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Grizzly and polar bears as nonconsumptive cultural keystone species

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Abstract

Grizzly bears and polar bears often serve as ecological "flagship species" in conservation efforts, but although consumptively used in some areas and cultures they can also be important cultural keystone species even where not hunted. We extend the application of established criteria for defining cultural keystone species to also encompass species with which cultures have a primarily nonconsumptive relationship but that are nonetheless disproportionately important to well-being and identity. Grizzly bears in coastal British Columbia are closely linked to many Indigenous Peoples (including the Haíłzaqv (Heiltsuk), Kitasoo/Xai'xais, and Nuxalk First Nations), where they are central to the identity, culture, and livelihoods of individuals, families, Chiefs, and Nations. Polar bears in Churchill, Manitoba, provide another example as a cultural keystone species for a mixed Indigenous and non-Indigenous community in which many of the livelihood benefits from the species are mediated by economic transactions in a globalized tourism market. We discuss context specificity and questions of equity in sharing of benefits from cultural keystone species. Our expanded definition of cultural keystone species gives broader recognition of the beyond-ecological importance of these species to Indigenous Peoples, which highlights the societal and ecological importance of Indigenous sovereignty and could facilitate the increased cross-cultural understanding critical to reconciliation.

Key words: conservation, cultural keystone species, grizzly bear, Heiltsuk, Kitasoo, Nuxalk, polar bear, reconciliation, resurgence, *Ursus arctos*, *Ursus maritimus*, Xai'xais

Introduction

The concept of cultural keystone species (CKS) has promise for advancing reconciliation among Indigenous and non-Indigenous Peoples by conveying the cultural importance of some species for which there are rarely analogs in western societies and by identifying a common focus for environmental restoration, conservation, and governance efforts. The concept of CKS was introduced by Garibaldi and Turner (2004) to connect cultural perspectives with environmental conservation and

restoration discourses, offering a common framing for biocultural conservation thinking and action. They define CKS as "the culturally salient species that shape in a major way the cultural identity of a people, as reflected in the fundamental roles these species have in diet, materials, medicine, and (or) spiritual practices" (Garibaldi and Turner 2004, p. 4).

Garibaldi and Turner (2004) noted that some species have disproportionate relevance and recognition in peoples' lifeways and have developed a primary, overriding importance in particular culture contexts. Characteristics they suggested for identifying CKS include any or all of: the intensity, type, and range of uses; the application of names and associated terminology; use as seasonal or phenological indicators; roles in ceremony, narratives, or symbolism; continued salience in the face of cultural change; uniqueness in cultural applications in relation to other culturally important species; and potential role in trade and exchange beyond a community's territory. Garibaldi and Turner (2004) also suggested that the keystone concept is fluid and flexible; that it can be applied at different spatial, temporal, and social scales; and that it can be useful in specific conservation and restoration efforts, as well as more broadly. They indicated that the CKS concept can be particularly applicable in Indigenous communities in which long-term direct contact with their homeland ecosystems has been possible and has led to development of close and long-term relationships with exceptional species.

Although the term CKS initially drew some opposition from some conservation biologists (e.g., Nuñez and Simberloff 2005), it has gained traction and has been fruitfully applied in situations from the Amazon to Melanesia (e.g., Cristancho and Vining 2004; Platten and Henfrey 2009; Butler et al. 2012). The concept has also been extended to social–ecological complexes (Platten and Henfrey 2009; Loring 2020) and places (Cuerrier et al. 2015; Lepofsky et al. 2017). Here, we extend the concept to more explicitly include species with which cultures have a primarily nonconsumptive relationship, but that are nonetheless disproportionately important to well-being and identity. We explore how grizzly bears (*Ursus arctos horribilis*) and polar bears (*Ursus maritimus*), two high-profile species that often serve as ecological "flagship species" in conservation efforts, are also important CKS despite, at least in these examples, not being used extractively. We describe how these species illustrate the importance of recognizing the significance of many species to the cultures with which they have shared landscapes with since time immemorial, even independent of material benefits.

