Routledge
Taylor & Francis Group

Ethics, Policy & Environment

ISSN: (Print) (Online) Journal homepage: https://www.tandfonline.com/loi/cepe21

# Decolonial Model of Environmental Management and Conservation: Insights from Indigenous-led Grizzly Bear Stewardship in the Great Bear Rainforest

K. A. Artelle, M. S. Adams, H. M. Bryan, C. T. Darimont, J. (‘Cúagilákv) Housty, W. G. (Dúqváísḷa) Housty, J. E. Moody, M. F. Moody, D. (Muq’vas Glaw) Neasloss, C. N. Service & J. Walkus

**To cite this article:** K. A. Artelle, M. S. Adams, H. M. Bryan, C. T. Darimont, J. (‘Cúagilákv) Housty, W. G. (Dúqváísḷa) Housty, J. E. Moody, M. F. Moody, D. (Muq’vas Glaw) Neasloss, C. N. Service & J. Walkus (2021) Decolonial Model of Environmental Management and Conservation: Insights from Indigenous-led Grizzly Bear Stewardship in the Great Bear Rainforest, Ethics, Policy & Environment, 24:3, 283-323, DOI: 10.1080/21550085.2021.2002624

**To link to this article:** https://doi.org/10.1080/21550085.2021.2002624



Published online: 11 Jan 2022.

ETHICS, POLICY & ENVIRONMENT
2021, VOL. 24, NO. 3, 283–323
https://doi.org/10.1080/21550085.2021.2002624

Routledge
Taylor & Francis Group



# Decolonial Model of Environmental Management and Conservation: Insights from Indigenous-led Grizzly Bear Stewardship in the Great Bear Rainforest

K. A. Artelle[a,b], M. S. Adams[b,c*], H. M. Bryan[b,d*], C. T. Darimont[a,b*], J. ('Cúagilákv) Housty[e*], W. G. (Dúqváísḷa) Housty[f*], J. E. Moody[g*], M. F. Moody[h*], D. (Muq'vas Glaw) Neasloss[i*], C. N. Service[b,i*] and J. Walkus[j,k*]

[a]Department of Geography, University of Victoria, Victoria, Canada; [b]Raincoast Conservation Foundation, Victoria, Canada; [c]University of British Columbia, Department of Forestry and Conservation Science, Vancouver, Canada; [d]Ecosystem Science and Management Program, University of Northern British Columbia, Prince George, BC, Canada; [e]QQS Projects Society, Bella Bella, BC, Canada; [f]Heiltsuk Integrated Resource Management Department, Bella Bella, BC, Canada; [g]Nuxalk Fisheries and Wildlife Department, Bella Coola, BC, Canada; [h]Nuxalk Fisheries Biologist Consultant, Nuxalk Nation, Victoria, BC, Canada; [i]Kitasoo/Xai'xais First Nation Stewardship Authority Klemtu, BC, Canada; [j]Hakai Institute, Heriot Bay, BC, Canada; [k]Wuikinuxv Nation Stewardship Office, Katit, BC, Canada

**ABSTRACT**

Global biodiversity declines are increasingly recognized as profound ecological and social crises. In areas subject to colonialization, these declines have advanced in lockstep with settler colonialism and imposition of centralized resource management by settler states. Many have suggested that resurgent Indigenous-led governance systems could help arrest these trends while advancing effective and socially just approaches to environmental interactions that benefit people and places alike. However, how dominant management and conservation approaches might be decolonized (i.e., how their underlying colonial structure might be addressed, transformed, and replaced) is not always clear. Here, we describe a 'Decolonial Model of Environmental Management and Conservation' as an alternative paradigm to dominant approaches of conservation and management. The tenets of the model describe characteristics that might be expected of decolonized management, contrasted with those of dominant state-led approaches such as those embedded in the North American Model of Wildlife Conservation. The model does not prescribe how Indigenous governments or communities ought to govern their own territories, but instead offers insights into how external management and conservation agencies and practitioners might support (or stop impeding) Indigenous-led governance. We illustrate the model with a conservation 'bright spot': grizzly bear stewardship in the area now referred to as the Great Bear Rainforest in British Columbia, Canada, with a focus on work led by or in collaboration with, and within the territories of, the Haíłzaqv, Kitasoo/Xai'xais, Nuxalk, and Wuikinuxv First Nations. While acknowledging the important

**KEYWORDS**

Decolonial; Management; Conservation; Indigenous-led governance; North American Model of Wildlife Conservation; grizzly bears; Great Bear Rainforest; Haíłzaqv; Kitasoo/Xai'xais; Nuxalk; Wuikinuxv

**CONTACT** K. A. Artelle kartelle@gmail.com Department of Geography, University of Victoria, Victoria,V0T 1Z0, Canada

*listed alphabetically - equal contribution

context-specific variability among place-based management and conservation applications, we also discuss the model's broader applicability.

Global declines in biodiversity are increasingly being recognized as profound social and ecological crises (Betts et al., 2017; Sánchez-Bayo & Wyckhuys, 2019; Secretariat of the Convention on Biological Diversity, 2020; WWF, 2018). Addressing this crises successfully will require models of environmental governance that are both effective and socially just. Many have identified the need for conservation practitioners to abandon models that are harmful to people (*e.g*. through displacing people and lifeways; Domínguez & Luoma, 2020; Eichler & Baumeister, 2018; K. Whyte, 2018) and environments (*e.g*. through hindering place-based and biodiversity-supporting land use practices; Bird & Nimmo, 2018; Kimmerer & Lake, 2001) alike (Artelle et al., 2019; Indigenous Circle of Experts, 2018; Moola & Roth, 2019; Witter & Satterfield, 2018; Zurba et al., 2019).

Supporting place-based governance systems provides an avenue to address biodiversity loss and social injustices simultaneously. Around the world, place-based governance systems and practices have supported the coexistence of people and their environments, often for millennia, before being displaced by colonial peoples and systems. Although some environmental degradation occurred pre-colonization as societies adapted to places, it was often followed by people reliant on their ecosystems developing practices to coexist with them (Atleo, 2011; Berkes, 2012; Berkes & Turner, 2006; N. J. Turner & Berkes, 2006; Wehi et al., 2018). By contrast, in many places, the onset of settler colonialism has occurred in lockstep with concurrent ecological degradation (Borrows, 2018; Pasternak et al., 2019; Turner et al., 2013; Whyte, 2020). Many have suggested that implementing (or returning to) adaptive, place-based, and local governance of resources provides a powerful mechanism for achieving effective and socially just environmental stewardship (Atlas et al., 2021; Cox et al., 2010; Dietz et al., 2003; A. K. Salomon et al., 2019; Lee et al., 2019; Ostrom, 1990).

Since its onset, settler colonialism has disrupted, impeded, or erased locally adapted cultures and ways of living and interacting with environments, and replaced them with western, centralized approaches (Claxton & Price, 2020; Indigenous Circle of Experts, 2018; Pasternak et al., 2019; Talaga, 2018; Turner et al., 2013; K. Whyte, 2018). Although contemporary state-led approaches and models of environmental stewardship and management have probably slowed and abated some of the degradation that might have occurred in their absence, the continuing (and accelerating) degradation of biodiversity worldwide hints at the limitation of current conservation efforts to stem ecological degradation caused by broader economic activities (Betts et al., 2017; Sánchez-Bayo & Wyckhuys, 2019; Secretariat of the Convention on Biological Diversity, 2020; WWF, 2018). Moreover, assuming or asserting colonial jurisdiction (*e.g*. assumption of state or province-level jurisdiction of natural resource management and protection typical in USA and Canada) and imposing western conceptualizations of conservation and management approaches perpetuates settler colonialism in a direct way, as it continues to displace people and place-based approaches to environmental governance (Corntassel, 2012; Eichler & Baumeister, 2018; Indigenous Circle of Experts, 2018; Pasternak et al., 2019; Turner et al., 2013)

The North American Model ('NAM') of Wildlife Conservation provides an instructive example of approaches and assumptions underlying contemporary dominant environmental management. Although specific to wildlife, it arises from, and is an expression of, the dominant worldview toward resource extraction in North America (and other areas colonized by European Peoples; Eichler & Baumeister, 2018). Geist et al. (2001), Organ et al. (2012), and others have described the central tenets of the NAM: that wildlife are a public trust resource, that wildlife should not be sold on markets, that allocation of wildlife should be 'by law', that wildlife should only be killed for a 'legitimate purpose', that wildlife are considered an international resource (especially to account for migratory species), and that science is the proper tool to discharge of wildlife policy.

The NAM has been criticized for a number of shortcomings. Criticisms have ranged from doubts about the extent to which these tenets are actually followed (Artelle et al., 2018a; S. G. Clark & Milloy, 2014; Treves et al., 2017; Vucetich et al., 2017), the extent to which the NAM accurately describes the history of wildlife conservation on the continent (Serfass et al., 2018), and the adequacy of its tenets for guiding governance of wildlife and the ecosystems they depend on (S. G. Clark & Milloy, 2014; Nelson et al., 2011; Peterson & Nelson, 2017; Serfass et al., 2018). Eichler and Baumeister (2018) have additionally described how the NAM perpetuates settler colonialism, centers a western worldview and conceptualization of wildlife as the dominant and default driver of environmental management, and dismisses the values, worldviews, and governance systems of Indigenous Peoples that have been in place often for millennia prior to colonization (though see Hessami et al., 2021 for a proposed 'Indigenizing North American Model of wildlife Conservation'). The NAM provides an instructive but not unique example, with similar colonial approaches dominating other areas of resource management, including fisheries (Atlas et al., 2021; Augustine & Dearden, 2014; Beveridge et al., 2020; Turner et al., 2013) and fire (Kimmerer & Lake, 2001) management.

