.org/10.1016/j.biocon.2021.109298.
Palm EC, Fluker S, Nesbitt HK, Jacob AL, Hebblewhite M. 2020. The long road to protecting critical habitat for species at risk: The case of southern mountain woodland caribou. *Conservation Science and Practice* 2(7):e219. https://doi.org/10.1111/csp2.219.
Pavelka JP. 2019. *Crowding and Congestion in Banff Alberta Canada*. Amherst, MA: University of Massachusetts Amherst. https://scholarworks.umass.edu/ttracanada_2019_conference/3/; accessed on 10 January 2023.
Petersen B, Aslan C, Stuart D, Beier P. 2018. Incorporating social and ecological adaptive capacity into vulnerability assessments and management decisions for biodiversity conservation. *BioScience* 68(5):371–380. https://doi.org/10.1093/biosci/biy020.
Peterson C. 2019. Americans' love of hiking has driven elk to the brink, scientists say. *The Guardian*. 25 August 2019. https://www.theguardian.com/environment/2019/aug/25/hiking-elk-driven-to-brink-colorado-vail.
Pettersson M, Keskitalo ECH. 2013. Adaptive capacity of legal and policy frameworks for biodiversity protection considering climate change. *Land Use Policy* 34:213–222. https://doi.org/10.1016/j.landusepol.2013.03.007.
Pullin AS, Knight TM. 2001. Effectiveness in conservation practice: Pointers from medicine and public health. *Conservation Biology* 15(1):50–54.
Pullin AS, Knight TM, Stone DA, Charman K. 2004. Do conservation managers use scientific evidence to support their decision-making? *Biological Conservation* 119(2):245–252. https://doi.org/10.1016/j.biocon.2003.11.007.
Renzi N. 2022. Water protectors 'behind the screen'. Digital activism practices within the #nodapl movement. *Antropologia* 9(2):141–162. https://doi.org/10.14672/ada20221968141-162.
Rice WL, Taff BD, Newman P, Miller ZD, D'Antonio AL, Baker JT, Monz C, Newton JN, Zipp KY. 2019. Grand expectations: Understanding visitor motivations and outcome interference in Grand Teton National Park, Wyoming. *Journal of Park and Recreation Administration* 37(2). https://doi.org/10.18666/JPRA-2019-9283.
Rushton B. 2022. *Gaining Insight on the Most Challenging Expedition: Climate Change from the Perspective of Canadian Mountain Guides*. Vancouver, British Columbia, Canada: British Columbia Protected Areas Research Forum, Vancouver Island University.
Ryan C, Cessford G. 2003. Developing a visitor satisfaction monitoring methodology: Quality gaps, crowding and some results. *Current Issues in Tourism* 6(6):457–507. https://doi.org/10.1080/13683500308667966.
Sandlos J. 2014. National parks in the Canadian north: Comanagement or colonialism revisited? *In:* Stevens S, editor. *Indigenous Peoples, National Parks, and Protected Areas: A New Paradigm Linking Conservation, Culture, and Rights*. Tucson, AZ: University of Arizona Press.
Saunders C. 2013. *Environmental Networks and Social Movement Theory*. London, United Kingdom: Bloomsbury Academic.
Schwartz MW. 2020. A social movement for conservation. *Stanford Social Innovation Review*. 14 May 2020. https://doi.org/10.48558/S7AF-R390.
Scott JL, Tenneti A. 2021. *Race and Nature in the City: Engaging Youth of Colour in Nature-Based Activities*. Ottawa, Ontario, Canada: Nature Canada. https://naturecanada.ca/wp-content/uploads/2021/04/Race-Nature-in-the-City-Report.pdf; accessed on 8 March 2023.
Smith JS. 2018. *Explorations in Place Attachment.* 1st edition. London, United Kingdom: Routledge. https://go.exlibris.link/M9LG87CL.
Steinman E. 2019. Why was Standing Rock and the #NoDAPL campaign so historic? Factors affecting American Indian participation in social movement collaborations and coalitions. *Ethnic and Racial Studies* 42(7):1070–1090. https://doi.org/10.1080/01419870.2018.1471215.
Sutherland WJ, Dias MP, Dicks LV, Doran H, Entwistle AC, Fleishman E, Gibbons DW, Hails R, Hughes AC, Hughes J, et al. 2020. A horizon scan of emerging global biological conservation issues for 2020. *Trends in Ecology and Evolution* 35(1):81–90. https://doi.org/10.1016/j.tree.2019.10.010.
Switalski A. 2018. Off-highway vehicle recreation in drylands: A literature review and recommendations for best management practices. *Journal of Outdoor Recreation and Tourism* 21:87–96. https://doi.org/10.1016/j.jort.2018.01.001.
Takahashi B, Selfa T. 2015. Predictors of pro-environmental behavior in rural American communities. *Environment and Behavior* 47(8):856–876. https://doi.org/10.1177/0013916514521208.
Tran TC, Ban NC, Bhattacharyya J. 2020. A review of successes, challenges, and lessons from Indigenous protected and conserved areas. *Biological Conservation* 241:108271. https://doi.org/10.1016/j.biocon.2019.108271.