Large carnivores are frequently the subject of large-scale and high-profile conservation initiatives. Ecological justifications for these species as conservation foci include their often depleted populations, habitat loss and restricted range, specialized ecological niches, the need to restore ecological processes they mediate, the species' own intrinsic value, and arguments that protecting them can protect other species and shared habitats (e.g., Noss et al. 1996; Clark et al. 1999; Fleishman et al. 2000; Carroll et al. 2001; Treves et al. 2009). While such rationales may well be necessary or appropriate in some contexts, they are rooted in western scientific worldviews. The cultural significance of large carnivores to Indigenous Peoples is rarely acknowledged in science or management, and where it has been (e.g., through recognition of Indigenous Peoples' right to hunt polar bears in International Agreements and nation–state legislation), it has often produced further contention and even neo-colonialist resistance (e.g., Aho and Meek 2020). That omission is increasingly apparent and it has produced maladaptive policy processes that corrode societal trust, impede reconciliation between peoples, and hinder conservation initiatives (Clark and Slocombe 2005; Clark et al. 2008; D.A. Clark et al. 2014; Watters et al. 2014). Land use and stewardship priorities for Indigenous Peoples often include not only preserving carnivores but also the relationships, cultural practices, and language often associated with them (e.g., Atleo 2004; Keith et al. 2005; Clark and Slocombe 2009; Housty et al. 2014; Artelle et al. 2018).

In this paper, we examine how the CKS concept can apply to nonconsumptive relationships, illustrated with two examples of relationships with species that are nonconsumptive but nonetheless are closely tied to the cultural identities of Indigenous Peoples. While acknowledging that in other places

Indigenous and non-Indigenous hunters do hunt both polar and grizzly bears under Indigenous and Canadian legal orders, here we focus on two situations in which these species are not locally hunted in any significant number and in which the societal values they provide are primarily derived from nonconsumptive interactions with them. We use these specific situations to explore how the scope and current criteria for understanding CKS can be expanded to also include nonconsumptive relationships. Our research addresses four questions:

1. What are the characteristics that differentiate between consumptive and nonconsumptive relationships with a CKS?
2. How can nonconsumptive CKS relationships change over time?
3. How can extending the CKS concept to include nonconsumptive uses contribute to the conservation of biological and cultural diversity?
4. Similarly, how can societal and epistemic barriers preventing Indigenous Peoples from maintaining nonconsumptive relationships with CKS be overcome?

Methods

We adapted Garibaldi and Turner's (2004) concepts and criteria for identifying CKS as an index for assessing the degree to which the manifold roles of CKS might be fulfilled through nonconsumptive relationships with our two focal species. We constructed two regional cases (one for each species) by drawing on insights documented through our ongoing research relationships: an Indigenous-led grizzly bear conservation program in coastal British Columbia (e.g., Adams et al. 2014; Housty et al. 2014; Service et al. 2014; Artelle et al. 2018) and Clark's long-term association with the community of Churchill, Manitoba, and research on polar bear management there (e.g., Clark et al. 1997; Lunn et al. 2002; Clark 2003; Schmidt and Clark 2018; Schmidt et al. 2018). Our overall synthesis is based on comparing the CKS attributes of the documented human–bear relationships in each of these cases. Those attributes are summarized in **Tables 1** and **2**. Below, we describe how both bear species fulfill the definitions of CKS in the contexts we develop here.

Table 1. Cultural keystone attributes for grizzly bears on the central British Columbia coast.

Attribute	Indications of a cultural keystone species
Intensity, type, and multiplicity of use	Diverse: (*i*) ceremonial use of an individual bear over multiple years, extensive hunt preparation; (*ii*) bear-viewing tourism is economically very important; (*iii*) trophy hunting is against traditional law, halted by provincial government in 2017
Naming and terminology in traditional languages	Extensive and detailed terminology, including in ceremony
Role in narratives, ceremonies, or symbolism	Important stories, significant ceremonial power
Persistence and memories of use in relation to cultural change	Yes, despite change the role of grizzly bears has adapted: e.g., Central Coast Bear Working group, a collaboration among the four Central Coast First Nations (Haíłzaqv (Heiltsuk), Kitasoo/Xai'xais, Nuxalk, and Wuikinuxv), centered around Grizzly Bear conservation
Level of unique position in culture	Irreplaceable ecological functions, teachings
Extent it provides opportunity for resource acquisition from beyond the territory	(*i*) Tourism: significant and distributed economic benefits, (*ii*) protecting bears protects the ecosystem, salmon, and future options for First Nation citizens

Table 2. Cultural keystone attributes for polar bears in northern Manitoba.