Across Canada, decolonization and Indigenous resurgence movements are working to address the harms and to interrupt the continued progression of settler colonialism. It is beyond the scope of this paper to review the enormous, rapidly growing, and diverse body of relevant scholarship (but, as a start, see the literature cited herein, and online reading lists[1]). However, as a rough definition, decolonization encompasses addressing, transforming, and replacing the colonial structures and processes that underlie settler colonialism. As Tuck and Yang (2012) put succinctly (in a manuscript titled as such): 'Decolonization is *not* a metaphor' for any activities, including state-led ones, meant to address social justice implications of settler colonialism. Instead, it refers specifically to the repatriation of Indigenous power, land, and lifeways (Alfred, 2005; Coulthard, 2014; Manuel & Derrickson, 2017; Pasternak et al., 2019; Tuck & Yang, 2012; Whyte, 2020). Although decolonization spans all human-to-human and human-to-other-than-human relations, scholarship has been particularly well developed in certain fields. For example, the colonial foundations of academic scholarship are increasingly recognized, and remedies increasingly discussed, including decentering western thought, beliefs, values, and methodologies, while making room for Indigenous methodologies and scholarship, in part by addressing persistent structures and imbalances of power and privilege (Held, 2019; Kovach, 2010; Latulippe & Klenk, 2020; Smith, 2013). With respect to resurgence, what it specifically means so varies among contexts that it defies crisp definition (L. Simpson, 2011), but it generally refers to Indigenous Peoples upholding, protecting, restoring, and/or advancing their own laws, teachings, languages, practices, stories, and/or other aspects of

their lifeways, and doing so on their own terms, as Leanne L. Simpson (2011) notes: 'without the sanction, permission or engagement of the state, western theory, or the opinions of [settler society]' (Alfred, 2005; Corntassel, 2020; Corntassel & Holder, 2008; Coulthard, 2014; Indigenous Circle of Experts, 2018; L. Simpson, 2011; Whyte, 2020; Zurba et al., 2019). Resurgence encompasses not only people-people relationships but also relationships with other species and environments (Artelle et al., 2019; L. B. Simpson, 2014; Borrows, 2018; Brown & Brown, 2009; Indigenous Circle of Experts, 2018; Wildcat et al., 2014; Zurba et al., 2019).

Decolonization and resurgence are closely linked. Given the persistence of colonization in settler colonial contexts (*e.g*. North America), reducing its continued impediments to Indigenous lifeways provides room for resurgence to proceed. Complementarily, true decolonization might be inconceivable without a concurrent resurgence of Indigenous governance to replace the dismantled colonial systems. Whereas Canada has made commitments toward reconciliation (defined by the Truth and Reconciliation commission as 'as an ongoing process of establishing and maintaining respectful relationships', Sinclair & TRC members, 2015), many have emphasized that decolonization and resurgence are prerequisites for the reparations required of reconciliation, and that state-led attempts that do not fundamentally address Indigenous sovereignty and ongoing settler colonial processes might serve only to (or disproportionately) benefit colonial states and agencies themselves, further enshrining colonial injustices (Alfred, 2005; Corntassel & Holder, 2008; Coulthard, 2014; L. Simpson, 2011; The 180, 2016). It is our belief, and part of our motivation in writing this paper, that specific examples of how resurgence and decolonization might play out and be supported on the ground might be useful for inspiring these paired tasks elsewhere, to move toward meaningful reconciliation that goes 'beyond empathy and treaty acknowledgments [to] pursue systemic change' (The 180, 2016).

Decolonization and resurgence are at their crux driven by ethics and justice rather than means to ends for achieving other goals, such as conservation (*e.g*. 'Supporting Indigenous resurgence: a justice imperative, not a means to an ends' section in Artelle et al., 2019). However, these processes have the potential to improve contemporary relationships between people and the environment, including those relationships mediated by current management and conservation practices (Artelle et al., 2019; Borrows, 2018; Indigenous Circle of Experts, 2018; Pasternak et al., 2019). Across many Indigenous territories (which comprise large parts of Canada, the USA, and elsewhere – see native-land.ca), place-based approaches to environmental interactions have often been the norm until very recently. Resuming stewardship approaches that work for people and places alike could benefit local conservation efforts and provide insights to improve conservation elsewhere (Armitage, 2005; Armitage et al., 2009). However, the process by which such a transition might occur, and the ways by which current natural resource agencies, practitioners, and scholars might support such change (or avoid hindering it), is not always clear.

Here, we describe a Decolonial Model of Environmental Management and Conservation (hereafter 'Decolonial Model') as an alternative to dominant management and conservation approaches, one that recognizes and supports resurgent Indigenous-led and community-led conservation, meaningful co-management (*i.e*. where settler and Indigenous governments collaborate on management), and other governance approaches. This model aims to support improvements in both social and ecological outcomes of resource management. While building on extensive decolonization and

resurgence efforts, the model has a particular focus on environmental interactions and their governance. We illustrate the model with examples of Indigenous-led conservation and management of grizzly bears (*Ursus arctos horribilis*) in an area now known as coastal British Columbia, Canada, a system that the authors are intimately familiar with. We also use this system to provide an in-depth description of a conservation 'bright spot': that is, a system where conservation success has exceeded norms (*e.g*. Bennett et al., 2016; Cinner et al., 2016; Cvitanovic & Hobday, 2018), relative to dominant state-led approaches to environmental management across the continent, and a system that we believe might provide inspiration for ambitious, effective, and just conservation elsewhere. Although we use a specific case study to illustrate the Decolonial Model, we provide examples of how the model could be applied more generally, while acknowledging that variable contexts elsewhere might lead to different obstacles and outcomes than those observed here.

The positionalities, experiences, and relationships among our authorship team have played an important role in the work described herein. We began collaborating initially through a shared interest in bear ecology and conservation. Over the years, personal and professional connections have strengthened in part due to a strong and mutual shared dedication to conservation solutions that support people and wildlife alike. JH, WGH, JEM, MFM, DN, and JW are Indigenous leaders, knowledge holders, and practitioners who, among many roles, have been instrumental in instituting a bear conservation approach across the Central Coast region of British Columbia, and have worked at various government-to-government (i.e. Indigenous Nation to Crown) tables. JH, who holds the name 'Cúagilákv, is a citizen of the Haíłzaqv Nation and the Executive Director of Qqs Projects Society. Her work, including as an outgoing Haíłzaqv Tribal Councillor and Chairwoman of the council's Stewardship Portfolio, bridges the wellbeing of Haíłzaqv people with the integrity and protection of their unceded homelands. WGH, who holds the name Dúqváísḷa, holds the responsibility of being one of the knowledge keepers on behalf of his family and the Haíłzaqv Nation, while also working in the natural resource management sector. Being able to bring together cultural knowledge and natural resource management strengthens the relationship between western science and traditional knowledge, which has allowed for more effective management and governance of all resources in Haíłzaqv territory. JEM is a member of the Nuxalk Nation and program manager of the Nuxalk Fisheries and Wildlife department, a role he has held for over a decade. He has deep expertise in bear behavior as has spent his career working in the field of fisheries assessment/enhancement, co-existence with bears, and as a bear viewing guide, bear researcher, and program lead for the Nuxalk Bear Safe Program. MFM is a Nuxalk fisheries biologist who lives in Victoria BC and currently works as a consultant, with the Coastal First Nations-Great Bear Initiative and with her community, the Nuxalk Nation, on an array of stewardship initiatives. Her career spans almost two decades and includes years of fisheries field work leading to much experience working around bears. In her former position as the Nuxalk Stewardship Director, she learned from Nuxalk teachings that culture and traditional laws were integral to stewardship, and thus worked with JEM to develop the Nuxalk Bear Safe program. DN, who holds the name Muq'vas Glaw (White Bear), is a member of the Kitasoo/Xai'xais Nation, where he serves as elected Chief and Stewardship Director. He is Executive Director of the Spirit Bear Research Foundation, and has been

**Table 1.** Tenets of the Decolonial model of environmental management and conservation. Graphical representations by Leya Tess (https://www.leyatess.com/).

| Graphical Representation | Tenet | Description | Relevant reading |
|---|---|---|---|
|  | *(1) Stewardship of resources is inseparable from the Rights, Title, Responsibilities, self-determination, and sovereignty of Indigenous Peoples* | Rights and title extend not only to lands and waters (and associated resources), but also to their stewardship and governance. Although this concept is addressed in international declarations such as the United Nations Declaration on the Rights of Indigenous Peoples and individual country commitments (*e.g.* Canada's 'Principles Respecting the Government of Canada's relationship with Indigenous peoples'), state-led management agencies might recognize that Indigenous uses of resources need to be protected but assume that management of resources themselves are solely the jurisdiction of state governments. By contrast, decolonized approaches recognize Indigenous and local communities as not solely resource users (or 'stakeholders', among other groups) but instead as rights-holders to both their environments and decision-making regarding them. | (Daes, 2004, Corntassel, 2012, Manuel & Derrickson, 2017, Indigenous Circle of Experts, 2018, Pasternak et al., 2019, Artelle et al., 2019, Claxton & Price, 2020) |
|  | *(2) Practitioners steward interconnections among species, people, and their environments* | Whereas state-led management approaches often focus on single species (or small groups of species), in order to ensure effective and just management of resources, recognition is required that people, other species, and environments are interdependent, and hence governance of one species or place requires consideration and stewardship of the full social-ecological context of other species and places with which they are associated, including relationships of those species with people. Decolonized approaches recognize these relationships and incorporate interconnections into stewardship. | (Brown & Brown, 2009, Atleo, 2011, Borrows, 2018, p. 201, Indigenous Circle of Experts, 2018, Artelle et al., 2019) |

(*Continued*)