Tysiachniouk MS, Horowitz LS, Korkina VV, Petrov AN. 2021. Indigenous-led grassroots engagements with oil pipelines in the U.S. and Russia: The NoDAPL and Komi movements. *Environmental Politics* 30(6):895–917. https://doi.org/10.1080/09644016.2020.1851534.
Tyson A, Kennedy B. 2020. Two-thirds of Americans think government should do more on climate. Pew Research Center. 23 June 2020. https://www.pewresearch.org/science/2020/06/23/two-thirds-of-americans-think-government-should-do-more-on-climate/.
US Fish and Wildlife Service. 2020. Natural Resource Program Center, National Wildlife Refuge System. Human Dimensions Branch 2020 Annual Report. Washington, DC: US Fish and Wildlife Service. https://prod-is-cms-assets.s3.us-west-2.amazonaws.com/hd/prod/9fde1320-e4ef-11eb-80ce-2914a559fff9-2021-07-14_FY20_Annual_Report.pdf; accessed on 10 January 2023.
Van den Born RJG, Arts B, Admiraal J, Beringer A, Knights P, Molinario E, Polajnar Horvat K, Porras-Gomez C, Smrekar A, Soethe N, et al. 2018. The missing pillar: Eudemonic values in the justification of nature conservation. *Journal of Environmental Planning and Management* 61(5–6):841–856. https://doi.org/10.1080/09640568.2017.1342612.
Vaske JJ, Needham MD, Cline RC. 2007. Clarifying interpersonal and social values conflict among recreationists. *Journal of Leisure Research* 39(1):182–195. https://doi.org/10.1080/00222216.2007.11950103.
Wilhelm-Rechmann A, Cowling RM. 2011. Framing biodiversity conservation for decision makers: Insights from four South African municipalities. *Conservation Letters* 4(1):73–80. https://doi.org/10.1111/j.1755-263X.2010.00149.x.
Wilkins EJ, de Urioste-Stone S. 2018. Place attachment, recreational activities, and travel intent under changing climate conditions. *Journal of Sustainable Tourism* 26(5):798–811. https://doi.org/10.1080/09669582.2017.1417416.
Wilkins EJ, Wood SA, Smith JW. 2021. Uses and limitations of social media to inform visitor use management in parks and protected areas: A systematic review. *Environmental Management* 67(1):120–132. https://doi.org/10.1007/s00267-020-01373-7.
Willow AJ. 2019. Strategies for survival: First Nations encounters with environmentalism. *In:* Clapperton J, Piper L, editors. *Environmental Activism on the Ground: Small Green and Indigenous Organizing*. Calgary, Alberta, Canada: University of Calgary Press, pp 23–45.
Woolaston K, Flower E, van Velden J, White S, Burns G, Morrison C. 2021. A review of the role of law and policy in human–wildlife conflict. *Conservation and Society* 19(3):172. https://doi.org/10.4103/cs.cs_176_20.
Wright P. 2012. Field staff perspectives on managing climate change impacts in parks and protected areas. *Journal of Ecosystems and Management* 13(2). https://doi.org/10.22230/jem.2012v13n2a147.
Wright PA, Moghimehfar F, Woodley A. 2019. Canadians' perspectives on how much space nature needs. *FACETS* 4(1):91–104. https://doi.org/10.1139/facets-2018-0030.
Wyborn CA. 2015. Connecting knowledge with action through coproductive capacities: Adaptive governance and connectivity conservation. *Ecology and Society* 20(1):art11. https://doi.org/10.5751/ES-06510-200111.
Y2Y [Yellowstone to Yukon Conservation Initiative]. n.d. a. The region. *Yellowstone to Yukon Conservation Initiative*. Canmore, Alberta, Canada: Y2Y. https://y2y.net/work/region/; accessed on 22 February 2023.
Y2Y [Yellowstone to Yukon Conservation Initiative]. n.d. b. Vision and mission. *Yellowstone to Yukon Conservation Initiative*. Canmore, Alberta, Canada: Y2Y. https://y2y.net/about/vision-mission/; accessed on 22 February 2023.
Youdelis M. 2016. "They could take you out for coffee and call it consultation!": The colonial antipolitics of Indigenous consultation in Jasper National Park. *Environment and Planning A* 48(7):1374–1392. https://doi.org/10.1177/0308518X16640530.
Youdelis M, Nakoochee R, O'Neil C, Lunstrum E, Roth R. 2020. "Wilderness" revisited: Is Canadian park management moving beyond the "wilderness" ethic? *The Canadian Geographer/Le Géographe canadien* 64(2):232–249. https://doi.org/10.1111/cag.12600.
Youngs Y. 2018. Constructing place attachment in Grand Teton National Park. *In:* Smith JS, editor. *Explorations in Place Attachment*. London, United Kingdom: Routledge, pp 117–132.
Yuriev A, Dahmen M, Paillé P, Boiral O, Guillaumie L. 2020. Pro-environmental behaviors through the lens of the theory of planned behavior: A scoping review. *Resources, Conservation and Recycling* 155:104660. https://doi.org/10.1016/j.resconrec.2019.104660.

Supplemental material

FIGURE S1 Occupational category of participant's current position.
FIGURE S2 Geographic location of participant's work.

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