Attribute	Indications of a cultural keystone species
Intensity, type, and multiplicity of use	Both historic (hunted, fur trade) and current (bear-viewing tourism) uses that have shift over time
Naming and terminology in traditional languages	Persists: e.g., Cree name *Wapusk* (white bear) given to a new National Park in 1996, and adopted by a local Indigenous-owned business (Wapusk General Store)
Role in narratives, ceremonies, or symbolism	Polar bears feature in narratives and as symbols across all cultures in region, ceremonial roles not documented
Persistence and memories of use in relation to cultural change	Strong: e.g., a historic trapline now used by the same family for bear-viewing tourism
Level of unique position in culture	(*i*) Unique relationship with Cree people (though best documented in Ontario), (*ii*) dominates in local non-Indigenous culture, (*iii*) Dené relationship is not well documented
Extent it provides opportunity for resource acquisition from beyond the territory	Focus of a globalized, high-end tourism market, but distribution of resulting benefits is highly unequal

We outline how contextuality is crucial and multifaceted for each case but in an investigation such as this, it is important for readers to also understand our standpoints as authors. Five of us (DC, KA, CD, AW, NT) are interdisciplinary academic researchers who strive to orient our work at the intersection of scientific research, Indigenous self-determination efforts, Indigenous cultural resurgence, and environmental conservation. Three of us (WH, CT, DN) are members of First Nations whose traditional territories are on Canada's west coast and have long experience with grizzly bear management and conservation in those territories. Many of us are also professionally associated with environmental nongovernment organizations that are allied closely with First Nations. While our individual perspectives and priorities vary, we share an interest in advancing Indigenous self-determination and cultural resurgence, as well as working towards healthy ecosystems that sustain a range of respectful human relationships with them.

Examining two nonconsumptive human–bear relationships

Grizzly bears in the Great Bear Rainforest

The Central Coast of British Columbia is part of a region now often referred to as the Great Bear Rainforest (GBR). This area is still inhabited by most species present prior to European colonization of North America, including the full guild of large carnivores (DellaSala et al. 2011) and—notably—the white-phase black bear (*Ursus americanus*), or "Spirit Bear" (Service et al. 2020). The region is comprised primarily of the unceded territories of First Nations who have lived in and shaped the region since time immemorial (Price et al. 2009; Turner and Bitonti 2011; Housty et al. 2014). Grizzly bears in coastal British Columbia are closely linked to many Peoples, where they are considered close relatives; are a link to the spiritual world; play an important role in crests and language; are featured in songs, dances, and stories; and are central to the identity and livelihoods of individuals, families, Chiefs, and Nations (Table 1).

Diverse uses continue and the role of bear has adapted in the face of much cultural change. Interactions—personal, ceremonial scientific, economic, governance—of Haíłzaqv people with grizzly bears, for example, have been—and continue to be—guided by *Lhaxvai* (authority or power of place)

and *Gvi'ilas* (customary law). For example, people in Haíłzaqv territory live and harvest food resources among grizzly bears, indeed sharing salmon, berries, and other foods with them. The grizzly bear is present in ceremony via masks, songs, dances, issuing reminders as an enforcer for Haíłzaqv people to conduct themselves respectfully (Housty et al. 2014). Given such values, and the threats the outside world has placed on grizzlies (via salmon declines, habitat loss, and trophy hunting), grizzlies figure prominently in environmental stewardship and governance affairs of the Haíłzaqv (Housty et al. 2014; Artelle et al. in revision).

Grizzlies also figure prominently in neighbouring territories. The Central Coast Bear Working Group, a collaboration of the Haíłzaqv, Kitasoo/Xai'xais, Nuxalk, and Wuikinuxv First Nations, leads stewardship of *náɲ* (grizzly bear) populations in the area, and collaborates with the Raincoast Conservation Foundation, the University of Victoria, Simon Fraser University, and others on a large-scale bear research and monitoring project over 23 000 km^2 of the region (e.g., Housty et al. 2014; Service et al. 2014; Adams et al. 2017). Grizzly bears are also an important economic driver in the region, providing the foundation for an expanding ecotourism industry that offers significant economic benefit to local communities (Lemelin et al. 2015; Honey et al. 2016). As is the case in much of British Columbia (Artelle et al. 2013, 2014), bears in the Central Coast region have been subject to a trophy hunt sanctioned by the province but in contradiction to local Indigenous laws (Housty et al. 2014; Artelle et al. 2018). In 2017 the province ended grizzly bear hunting throughout the GBR, a direct result of almost a decade of work by the Central Coast Bear Working Group and partners (Darimont et al. 2017).