**Table 1.** (Continued).

| Graphical Representation | Tenet | Description | Relevant reading |
|---|---|---|---|
|  | *(3) All available knowledge sources are considered (and respected)* | Diverse disciplines and knowledge systems exist, are often complementary, and can contribute productively to informing environmental interactions. This precludes assumed primacy of one knowledge source over another. For example, although positivist science is valuable for informing management, it is often presumed to be superior to all other knowledge sources, as explicitly reflected in the NAM's tenet 'Science is the proper tool to discharge policy'. Decolonized management instead respects and considers all knowledge sources in decision-making. Notably, knowledge is inextricable from context and the people who hold and create it. Decolonized approaches do not seek to 'integrate' (*i.e.* extract) knowledge from one knowledge system into a dominant one, but instead support meaningful co-governance that includes the people and governance systems tied to knowledge directly into governance processes. | (Jasanoff, 2007, Whyte, 2013, Whyte et al., 2016, Pasternak et al., 2019, Burt et al., 2020, Latulippe & Klenk, 2020, Reid et al., 2021) |
|  | *(4) Environmental stewardship is place-based (centered on communities), with collaborations with other governments as appropriate.* | Decolonized management and stewardship processes match the scale of the social-ecological processes they support. This contrasts with agencies of settler states, which might have region-specific objectives but are often governed centrally by organizational systems not specifically adapted to places of application. In Indigenous contexts, place-based approaches and governance systems have existed for millennia. However, recognizing that fauna, flora, and ecological processes might span large spatial scales – for example, many species are migratory, rivers and the atmosphere flow through territories – highlights that large-scale collaborations or co-governance arrangements might be needed among place-based governance systems to match governance to all relevant ecological scales. Decolonized governance therefore is place-based and interconnected with other governments as appropriate. | (Ostrom, 1990, Berkes et al., 2006, Lee et al., 2019, Burt et al., 2020) |

(*Continued*)

Table 1. (Continued).

| Graphical Representation | Tenet | Description | Relevant reading |
|---|---|---|---|
|  | *(5) Practices reflect, support, and/or are led by local governance structures and legal systems* | Indigenous Nations and local communities have a diversity of governance structures and their own legal systems, which have often been overlooked (or explicitly ignored, impeded, actively suppressed, outlawed, or excluded) through colonization. Decolonized approaches reverse this damage in part by acknowledging, abiding by, and supporting local governance structures and upholding legal systems that predate colonial systems. In cases where local communities face logistical capacity barriers to address certain stewardship challenges and opportunities, allies and collaborators might be drawn upon to support reducing those barriers. | (Borrows, 2002, Borrows, 2018 Simpson, 2011, Corntassel, 2012, Coulthard, 2014, Manuel & Derrickson, 2017, Pasternak et al., 2019) |
|  | *(6) Practices reflect local values/worldviews* | Conservation and management practices are not value-free but are instead based on worldviews of people conducting them. Although conservation and management are often mistakenly described as largely positivist scientific exercises (*e.g.* as depicted in the NAM), ethical and values-based dimensions guide conservation decisions at a foundational level. For example, questions of whether or why conservation activities are required at all; which species to focus on; what constitutes sufficient or appropriate conservation; and how human and non-human needs are balanced are all based on values and related to motivations of practitioners, decision-makers, and researchers themselves. In many current governance configurations, only dominant values drive environmental management and conservation. Decolonized stewardship approaches instead reflect local values and worldviews. | (Kovach, 2010, Smith, 2013, Housty et al., 2014, Whyte et al., 2016, Bhattacharyya & Slocombe, 2017, Indigenous Circle of Experts, 2018, Artelle et al., 2018b, Held, 2019, Pasternak et al., 2019, Latulippe & Klenk, 2020, Beveridge et al., 2020) |

(*Continued*)

Table 1. (Continued).

| Graphical Representation | Tenet | Description | Relevant reading |
|---|---|---|---|
|  | (7) *Governance recognizes, respects, and addresses the cultural importance of species and places* | The ways by which particular species or places are perceived and, hence, what is required in interactions with them might vary substantially based on worldview, an important consideration for cross-cultural collaborations and allyship. Species might have importance beyond their numerical sustainability. For example, keeping 'herds' of wildlife at levels where extinction is unlikely, or ecological or percentage-based targets (*e.g.* of maintain x% of a landscape intact) that might be compatible with conservation paradigms such as ecosystem-based management might not be deemed sufficient for species or places of particular cultural importance. Decolonized approaches recognize species and places of cultural importance and uphold specific additional requirements for them, *e.g.* for place-specific protocols, respectful conduct, and reciprocal interactions. | (Garibaldi & Turner, 2004, Atleo, 2011, Reo & Whyte, 2012, Housty et al., 2014, Cuerrier et al., 2015, Indigenous Circle of Experts, 2018, DeRoy et al., 2019) |

instrumental in advancing stewardship while concurrently helping to develop a rapidly expanding local Indigenous-led ecotourism industry. JW has held the position of family representative on many committees within the Wuikinuxv Nation and has held positions and provided advice on fisheries, forestry, treaty, and elected council. She follows many of her ancestors into management and resource stewardship. She has a strong interest in finding ways to take western science and use it to put aboriginal management strategies in a form that is understandable by the current management regime in order to bring a less industry siloed approach to management. KAA, HMB, MSA, CTD, and CNS are Canadians of mixed European descent. They are interested in wildlife conservation and seek to conduct scholarship that supports the governance of Indigenous communities with which they partner. KAA is an adjunct professor who lives in the Haíłzaqv village of Waglisla (Bella Bella BC), and has worked throughout his academic career with Haíłzaqv and neighboring Nations. HMB is an assistant professor who now lives on Lheidli T'enneh Territory and has worked with Nations throughout the coast, especially the Haíłzaqv and Nuxalk Nations. MSA is a postdoctoral fellow who lives in K'ómoks territory and who has worked in Nations throughout the coast, especially the Wuikinuxv Nation. CTD is a Professor and a Science Director with an environmental NGO, who lives in Victoria (WSÁNEĆ territory), BC, and whose lab and research program have been deeply involved in the bear monitoring described herein, in partnership with all Central Coast First Nations since its inception. CNS is the Wildlife Biologist and Science Coordinator with the Kitasoo/Xai'xais Nation who lives in the Kitasoo/Xai'xais village of Klemtu and Cumberland, BC (K'ómoks territory), and has partnered with Nations across the Coast, especially the Kitasoo/Xai'xais. KAA's role as lead author reflects his efforts in organizing and coordinating the writing of this document. The ideas herein, however, resulted from over a decade of collaboration among the authors along with a larger team of over 140 researchers, community members, and advisors (see acknowledgments for a non-exhaustive list).

## Decolonial Model of Environmental Management and Conservation

We describe a Decolonial Model for supporting Indigenous-led resurgence of place-based approaches to management and as an alternative paradigm to dominant western management approaches. The model's tenets (Table 1) distill, at a coarse scale, characteristics that might be expected of decolonized approaches to environmental conservation and management. The model does not prescribe the specifics of how Indigenous governments or communities govern in decolonized contexts: by their very nature, these place-based approaches vary from location to location, and people in those areas would be most appropriate for prescribing their own governance systems. Instead, the Decolonial Model provides an heuristic tool to better understand foundational differences between decolonized and dominant approaches. The model provides suggestions on how to support (or avoid impeding) Indigenous-led governance or meaningful co-management arrangements among Indigenous and colonial agencies. Although we focus on examples from Indigenous governance systems, applicability extends to other communities that are

affected by current dominant models of environmental management and conservation (*e.g.* communities facing environmental injustice, such as disproportionate harms and risks from pollution; Whyte, 2020).

We argue for the importance of place-based approaches to environmental interactions but do so under the assumption that Indigenous and non-Indigenous practitioners have roles to play in the decolonization of practices, in the support of resurgent place-based approaches, and in the development of collaborative knowledge production and meaningful co-management arrangements. A decolonized approach to management does not negate the potential for the incorporation of knowledge sources or approaches developed elsewhere into management or collaboration with non-Indigenous agencies, practitioners or other partners (Adams et al., 2014; Popp et al., 2019; Salomon et al., 2018; Stephenson & Moller, 2009). Indigenous and local communities, as all human cultures, are continuously evolving and incorporate new knowledge and technology as they become available (Berkes, 2012; Brown & Brown, 2009), with Indigenous practitioners identifying the value of 'Two-Eyed Seeing' (defined by Albert Marshall in Bartlett et al., 2012 as 'learning to see from one eye with the strengths of Indigenous knowledges and ways of knowing, and from the other eye with the strengths of Western knowledges and ways of knowing, and to using both these eyes together, for the benefit of all' see also (Bartlett et al., 2012; Indigenous Circle of Experts, 2018; Kutz & Tomaselli, 2019; Marshall et al., 2015; Reid et al., 2021).

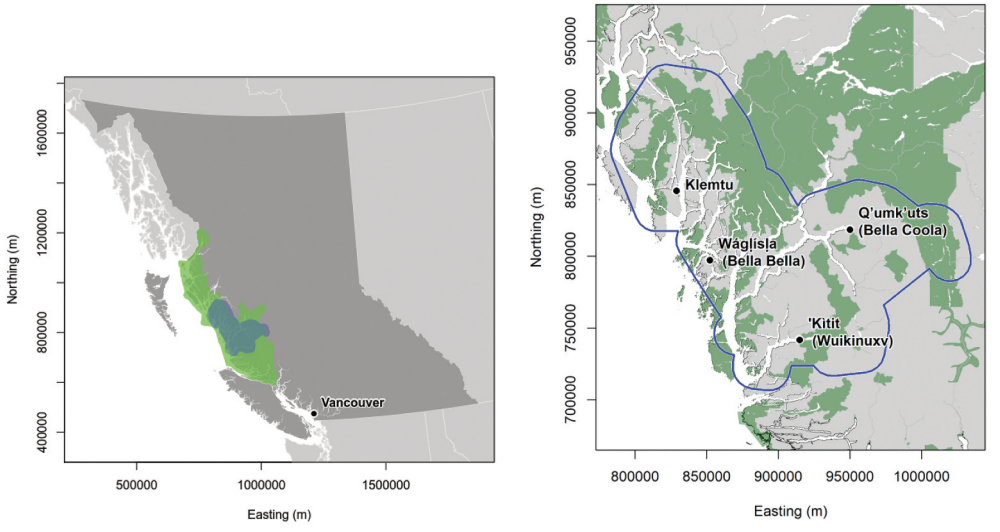


**Figure 1.** (Left) location of the region now commonly referred to as the Great Bear Rainforest (shown in green), British Columbia (shown in dark gray), Canada. Blue area represents the region around which the Central Coast Bear working group and collaborators conduct black and grizzly bear monitoring. Right) Location of the Haíłzaqv (Heiltsuk), Kitasoo/Xai'xais, Nuxalk, and Wuikinuxv villages of Wáglísla (Bella Bella), Klemtu, Q'umk'uts (Bella Coola), and 'Kitit, respectively. Green areas on right panel represent regions protected or conserved through federal and provincial designations. Blue perimeter denotes the same blue area depicted in left panel.