From a Haíłzaqv perspective the ecosystem services provided by grizzly bears are irreplaceable, an understanding that enabled Haíłzaqv to use protection of grizzly bear habitat in the face of resource extraction to advance their own self-determination. Information on bear landscape use from local knowledge (collated from map-based interviews), genetic data (from Coastwatch and Raincoast monitoring data), and general knowledge has been collated and spatialized into Haíłzaqv-defined polygons denoting areas of conservation importance to bears (Artelle et al. in revision). When third-party proponents (currently, primarily logging companies) submit a land use application in the territory they now go to the Heiltsuk Integrated Resource Management Department first, before going to the provincial government. Proposed land uses (such as cutblocks, log storage, occupancy) are now compared to the layout of these polygons; potentially deleterious activities within the polygons are either prohibited or are subject to stricter restrictions in size, location, and other attributes. Only once agreement has been made on this do the companies approach the province, informing them of the terms of agreement already reached with the Nation. In this way, grizzly bears figure prominently in rapid changes to natural resource management governance processes on the coast.

Polar bears in Churchill, Manitoba

Churchill is a sub-Arctic community of approximately 800 residents on the west coast of Hudson Bay. Located in Treaty Five Territory (1910 Adhesion), its population is a mixture of Indigenous (Cree, Dené, Métis, Inuit) and non-Indigenous people. The community and its regional ecosystem have a long history of top-down decision-making by outside governments and corporations, which has left a legacy of deleterious social, ecological, and economic effects in the community (Lankshear 2013). The region is inhabited by the western Hudson Bay subpopulation of polar bears, whose conservation and management, especially of polar bear–human conflicts, poses an enduring challenge (Stirling et al. 1977; Struzik 2014; Schmidt and Clark 2018; Heemskerk et al. 2020).

This challenge is magnified by different prevailing uses of polar bears in the jurisdictions that share management responsibilities for these bears, and now-entrenched differences between local and scientific–managerial perspectives about the effects of climate change on the population itself. Over

the past two decades polar bears have also become potent symbols in global efforts to combat climate change (Clark et al. 2008; Tyrrell and Clark 2014), largely based on research findings that pointed to a decline in the western Hudson Bay polar bear population (Stirling et al. 1999). Those scientific estimates of population status were contested by local and Indigenous peoples (Tyrrell 2006; Dowsley and Wenzel 2008; Nirlungayuk and Lee 2009), and more recent population estimates are in line with local perceptions that the population is not currently declining (Stapleton et al. 2014; Lunn et al. 2016; Dyck et al. 2017).

These challenges notwithstanding, polar bear viewing has become an established and lucrative tourism activity in Churchill since the 1980s, drawing an international clientele (Lemelin et al. 2010a). Polar bears serve as a CKS for the mixed Indigenous/non-Indigenous community in Churchill, where many of the livelihood benefits from the species are mediated by economic transactions in a globalized tourism market (**Table 2**). A shift from consumptive to nonconsumptive use of polar bears occurred between the 1950s, when the first bear hunting regulation was enacted, and the 1990s, when bear-viewing tourism expanded. The last publicly acknowledged polar bear hunt by a First Nation member near Churchill was in 1992. The role of polar bears in Cree culture is not well-documented in Manitoba but it is in nearby coastal Ontario (Lemelin et al. 2008, 2010b). There the relationship between Cree people and *Wabusk* (polar bears) from the Southern Hudson Bay population is based on respect and mutual tolerance, often through avoidance. Polar bear hunting and consumptive use continue, and some guided polar bear viewing has begun (Lemelin et al. 2010b). In Churchill polar bears clearly bring opportunities to access resources from beyond local First Nations' traditional territories, but such access is not evenly distributed. There is a strong perception that opportunities to benefit from nonconsumptive uses of polar bears are unequally divided locally (D. Clark, unpublished observation). For example, only one of the five tourism businesses grandfathered into the 1996 *Wapusk National Park Establishment Agreement* is Indigenous-owned. The established polar bear tour companies there were begun by local entrepreneurs, but many are now often run by larger nonlocal companies or original owners who now reside elsewhere.

Discussion

Comparing two nonconsumptive bear–human relationships

The two bear–human relationships described here have notable similarities, suggesting that Garibaldi and Turner's (2004) criteria for identifying CKS can be usefully applied to species with nonconsumptive uses. Naming and terminology of polar and grizzly bears in traditional languages remains strong in both places, as do their prominent roles in narratives and their uniquely prominent position in local cultures. Persistence of memories of use are strong, and both cases strongly exhibit adaptation to cultural change, particularly economic changes. Both bears have very clearly created opportunities for resource acquisition from beyond the immediate territory of communities discussed here. Multiplicity of use the only criterion that substantially differs between the two cases because of the lack of polar bear hunting in Manitoba. However, examining at the range of this bear population as a whole—including Nunavut, where the bears are regularly hunted and bear-viewing tourism is beginning—this criterion would clearly apply to both cases. We chose not to extend our comparison that far because of limitations in our data and to be respectful of the sensitivities around polar bear management in the region's Inuit communities (Lokken et al. 2019).

Consumptive and nonconsumptive CKS clearly exist, and both roles can be played by the same species in different contexts. The difference between them is more likely one of degree rather than kind, answering our first research question while revealing that it was originally framed simplistically. Accordingly, we consider the relationship between those forms of CKS is not dualistic or static but likely complex and dynamic, and worth further study since conflicts over such differing "uses" of a

species can have profound influences on conservation efforts (Darimont et al. 2017). Our examination of these two cases should not be interpreted as an argument for differentiating two kinds of CKS or creating a moral hierarchy between consumptive and nonconsumptive relationships between humans and other-than-human persons. Rather, these attributes of a relationship between a society and a species could be considered different ends of a spectrum of consumptive to nonconsumptive uses. However, even that linearity may be simplistic and not fully reflect complex, dynamic relationships that have clearly changed over time in both the cases presented here (thereby partially addressing our second research question). Moreover, we do not claim that the CKS definition and criteria here explain how a particular species comes to have the significance that it does, especially where the relationship is a nonconsumptive one and the benefits to people are primarily cultural. As well, when large carnivore populations are restored, conflicts with people often become more frequent, so conflict mitigation often becomes increasingly important to population persistence (Linnell et al. 2001; Frank et al. 2019). These situations can be particularly challenging when there are long gaps between species' depletion and recovery since societal knowledge of how to co-exist, or even act safely around those species, can be lost (e.g., MacKinnon 2017). Such vulnerability should not be overstated though, since many First Nation traditions around co-existing with grizzly bears, for example, have proven highly resilient over time (Clark and Slocombe 2009).

Our research could not consider all contexts where these species interact with people, so we recommend that others ask similar questions to ours elsewhere and then compare and contrast their answers with our provisional answers here. Explicit attention should be paid to geographic, temporal, and cultural dimensions of context in any such research. While we look forward to seeing future investigation of bears as CKS elsewhere, that work must be built upon a respectful and appropriate foundation (Barrett 2013; Artelle et al. 2018; DeRoy et al. 2019) to avoid repeats of past controversies over bear research (Van Daele et al. 2001; Tyrrell 2006; Clark and Slocombe 2009; Nirlungayuk and Lee 2009). Ideally, such research should be led by or conducted at the invitation of the Peoples in whose territories the bears occur (Housty et al. 2014). Not all CKS identifying categories fit every situation, so close attention must be paid to interpreting the specific expressions of each category in their own contexts.

Further questions about nonconsumptive use of CKS

Our preliminary expansion of the CKS concept in these situations answered our first and second research questions but did not provide firm answers to the third and fourth. Moreover, comparison of these two cases revealed a number of further research questions that would strengthen the theoretical dimensions of the concept, provide more specific guidance determining where and when it can best be used, clarify its limitations, and enhance methods for applying it to on-the-ground conservation and governance challenges.

First, following its ecological analogue, how does a social–ecological system respond when a CKS disappears? If such risk exists, then reclaiming Indigenous authority to manage CKS may be especially urgent as a social justice issue in its own right as well as to prevent the sorts of system collapse that the metaphor implies. Moreover, the correspondence between ecological and cultural keystone roles needs to be examined further since CKS may not be ecologically important or may currently exist at depleted levels. Approaches to conservation based on purely ecological versus CKS would probably differ.

Second, what determines how resource acquisition opportunities associated with a CKS are distributed? This is an important practical question because such opportunities are not necessarily equally shared within or among communities who are invested in various ways in the act of defining a CKS. In Churchill, a transient labor force now immigrates temporarily for summer and autumn "bear

season", where previously most such jobs were held by local residents (Schmidt 2017). This situation contrasts with Spirit Bear Lodge, an ecotourism operation owned and operated by the Kitasoo/Xai'xais Nation in Klemtu, British Columbia, which guides bear watching and other wildlife viewing activities throughout the area and is one of the community's largest local employers. In addition to substantial employment and other financial benefits to the Nation, the operation also funds the Spirit Bear Research Foundation, which conducts conservation-oriented work throughout the region (Service et al. 2014; Lemelin et al. 2015; Artelle et al. 2018). Broadly, differential access might conceivably create social frictions that could even pose risk to conservation. A comparison between Indigenous-owned businesses and non-Indigenous-owned businesses might be especially illuminating about how human–animal relationships shape their practices.