This model has been informed by the authors' collective experiences in, or in partnership with, Indigenous-led conservation and management efforts and the interface of these efforts with settler agencies and allies. In particular, it has been informed by the large-scale collaborative approach to grizzly bear conservation described herein. It is intended to be generally applicable as a set of guiding principles to support decolonizing conservation and management. We propose this model not as the last word in how Indigenous-led conservation and management might be supported, but instead to further discussion about the ways by which conservation and management might be reconceptualized in other contexts. This evolution might be informed by considerations beyond the scope of the authors' experience. To provide a comparison point for those more familiar with current dominant approaches to management, we explain these tenets in reference (and in contrast) to dominant approaches. We focus on environmental management and conservation specifically while acknowledging that the distinction between these activities and other aspects of human-to-human and human-to-environment relationships, and the conceptual separation between people and their environments, is artificial and problematic. We note that the resurgence and decolonization that we describe within are part of, not apart from, larger-scale decolonial and resurgent movements, much as the environments and species managed are inseparable from their social and environmental contexts. Although we present the model as seven distinct tenets, we note that all are inter-related and interdependent. We describe the Model at a high level in Table 1, and then describe each tenet more fully below, drawing from our experiences with grizzly bears in coastal British Columbia.

## Indigenous-led Management of Grizzly Bears in the 'Great Bear Rainforest'

The Great Bear Rainforest (GBR) of British Columbia, Canada (Figure 1), has garnered international attention given its significance as part of the world's largest remaining temperate rainforest, and recent conflicts and negotiations over land use (Affolderbach et al., 2012; DellaSala et al., 2011; K. Price et al., 2009). Stretching along the coast of British Columbia, Canada, from just north of Vancouver Island to the southern tip of Southeast Alaska, this area still hosts most of the species that were present prior to European colonization, including notably intact assemblages of terrestrial large carnivores (DellaSala et al., 2011). It is composed mostly of the unceded territories of First Nations who have inhabited and shaped the region for millennia (Housty et al., 2014; K. Price et al., 2009; K. Turner & Bitonti, 2011).

Grizzly bears (along with black and spirit bears, *Ursus americanus* and *Ursus americanis kermodei*) are the namesake of this region and serve as one of its *de facto* flagship species. Their conservation featured prominently in the conflict leading up to, and during the negotiation of, the current provincial conservation strategy (*e.g.* British Columbia Ministry of Environment, 2008; Grizzly Bear Habitat Mapping Technical Review Team, 2010; Horn et al., 2009; Rumsey et al., 2004). Their modeled habitat was one of the primary ecological considerations in negotiations (Central Coast LRMP completion table, 2004; Rumsey et al., 2004, map 11) and they are one of five 'focal indicator species' of ecological health for the region (Province of British Columbia, 2016). They also attract revenue for a burgeoning ecotourism industry (Honey et al., 2016; Lemelin et al., 2015).


**Figure 2.** Central Coast Bear Working group members and allies in front of a sign declaring Grizzly Bear trophy hunting was closed, in respect of traditional laws (Photo by KAA).

Grizzly bears are also of central importance to many of the First Nations whose territories comprise the region. Since the beginning of time, grizzly bears have been considered relatives, requiring respect and instilling an imperative of responsibility more in line with that felt by settler cultures primarily toward human relatives (Bears Forever, 2013; Housty et al., 2014, Artelle et al. 2018; E. Windsor and F. Hanuse, Wuikinuxv Nation Elders, pers. comm. 2019; see also; D. A. Clark & Slocombe, 2011; Bhattacharyya & Slocombe, 2017 for other examples of grizzly-human relationships). In part because of this relationship, and in continuing with millennia of stewardship, over the past decade Central Coast First Nations (Haíłzaqv, Kitasoo/Xai'xais, Nuxalk, and Wuikinuxv) have led a multi-faceted approach to conservation of this species-relative.

Although many aspects of dominant approaches to grizzly bear management differ from those of the Central Coast First Nations, the specific practice of grizzly bear trophy hunting sanctioned under the provincial government through much of the 20th and 21st centuries provided the initial impetus spurring a recent collaboration among First Nations and others to change bear stewardship and management approaches in the region. This hunt was for largely non-consumptive (*i.e*. trophy) purposes, being one of the few species for which the province allowed the 'edible portions' to be left behind, with hunters usually taking only heads, paws, and pelts as trophies. In the last century, the Great Bear Rainforest region was a popular bear hunting destination, with celebrities traveling from across North America and beyond to participate (*e.g*. Mack & Thommasen, 1993). There are accounts of 'piles of bears' being discarded on the shores of Wuikinuxv Lake described by members of the Wuikinuxv Nation and in Mack and Thommasen (1993). Whereas killing of grizzly bears for 'sport' has never aligned with the values of the Central Coast First Nations in whose territories this occurred, ongoing concerted opposition was ramped up in 2010, including through strategies such as Nations publicly expressing their opposition and sharing information in various media (*e.g*. see https://www.youtube.com/watch?v=LSMXZzy235I).

In 2011, the Central Coast First Nations formed the 'Bear Working Group'. Its initial initiative to end grizzly bear trophy hunting was ultimately endorsed by Coastal First Nations, an alliance of First Nations whose territories cover most of the Great Bear Rainforest. In 2012, the Bear Working Group issued a public statement, asserting that trophy hunting was banned

throughout the Great Bear Rainforest (Figure 2) by Indigenous law – the legal traditions, customs, ceremonies, stories, and languages of Indigenous Peoples, distinct among Nations, that govern people's relations to each other and the land (Borrows, 2002). To bring provincial policies in line with Indigenous laws, Nations and their collaborators led informational campaigns, research on economic benefits of hunting vs. tourism activities (Honey et al., 2016), documentary films (Bears Forever, 2013), and meetings with governing bodies and hunting groups. Ultimately, a ban was announced by the Province in late 2017 (covering the whole province, not only the Great Bear Rainforest region that was the focus of the Coastal First Nations campaign). This ban – a modification to provincial hunting regulations, not a legislative change – could potentially be reversed by future provincial governments. However, it has already prevented the hunting of approximately 300 grizzly bears a year across the province (over to 1,200 bears at the time of writing), though ongoing poaching rates remain unknown. Complementary efforts to end the hunt were also conducted by, or in collaboration with, various NGOs. For example, since 2005, the Raincoast Conservation Foundation has been purchasing 'hunting tenures', exclusive rights to guide nonresident grizzly bear hunters throughout large swaths of the GBR, effectively extinguishing all commercial sport hunting operations (*e.g.* also for wolves and black bears) from these areas.

The Bear Working Group collaboration has since spurred additional conservation and research collaborations. For example, the Central Coast First Nations have partnered with multiple universities and NGOs (primarily the Raincoast Conservation Foundation, Spirit Bear Research Foundation, and Coastwatch/Qqs Projects Society) to conduct an ongoing long-term, noninvasive monitoring project tracking black and grizzly bear populations. This approach was first established in the region by Housty et al. (2014) in two focal watersheds, and has since expanded across an area of over 23,000 $km^2$ (Adams et al., 2017; Bryan et al., 2013, 2014; Service et al., 2014). This applied research now addresses questions specific to, and at scales of, each partnering Nation, as well as at international scales (*i.e.* across Central Coast First Nations). The work provides general information on bear population sizes and trends, temporal and spatial variation raised by landscape use, and other focal questions of stewardship departments in each individual Nation. Results have informed conservation efforts including the enhancement and expansion of land protections, integrated approaches to fisheries management that consider the nutritional needs of bears, human-bear coexistence efforts, and sustainable tourism policy. Although some aspects of this approach are specific to this particular region and species, the program exemplifies a more broadly applicable approach. Below, we elaborate on this multi-pronged conservation approach as it relates to the Decolonial Model of Environmental Management and Conservation.

## Decolonial Model as It Pertains to Great Bear Rainforest Grizzly Bear Management

We illustrate each tenet of the Decolonial Model with examples from grizzly bear management on the Central Coast. Although we focus on particular stewardship aspects of individual Nations to illustrate each tenet, these tenets are in fact practiced across all Nations. Similarly, examples highlighted under individual tenets often relate to multiple tenets. Although we refer to outside publications and other sources where available, all of the examples have been led by or in collaboration with authors of this paper who write based on their firsthand experiences.