Third, does the cultural keystone concept hold or communicate well across cultures and what are the strengths/drawbacks of trying to do so? The Grizzly Bear Treaty signed by more than 200 First Nations attests to a widespread concern throughout the United States and Canada that clearly evokes the criteria of CKS without using the term (Lightfoot and MacDonald 2017). In Eurasia, Indigenous peoples have long held a special veneration for the Eurasian brown bear (Hallowell 1926), yet in Eurasia the concept of CKS is hardly known. A mainstream/western worldview understands intrinsic value and instrumental value with respect to bears (Kellert et al. 1996), but this idea that a species can have "value" to a people (not just intrinsic) without being directly used can be challenging to communicate (but see Housty et al. 2014; Artelle et al. 2018). Moreover, in both hemispheres the relationship between bears, Indigenous peoples, and nation–states is everywhere subject to the uneven broader cultural changes that continue to destabilize and reconfigure communities and cultural identities, making comparison across time and space as an element of validation enormously difficult. Undoubtedly other conceptual gaps exist too. Relatedly, how can cultural appropriation of CKS as symbols be guarded against, and what happens when different groups or cultures value a CKS highly but use it or related to it differently? These questions matter in the case of polar bears, who have been used as symbols in ways that Inuit communities perceive as not only uninformed but even detrimental to their interests (Tyrrell 2006; Nirlungayuk and Lee 2009).

Applications for an expanded conception of CKS

We believe that in specific contexts the CKS concept might be foundational for transitions supporting Indigenous sovereignty in resource management decisions (Artelle et al. 2019; Moola and Roth 2019; Witter and Satterfield 2019), as was the case for the Haíłzaqv Government. A related recent example provides insights—but not a conclusive answer—to our fourth research question about overcoming the barriers preventing Indigenous Peoples from maintaining nonconsumptive relationships with CKS. The August 2017 decision by the British Columbia Government to ban trophy hunting in the GBR, and subsequent province-wide ban in December 2017, followed a ban imposed by coastal BC First Nations three years earlier than the Province's "official" ban; bringing a clear case of an expression of Indigenous authority into the spotlight and into practice (Darimont et al. 2017). This sequence of events is of profound practical importance for conservation since grizzlies apparently provided a winning hand in a portfolio of governance goals by Indigenous Nations on the British Columbia coast. Such outcomes are not guaranteed though, as Churchill's history of local disempowerment attests, so it would be useful to more closely examine the policy processes that led to these differing outcomes and what they might mean for other Indigenous governance ambitions.

Such further examination of how to strategically apply the CKS concept for Indigenous-led conservation is important since transitions towards Indigenous sovereignty can be challenging for contemporary nation–states to accept, especially in a globalized neoliberal society facing accelerating, intertwined political and ecological challenges (Saul 2014; Simpson 2017). Clearly, efforts will not

automatically, easily, or rapidly find acceptance and specific applications of it could even become contested.

Where meaningful Indigenous–state co-governance (Simms et al. 2016) is mutually sought, and a meaningful social–ecological context exists, CKS might be able to be introduced as a bridging concept: one which can be expressed and at least sufficiently understood by the different parties to provide common ground for such endeavours. The concept of cultural landscapes played such a role in management planning for co-managed Kluane National Park, Yukon (Neufeld 2007), and the divided arena of polar bear conservation would benefit from just such a bridge (Clark et al. 2008; Aho and Meek 2020). Broader recognition of the beyond-ecological importance of specific nonhuman persons (Atleo 2004) to the cultures with which they have shared landscapes with since time immemorial would be an important step in furthering meaningful reconciliation (Penikett 2006; Corntassel et al. 2009; Castleden et al. 2017). Our expanded definition of the CKS concept that includes nonconsumptive uses could contribute substantially to respectful efforts towards Indigenous sovereignty, natural resource co-governance, and co-existence between species.

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Author contributions

DC, KA, CD, AW, and NT conceived and designed the study. DC, KA, CD, WH, CT, DN, and AS performed the experiments/collected the data. DC, KA, CD, WH, CT, DN, and AS analyzed and interpreted the data. DC, KA, CD, WH, CT, DN, AS, AW, and NT drafted or revised the manuscript.

Competing interests

The authors have declared that no competing interests exist.

Data availability statement

All relevant data are within the paper.

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