### *Stewardship of Resources Is Inseparable from the Rights, Title, Responsibilities, Self-determination and Sovereignty of Indigenous Peoples*

Extensive work on the conservation and/or management of grizzly bears (and of other species and resources) led by stewardship departments within each Nation is part of resurgent Indigenous-led governance throughout the region. The recognition of Indigenous Peoples' jurisdiction of their territories is increasing internationally and within Canada by both provincial and federal governments through case law, declarations, and commitments (*e.g.* legal cases such as Calder v. British Columbia (AG) (1973), R. v. Sparrow (1990), R. v. Gladstone (1996), Delgamuukwv v. British Columbia (1997), Haida Nation v. British Columbia (Minister of Forests) (2004), Tsilhqot'in Nation v. British Columbia (2014), Gitxaala Nation v. Canada (2016), Ahousaht Indian Band and Nation v. Canada (Attorney General) (2018) and Tsleil-Waututh Nation v. Canada (2018); Canada's 'Principles: Respecting the Government of Canada's Relationship with Indigenous Peoples' (Government of Canada, 2017); and the international United Nations Declaration on the Rights of Indigenous Peoples (UN General Assembly, 2007)). Despite this reality, realized respect of underlying rights and title by conservation and management agencies and practitioners is in many cases still in its infancy. For example, in reference to the Central Coast First Nations' declaration of a hunt ban in 2012, a national newspaper article reported that 'The province, however, said hunting is government jurisdiction, a position it still holds. "As we did last fall, we would ask that [Coastal First Nations] respect the province's authority over the harvest", Steve Thomson, B.C.'s Minister of Forests and Lands' (Stueck, 2013). Whereas this belief and statement was in contravention of inherent


Figure 3. The Heiltsuk Integrated Resource Management Department, whose authority and jurisdiction over management of their resources has been expressed through recent reforms to the way that forestry companies propose operations in the territory. Companies now apply directly to the Nation and seek approval before even approaching the provincial government, who claim jurisdiction over forests throughout the province. Photo from the Heiltsuk Integrated Resource Management Department.

rights and title, it reflected common assumptions of settler states. This has changed somewhat in recent years with moves toward more meaningful collaboration between provincial and federal level governments and First Nations on some stewardship issues, including through the development of Reconciliation Protocols (see https://www2.gov.bc.ca/gov/content/environment/natural-resource-stewardship/consulting-with-first-nations/first-nations-negotiations/reconciliation-other-agreements) that include resource management dimensions, though questions of ultimate jurisdiction remain mostly unresolved in the province.

A specific example of sovereignty being expressed through grizzly bear stewardship (or čísḷa, 'to take care of') comes from the Haíłzaqv Nation's approach to forestry. Land use orders under the provincial Great Bear Rainforest Land Use Order and Great Bear Rainforest (Forest Management) Act stipulate that habitats outside of formal protected areas in the GBR are subject to an 'ecosystem based management' modified form of rotational resource extraction (primarily forestry). Within harvestable areas, the highest quality modeled grizzly bear habitat is either not eligible for harvest ('Class 1 EBM reserves'; except where permitted through exemptions described in Province of British Columbia, 2016a), or needs to have 50% of its area retained at any given time ('Class 2 EBM reserves'; Grizzly Bear Habitat Mapping Technical Review Team, 2010). The Haíłzaqv Nation (and others) were concerned about the adequacy of these provincially-designated reserves due to the paucity of data informing them, with many being based solely on remote-sensed data of habitat potential without ground-truthing. Additional concerns related to their relatively small size, isolation, and the fact that they were not designed to provide connectivity among patches.

To address these shortcomings, the Heiltsuk Integrated Resource Management Department (Figure 3) devised its own spatial prescriptions. Specifically, Haíłzaqv Grizzly Bear Polygons identify priority grizzly bear habitat for conservation and to guide forestry and other developments in the territory. These prescriptions provide additional protections not only to this culturally important species (Housty et al., 2014) directly, but also to other species for whom grizzly bears act as partial proxies (Horn et al., 2009; Rumsey et al., 2004) due to their life history traits such as large home ranges, requirements for diverse habitats, sensitivity to human impacts, and high caloric requirements that require productive (or, alternatively, vast) environments (Adams et al., 2017; Carroll et al., 2001; Darimont et al., 2010; Noss et al., 1996). These Haíłzaqv Grizzly Bear Polygons were designated using a) data on locations and movement patterns as inferred from the bears identified genetically from noninvasive hair sampling, b) local knowledge as documented in a Haíłzaqv database on use of flora and fauna across the territory (Heiltsuk Nation c/o Heiltsuk Integrated Resource Management Department, n.d.) and obtained through conversations and interviews with local knowledge holders, and c) provincial data on locations of human-killed bears (British Columbia Ministry of Environment, Fish, Wildlife and Habitat Branch, 2010). These polygons are now used by HIRMD staff when companies propose forestry activities in Haíłzaqv territory. The locations of proposed cutblocks are compared to Haíłzaqv grizzly bear polygons, and in cases of overlap, proposals are now either rejected or are subject to restrictions considerably above and beyond those of the provincial land use orders. These Haíłzaqv polygons are evolving prescriptions subject to modification, for example, as additional data become available, and will be adapted as distribution and space use patterns of grizzly bears change.

In addition to providing further habitat protections and a mechanism for adaptive management in response to changing grizzly bear dynamics, the evolving approach to forestry here has also supported Haíłzaqv managers in upholding sovereignty over Haíłzaqv resources. A number of years ago HIRMD made a strong case to forestry stakeholders that it was in their best interest to respect Haíłzaqv title and rights as they pertained to proposed activities in the territory: obtaining the Nation's consent would provide increased business certainty and avoid costs that might be incurred if operations proceeded without consent and were opposed, delayed, or prevented. As a result, forestry companies now meet with the Haíłzaqv Nation before approaching provincial agencies when proposing new logging. Only proposals that have gone through the Haíłzaqv review process and are deemed acceptable by the Nation's forestry and referrals department (including as they pertain to Haíłzaqv Grizzly Bear polygons) are considered for further applications to the province, highlighting the primacy of the Nation's Integrated Resource Management Department as the governing authority over Haíłzaqv territory.

Some aspects of First Nations-led work on forestry has also been reflected more recently in provincial forestry policy for the region. For example, the Central Coast First Nations demanded considerably larger buffers to better protect known grizzly and black den locations from logging – increasing buffers from 25 m to at least

**Figure 4.** The Wuikinuxv Stewardship department oversees marine and terrestrial ecological research and monitoring programs, including those that focus on juvenile and adult salmon, as well as those focusing on bear distribution, diet, and population density. Coordinating capacity among field crews or using data across projects is paramount to Wuikinuxv's integrated management approach. For example, data from the annual catch per unit Effort salmon gillnet survey (pictured above) were used as part of the assessment of salmon allocations for bear diets in the watershed. Photo by Willy Passmore.

100 m of hard reserves and an additional 75 meters of 'soft reserves' (where any habitat disrupted from one portion of a soft reserve needs to be mitigated by additional offsets in another).

### *Practitioners Steward Interconnections among Species, People, and Their Environment*

Across Central Coast First Nations (and elsewhere) there is a strong recognition of, and culturally held values toward, the interconnection among species, people, and the environment (Artelle et al., 2018b; Bhattacharyya & Slocombe, 2017; Brown & Brown, 2009; Housty et al., 2014; Turner & Berkes, 2006; Turner, 2014).

The Wuikinuxv Nation provides an example of a stewardship approach that explicitly considers (and stewards) the interconnections among grizzly bears, salmon, and people. As with other Coastal First Nations, the Wuikinuxv Nation has coexisted, and shared resources including salmon, with grizzly bears for millennia. Humans and bears alike have had access to particularly abundant salmon resources there until recent decades. Wuikinuxv Lake (Rivers Inlet) sockeye had annual returns of upwards of 1.5 million sockeye (Cox-Rogers & Sturhahn, 2005; Groot & Margolis, 1991), and was home to one of the province's largest commercial fisheries (McKinnell et al., 2001; Walters et al., 1993). However, following decades of overexploitation from many commercial canneries that started in the 19th century, the population declined precipitously in the 1990s, resulting in indefinite commercial fisheries closures and ongoing threats to food security for the Wuikinuxv Nation. This loss of an important food source for bears corresponded with increased bear-human conflict leading to the killing of at least 15 starving grizzly bears in Wuikinuxv village in 1999, when only ~2,000 fish returned (Boulanger et al., 2004, F. Hanuse, pers. comm. 2013).

As the sockeye population of Wuikinuxv Lake has begun to recover (albeit with continued depressed abundance), the Nation is taking an explicitly holistic approach to ensure the fishery can again sustain salmon, people, bears, and their ecosystems alike (Figure 4; described in depth in Adams et al., 2021). This work is guided by the Wuikinuxv value of *Na na kila* – to look ahead or watch out for someone – to balance and share the needs of salmon among all users while ensuring long-term sustainability of salmon stocks. Operationally, the Nation is setting population targets using a 'triple bottom line' approach, balancing cultural, economic, and ecological needs (Marshall et al., 2018). Fishing targets are being set not only to ensure the sustainability of the targeted salmon populations, but also to ensure that sufficient salmon are available for local needs of people (*i.e.* for Food, Social, and Ceremonial purposes), bears, and their ecosystems as a primary concern, with future larger-scale commercial fisheries allotments possible only after local needs and stock sustainability are assured. Bears are being considered in fisheries allocations not only in their own right, as species of high cultural concern, but also as ecosystem surrogates for salmon-dependent ecosystems (Levi et al., 2012). They provide useful ecosystem proxies because a) they are only able to access salmon after it has escaped all marine predators, suggesting that if there is enough salmon for bears then there is also enough for predators that came before, and b) because bears are often the most important vector for transferring salmon carcasses and nutrients into riparian systems where they feed numerous scavengers and their associated food webs, and ultimately fertilize forest and aquatic ecosystems (Harrer & Levi, 2018; Levi et al., 2012; Van Daele et al., 2013).

To determine target salmon allotments for bears, the relationship between salmon availability and resultant bear density was estimated, with the assumption that as salmon recover bear populations will grow until reaching a saturation point when other limiting factors emerge (see Adams et al., 2021; Levi et al., 2012). This salmon-bear numerical relationship was then balanced against benefits of salmon to human fishers. An Ecosystem Based Fisheries Management approach (Levi et al., 2012) was applied whereby costs to humans (from reduced fishing opportunities) was traded off against costs to bears (from reduced fish availability and resultant changes to population density), with spawning targets identified that equalized costs between human and bears (and, by inference, other ecosystem users).

Moving forward, this approach is being formalized in the Wuikinuxv Nation's salmon management plan, ensuring that sufficient salmon are available for bears (and dependent ecosystems) and local people before allowing commercial harvests. By concurrently managing for multiple ecosystem components, and doing so in a repeatable, data-driven, and values-led approach, this salmon management provides a model for advancing conservation approaches that work for people and other species alike. Whereas Canada's Wild Salmon Policy also seeks to do this, implementation is rare (Gayeski et al., 2018; Price et al., 2017).

Across Central Coast First Nations, bear stewardship is housed within offices that address multiple and interconnecting social and ecological management files (*e.g.* management of fisheries and forestry). Compared to 'siloed' management more common in colonial management, this approach provides a more appropriate setting for considering resource decisions in relation to multiple species and arriving at more holistic solutions. For example, whereas in British Columbia bears and salmon are managed by entirely different agencies (salmon by federal agencies, bears by provincial agencies), within Nations the individual who manages bears might also be in charge of salmon, or share an office with the person who is, making scenarios such as the Wuikinuxv salmon policy more of an expected outcome than a surprising exception.

### *All Available Knowledge Sources are Considered (And Respected)*

Whereas the primacy of positivist science is often assumed in North American conservation and resource management, grizzly bear management, conservation, and research on the Central Coast provides an example of how using a more diverse knowledge base (*e.g.* combining local and Indigenous knowledge and governance systems with academic research) can better inform practice.

The study of, and response to, a recent range shift in coastal grizzly bears provides an informative example of management informed by local knowledge. In Kitasoo/Xai'xais and Haíłzaqv territories, grizzly bears have historically occupied mainland areas but were absent from almost all island habitats. However, starting in the late 1990s people in both Nations began to observe grizzly bears newly occupying some islands for the first time not only in living memory but also via knowledge passed down among generations. This shift could have important ecological implications, both in terms of the ecological effects of grizzly bears on their new habitats, and in terms of the ecological causes that might be underlying this expansion. The range shift also had conservation implications: although forest habitat protection is meant to be afforded to

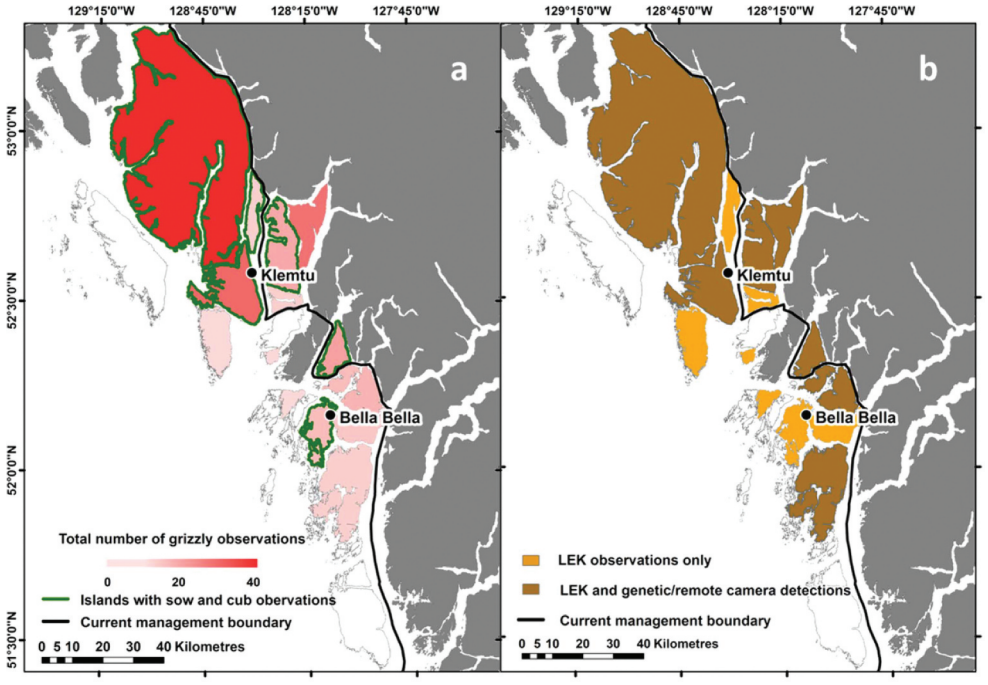


Figure 5. Mutually reinforcing evidence, from local ecological knowledge (LEK) paired with genetic data and remote camera detections, of occupancy, unbeknownst to provincial agencies, of grizzly bears on islands in the Great Bear Rainforest region (Figure 1 from Service et al., 2014). Panel a) shows the weight of evidence (with darker red indicating increasing weight) of all knowledge sources combined (genetic data, remote camera, local observations), while panel b) compares islands where bear occurrence was detected through LEK observations only (orange) vs. through both LEK observations and genetic/remote camera data (brown).

highest quality modeled grizzly bear habitat in the GBR, islands where grizzly bears now occur were beyond the provincially accepted grizzly bear range and – at the time – were not afforded any such protections. In the early 2000s one of the authors (DN) approached the provincial wildlife management agency, informed them of the shift that he and others from Klemtu had observed, and asked the agency how the expanded grizzly bear range would be addressed and protected. At the time he was told that he must be mistaken: grizzly bears did not occur on these islands and he was probably encountering black bears, misidentifying them because he was not a biologist. This response delayed provincial recognition of range expansion or support for Indigenous-led habitat protection at the time.

To document and gain finer-scale insights into the distributional shift of coastal grizzly bear populations, the Kitasoo/Xai'xais and Haíłzaqv Nations initiated a research project that combined local knowledge, collected by interviews, with hair snare and remote camera data (Figure 5; detailed in Service et al., 2014). All knowledge sources affirmed one another, detecting grizzly bears on 10 islands outside of the range the provincial government had identified (and recently defended). Importantly, each knowledge source offered complementary contributions, with local knowledge providing insight into

patterns spanning decades, and data from genetic hair sampling and remote cameras providing fine-scale information on the number of individuals and the presence of females with cubs, a common metric used in defining long-term occupation of grizzly bears. Promisingly, the provincial government has become more collaborative in addressing this shift in recent years, not only by incorporating data and perspectives from communities and research partners involved in this work to inform management, but also by taking early steps toward working more meaningfully and directly with Nations on evolution of management approaches and policies. Due to this work an additional ~3,600 hectares of habitat in this expanded range will be designated as Class 1 and 2 EBM reserves and protected from industrial activities. Moreover, management throughout the area is now driven by an increasingly accurate understanding of its ecology. For example, when new habitat protections were being delineated for grizzly bears on these islands, local observations of extensive grizzly bear foraging of intertidal resources led the Kitasoo/Xai'xais Nation to require the novel protection of forested habitat adjacent to these previously unknown foraging areas.

This combination of Indigenous and local knowledge paired with genetic hair sampling and remote camera trapping approaches proved particularly powerful for understanding, and subsequently protecting, habitat. Combining complementary data sources is more the rule than the exception in Indigenous-led grizzly bear work here. For example, the overall approach to research, monitoring, and environmental governance combines multiple knowledge sources leading to richer, more deeply informed governance capacity. Most research begins with a baseline of knowledge held in communities that provides a foundation on which additional tools can be used to broaden existing knowledge. For example, knowledge holders throughout the coast are aware of key areas of importance to bears, and how distributions shift among years and across seasons, but hair snaring and genetic analysis of hair samples has allowed fine-scale tracking of individuals as they move across territories.

### *Environmental Stewardship Is Place-based (Centered on Communities), with Collaborations with Other Governments/practitioners as Appropriate*

Bear-human coexistence work in the Nuxalk Nation provides an example of an innovative place-based approach to stewardship that is highly adapted (and adaptive) to local social and ecological conditions. The Bella Coola Valley in Nuxalk Territory is a provincial hotspot for grizzly bear conflict (Artelle et al., 2016). The valley is highly productive, with regionally significant runs of multiple species of spawning salmon, and extensive grizzly bear habitat that hosts a relatively high density of grizzly bears, especially during the summer and fall salmon spawning period. The narrow valley is also home to a number of communities with considerable human habitation (both Nuxalk and non-Indigenous) and land uses that include farms and home gardens. This configuration results in considerable overlap in space use between bears and people, presenting frequent opportunities for conflict. As elsewhere in BC, conflict is particularly acute in years with poor salmon returns (Artelle et al., 2016).

To protect the safety of bears and humans alike, the Nuxalk Bear Safe program (see plenary talk given by JEM at North American Congress for Conservation Biology at https://www.youtube.com/watch?v=EUM0m9iLPyw&t=3186s, beginning at 49:08) has been


Figure 6. Examples of Nuxalk Stewardship of grizzly bears in the region, including (top left) stewardship of salmon that are of importance to bears and people alike, (top right) electric fencing protecting salmon processing area and fish tote, and (bottom) electric fencing around a full property. Photo from North American Congress for conservation biology plenary session, available at https://www.youtube.com/watch?v = EUM0m9iLPyw.

developed to apply non-lethal, holistic approaches of preventing and mitigating conflict in the Nuxalk town sites (*i.e*. inhabited reserves). The program envisions not the bears as the source of conflict (and the target of interventions) but instead seeks to understand particular dysfunctions in the relationship between bears and people, and addresses those dysfunctions on a case by case basis. It is led by the Nuxalk Fisheries and Wildlife department, which also governs bear-relevant resources throughout the Nation such as salmon and other foods.

The program is multifaceted and includes components of public education, monitoring of bear ecology and movement patterns, and hands-on mitigation approaches (Figure 6). Throughout the year community flyers are distributed to households advising how to conduct oneself in bear country, how to manage attractants, and how to contact the Bear Safe program so that residents can connect early and immediately if conflict develops. The local Nuxalk Radio station also provides similar information, with hosts commonly sharing information on bear-human coexistence, and with Bear Safe technicians visiting as guests to share information.

As active bear seasons advance, the program monitors and records the location and behaviors of bears, and of their food resources, to predict if, when, and where bears might come into proximity to humans. Bear locations are tracked and are shared daily over Nuxalk Radio and social media, keeping the community advised of potential high-risk areas where extra caution might be warranted. At the peak of bear season, efforts are ramped up further through 'Bear Patrols' – crews in trucks who monitor (or respond to reports of) bears near or within the town sites. In cases where bears are too close for comfort, the patrols use trucks, lights, and noise to move the bears away. When

encouraging the bears to move is not safe or possible, the crews stay nearby to alert people, or offer rides to avoid having them cross paths with bears. These patrols operate overnight in the peak of the season, as this is when local bears are most active.

The program takes a proactive and situation-specific approach to responding to potential conflict when it arises. Crews conduct site visits to investigate the particulars of bear sightings/encounters to understand underlying causation. This will often involve inspecting people's yards and property (with permission) to identify attractants and yard configurations that might encourage specific bear travel routes. Crews remove attractants as they are identified (*e.g*. remains from harvested salmon or ungulates) to be composted elsewhere, and install electric fences around key attractants that cannot be removed (*e.g*. fruit trees, smokehouses, and compost piles). They instruct homeowners to leave a radio playing Nuxalk Radio to give bears the impression that someone is nearby, and are encouraging expanding this experimentation to include motion sensors connected to lights and sounds to further discourage bears. This program has had a high success rate, with bears rarely returning to properties that have been 'Bear Safed'.

Critically, Bear Patrol crew members also recognize the importance of education in human-carnivore coexistence. In cases of conflict, crews personally follow-up with landowners to explain why conflict might have occurred, describe the ultimate ecological context driving the behavior, and share information on efforts throughout the region to protect bears and people alike. Crew members also work to address cases where community members incur losses due to conflict. For example, in cases where Elders have had fish taken from their yards by bears, crews not only work to bear-proof the yards but work with the community to ensure the fish are replaced. Through these discussions and actions emotions can often shift from anger to understanding, with mitigation preventing both recurrence of conflict and harm to humans or bears.

The success of the Bear Safe program in this context would be hard to imagine were it not deeply engrained in place and led by the Nuxalk community. The program benefits from deep knowledge of the valley, of the ecology of grizzly bears within it and even knowledge of individual bears. It is also able to operate efficiently and cost-effectively, pulling resources and equipment (*e.g* trucks, crews, tools) from other Nuxalk stewardship projects when needed. Perhaps even more crucially, it is informed by an understanding of the cultural context of the communities (all crew are local Nuxalk members) and of the community members the crew engages with, allowing the crew to adapt their approach based on the subtle particularities of each situation. The innovations, efficiencies, and effectiveness exemplified here are perhaps part and parcel with decentralized, place-based approaches.

Although highlighted here as an example of place-based governance, the Bear Safe program is also a reflection of the care and attention that comes with species of high cultural importance (*i.e*. Model Tenet 7). When one of this paper's authors (JM), who leads this program and other fisheries and wildlife projects throughout the territory, is thanked for the 'Bear Safe' program keeping people safe from bears he gently corrects that, 'We call it "Bear Safe" – we're keeping the bears safe from people' (though the safety is reciprocal).

Despite the considerable success of the Bear Safe program to date it still faces obstacles in ensuring the well-being of bears throughout Nuxalk communities and the rest of the valley, and in advancing decolonial management of them. The conflict

mitigation work currently focuses primarily on members of the Nuxalk Nation and their homes and properties. However, the valley is also inhabited by non-Nuxalk residents, some of whom have differing worldviews, including historically viewing bears not as relatives but instead as pests. Thus, conflicts can arise, with reports of unnecessary conflict kills and evidence of poaching activities (locally referred to as 'shoot, shovel, and shut up') not uncommon. Monitoring, preventing, and enforcing laws pertaining to poaching are complicated by the presence of considerable tracts of private property, including many on parcels of high-use grizzly habitat. Moreover, concerns remain about persistent threats to grizzly bear populations across the valley and beyond from habitat degradation, uncertain future of salmon runs, and other changes such as ongoing climate change.

There is, however, momentum toward overcoming these challenges and improving relationships with bears throughout the valley. With the support from the Stataltmc (Nuxalk hereditary chiefs), Nuxalk elected chief and council, and community members, the Bear Safe program is continuing to expand its operation yearly with increased staff, training, and capacity. This work also dovetails with resurgent stewardship of the ecological requirements of bears (and other species) including healthy habitat and salmon populations. Although funding remains a persistent limiting factor, the work is well-positioned to expand further as additional support becomes available. Outside wildlife and management agencies are increasingly keen to collaborate with the Nuxalk Nation and to expand approaches championed by the Bear Safe program to addressing conflict throughout the entire valley. There is interest from the province to have Nuxalk and other First Nations collaborate on an evolving provincial Wildlife Act, an opportunity to advance policy that can address some of the complexities of human-wildlife coexistence within the Nuxalk Nation and beyond, while also moving closer toward enacting co-governance arrangements. The Nuxalk are also exploring the complexities of upholding Nuxalk law on private properties, with the parallel that BC and federal laws are currently expected to be followed simultaenously. Finally, there is a Provincial Wild Safe program that also operates in the Bella Coola Valley, outside the Nuxalk town sites, that currently partners with the Nuxalk program, but has limited funding and requires more support to properly address all the conflicts in the valley and more effectively complement the Nuxalk-led program. Supporting (financially, logistically, and otherwise) an expansion of the Nuxalk Nation's program to lead coexistence work across the entire valley would lead to an expansion of management that is not only further decolonized but also, for reasons described throughout this example and paper, likely more successful socially and ecologically.

At the regional scale, the Bear Working Group also provides a model of how place-based governance systems can interact to address ecological processes that transcend scales of individual territories. Although governance decisions and policies flow from individual Nations, these Nations communicate and collaborate with one another on grizzly bear stewardship, recognizing the fact that grizzly bears move large distances and travel among territories. These collaborations on larger-scale governance differ from colonial management in that even at larger scales governance is not centralized but flows from government-to-government relationships among the Nations. These relationships recognize one another's sovereignty in their own territories, while also recognizing the importance of co-governing larger scale ecological phenomena.

Figure 7. Kitasoo/Xai'xais-owned Spirit Bear Lodge, one the largest employers in the Nation's village of Klemtu, and an important component of the Nation's sustainable tourism efforts. Photo by Cael Cook, courtesy of Spirit Bear Lodge.

### *Practices Reflect, Support, And/or are Led by Local Governance Structures and Legal System*

The relationship between the Kitasoo/Xai'xais Nation's ecotourism industry, governance, and stewardship operations illustrates how locally-led stewardship and governance can reinforce one another while socially and economically supporting communities. Tourism in this Nation began in the 1990s at a time when Klemtu (the current village of the Nation) had a 90% unemployment rate. Considerable debate existed within the community about whether to protect resources or ramp up resource extraction to support employment. The Nation's government sought to identify activities that could support economic development while supporting conservation and stewardship efforts. Tourism was identified as an industry with potential for meeting both objectives and a decision was made to launch a Kitasoo/Xai'xais-owned tourism industry. In 2005, under the name 'Spirit Bear Lodge', the Nation transitioned to offering combination wildlife viewing and cultural tours with in-town accommodation provided for tourists (Figure 7). This shift was immediately successful with business revenues approximately doubling throughout the 2000s to current (pre-COVID-19) rates of approximately $2.5 million a year. As a Kitasoo/Xai'xais-owned business, most profits are either reinvested into the business or into community initiatives and local capacity-building opportunities. Additionally, the company has become the second largest employer in town, hiring approximately 40 Kitasoo/Xai'xais members a year (almost 10% of the community), while building capacity for community members through job training and opportunities in the tourism industry.

In addition to direct economic benefits, the tourism business has reciprocally supported increased stewardship and conservation activities. Community members have noted a recent rekindling of community-wide interest and investment in wildlife as tourism has grown. The Nation has embarked on research (as highlighted

herein) to ensure that bears are being well cared for and supported, as the bears are now supporting the Nation. The Spirit Bear Research Foundation was established to support research on bears in the area and now supports a variety of research efforts including tracking black (including Spirit) and grizzly bear movements, occupancy patterns, and densities; identifying and stewarding critical habitat; and monitoring salmon abundances in local watersheds. Tourism clients also support stewardship through a conservation 'tax' applied to their trip fees, which supports youth programs, the stewardship department, the Research Foundation, and partner NGOs.

Recognizing that tourism can have negative consequences, the Nation implements policies to constrain activities to sustainable levels and protect against stress to targeted wildlife. For example, they have imposed strict temporal and spatial limits on human visitation near key grizzly bear habitats, limiting the time and locations that tourism can occur and ensuring that bears have places of refuge and guaranteed quiet times. The Nation is taking an adaptive management approach, with ongoing research to assess the efficacy and design of these policies.

This Kitasoo/Xai'xais tourism stewardship has provided a model demonstrating the viability of a conservation economy whereby economic activity has thrived and continues to grow despite large portions of the land throughout the territory (>50%) being off-limits to extractive industries. It additionally shows the mutual social and ecological benefits that can arise from place-based stewardship that supports environments and peoples alike. As the community has benefited from this developing economy so too has their stewardship capacity, a contemporary manifestation of the reciprocity that has been part of environmental interactions here for millennia.

Grizzly bear management at the Central Coast scale also provides an example of management and conservation that is both led by local governance structures and legal systems and that in turn supports, builds capacity for, and facilitates further development of, those institutions. All activities related to grizzly bears are led by stewardship offices in each Indigenous Nation, which themselves get their authority from (and are guided by) their communities (*e.g*. Indigenous law, hereditary and elected leadership). Grizzly bear research here works to support that work. For example, the specific research questions being addressed in each Nation are usually set, and always guided, by its stewardship department. In this way the collaborative work not only upholds Nations' authority to govern (*e.g*. by recognizing them as the primary authorities for activities in their territories) but also directly contributes to capacity and evidence used in the governance itself.

Some specific outcomes of collaborative work have also been both informed by and reflect local legal systems. For example, although the province's grizzly hunt ban was enacted at the provincial level, the outcome has nonetheless, at least for now, resulted in better alignment with (and upholding of) principles derived from Indigenous laws that forbid the trophy hunt of bears here (see https://coastalfirstnations.ca/our-environment/protecting-bears/).

The bear work here has also worked to increase governance and capacity among leaders from each Nation (as well as partnering collaborators). For example, the initial work to halt grizzly bear hunting in the region provided a catalyst for broader and continuing leadership of those involved. The work brought neighboring communities together to work on a common cause. Efforts were led by emerging leaders from each Nation, who were breathing life into teachings they had received about proper ways to conduct oneself with bears. This proved to

be a launching point for leadership for many, providing experience in collaborating with one another and organizing with regional stewardship organizations (such as the Coastal First Nations umbrella organization). It has also provided a model for uplifting Indigenous laws as a driver for realized change on the ground, highlighting the primacy of Indigenous (not provincial or federal) laws. Whereas the bear work was focused on a specific species of high cultural importance, it was ultimately about considerably more – such as overarching wildlife stewardship approaches, Indigenous laws, and protected areas.

### *Practices Reflect Local Values/worldviews*

Colonial management agencies often act as trustees for natural resources, striving to ensure that the interests of the public are met in management approaches. These practices, however, tend to reflect dominant, settler worldviews which can, intentionally or not, further settler colonialism and impede Indigenous self-determination (Eichler & Baumeister, 2018; Watson, 2013; Watson & Huntington, 2008). By contrast, in a decolonial context, the worldviews of local Indigenous Peoples are respectfully and clearly reflected in management approaches, research methodology, and policy.

The depth and breadth of grizzly bear stewardship led by Central Coast First Nations reflects the values and worldviews that place high importance on human-grizzly bear relationships. However, differences in worldviews can also extend to more specific aspects of that relationship, such as the methodologies used in wildlife management research. For example, research methods commonly used to inform wildlife management, such as capturing and collaring, can cause harm to wildlife (*e.g.* Breed et al., 2019; Cattet et al., 2008; Cattet et al., 2003; Saraux et al., 2011; Weiser et al., 2016) and therefore might be inconsistent with values of kincentricity, responsibility, and reciprocity (Clark & Slocombe, 2011; Artelle et al., 2018b; Bhattacharyya & Slocombe, 2017; Housty et al., 2014). Since the onset of the Nations-led bear

Figure 8. Howard Humchitt, research technician on the Haíłzaqv (Heiltsuk) bear monitoring team, setting up a noninvasive hair snagging station. Photo April Bencze/Raincoast Conservation Foundation.

monitoring project in this region, it was determined that that capturing, collaring, and associated procedures that are often used in grizzly bear research do not align with local stewardship responsibilities for the species (Housty et al., 2014). Instead, the group uses only less invasive methods, including noninvasive hair snares and remote cameras (Figure 8), in combination with Indigenous Knowledge.

In addition to guiding research methods, local values and worldviews have been explicitly codified in local management documents. For example, in Haíłzaqv territory, grizzly bear management falls under the Nation's Integrated Resource Management Department's Wildlife Policy. This internal document describes how management is founded on values of interconnectedness of all species and places; reciprocity and responsibility; generosity; and well-being (of ecosystems and people), with an explanation of how each of these values ultimately guide management. Explicitly ensuring that local values are incorporated into management through meaningfully including Indigenous Peoples and/or governance structures may be particularly important in management contexts where power imbalances occur (all settler colonial contexts, *e.g.* Whyte, 2018), because Indigenous worldviews, and hence desired outcomes, likely differ from those of dominant management approaches (Watson, 2013; Whyte, 2018).

### *Governance Recognizes, Respects, and Addresses the Cultural Importance of Species and Places*

As a corollary to environmental stewardship reflecting local values and worldviews, grizzly bear stewardship on the Central Coast provides an example of stewardship reflecting the cultural importance of particular species and places. The extent of investments of

Figure 9. A λiáċi (big house) at the Haíłzaqv-run Kvai Youth, Culture, and Environment camp. Grizzly Bears are an important part of the cultural business conducted within the λiáĆi, and are represented here in the paintings on the front of the λiáċi as well as physically walking in front of it. As a reflection of their close relationship with people, the conservation considerations for them throughout the region goes beyond numerical sustainability. Photo by KAA.

stewardship, management, and research efforts directed toward grizzly bears is substantial, especially considering the size of the communities and governments leading the work, who have limited budgets and broad portfolios of natural resource files to manage. The scale of efforts, however, arise from the high cultural importance of grizzly bears and from the very different relationship between this species and people in the area, compared to that of practitioners and 'managed species' in dominant, colonial approaches to management.

The culturally-dependent importance of (and relationship with) species can be a source of confusion or conflict among resource users such as non-Indigenous hunters, managers, and conservationists. For example, for settler practitioners of wildlife management, conservation of populations is often the primary stated objective. In the case of grizzly bears, although the stewardship by Coastal First Nations certainly includes considerations for population health, cultural values and close relationships with grizzly bears (Figure 9) elicit considerations that go further, including responsibility for the well-being of individuals. Given this broader concern, Nations deemed that even a single individual killed for trophy to be unacceptable, independent of potential risks to the broader population (see Bears Forever, 2013 for an example of one such individual). By contrast, opponents characterized the 2017 grizzly hunt ban as misguided and unjustifiable because they believed that the hunt was numerically sustainable (though that is debated in the literature, *e.g*. Artelle et al., 2013, *c.f*. Mclellan et al., 2017) and hence characterized ending the hunt for any other reason as being 'unscientific' (*e.g*. Omand, 2017; Safari Club International, 2017; BC Wildlife Federation, 2017). In addition to exemplifying the common misconception of environmental management as solely driven by positivistic science, independent of values (Artelle et al., 2018b), dismissing considerations beyond numerical sustainability as misguided conservation assumes primacy of a narrow view of how humanity ought to interact with other species and environments. Decolonizing conservation will require recognition and respect of the diverse worldviews driving environmental governance, and will be especially critical to ensure that dominant forms of conservation do not dismiss the relationships that Indigenous Nations have with species, places, and individuals. In other words, recognition is needed of the fact that what constitutes appropriate conservation efforts and foci is culturally dependent. This might be particularly important in cases where requirements for honoring relationships to other species and places might not align directly with conservation priorities derived from other value systems.

We have discussed the cultural importance of grizzly bears to First Nations on the Central Coast, but cultural considerations are not limited to non-consumptive relationships. Eichler and Baumeister (2018) discuss how, in the North American context, the underlying assumption of 'wildlife' as 'natural resources' to be managed by (and for) human beings is a narrow view not reflective of the depth and breadth of relationships between many Indigenous Peoples and other species. For example, requirements for respectful interactions often underpin approaches to harvest (Kimmerer, 2013; Reo & Whyte, 2012; Watson & Huntington, 2008). Some of these protocols might have an obvious alignment with mainstream conservation objectives (*e.g*. being quiet around herring to allow them to spawn, Gauvreau et al., 2017), but others might not seem as relevant to outsiders (*e.g*. ceremonial aspects of relationships, *e.g*. Reo & Whyte, 2012; Whyte et al., 2016). That these remain an important part of a broader relationship with species than is often conceptualized in mainstream conservation and management requires recognition by allies and other settlers as practitioners of the future work to avoid repeating the harms of the past (and, often, present).

## Discussion

These examples of grizzly bear management on the Central Coast both informed and illustrate the Decolonial Model's tenets. Bear management here exemplifies many attributes of decolonized conservation, both through the degree to which efforts are Indigenous-led, and the positive outcomes achieved through this work, including increased habitat protection, reduced mortality, increased general awareness, and growth of research and governance programs. Moreover, the bear management project has built capacity for additional research and stewardship of grizzly bears and other species.

However, the decolonization described here is an ongoing process that has faced obstacles throughout, with obstacles remaining. For example, whereas the current grizzly bear ban now aligns with Indigenous laws on the Central Coast, the province still claims ultimate jurisdiction over bear management, including within these territories, and could again sanction hunting in the future. The locally-observed distributional shift of grizzly bears on islands is now resulting in provincially supported, on-the-ground conservation changes. However, that this distributional shift had to be 'proven' through academic scholarship – a process that has taken about a decade – when local knowledge holders already knew full well that it had occurred is not in line with respectful government-to-government relationships. The Spirit bear Lodge in Klemtu is a compelling Indigenous-led success story, but building the Kitasoo/Xai'xais ecotourism industry took considerable time and effort to adapt to global tourist demands and expectations. The Haíłzaqv forestry example highlights the Nation's realized decision-making leverage in logging as it pertains to grizzly bears and other conservation considerations, but the province still claims jurisdiction and this arrangement depends on maintaining positive relationships between the Nation and logging companies. Companies currently cooperate in part through good will and in part because it provides better business certainty through avoided conflicts. However, provincial laws do not require this level of consent. Moreover, such constructive relationships and human resource capacity do not necessarily exist in all contexts, and logging still occurs that is strongly opposed by other Nations in their territories. In the Nuxalk Bear Safe program example, the Nation has developed an extensive and effective approach to coexistence but there are no mechanisms currently in place to enforce Nuxalk Law as it pertains to bears and other species; the province (and Canada) do not currently recognize the Nation's jurisdiction beyond their reserves, which cover only a couple of small land parcels within the much larger Bella Coola Valley and broader Nuxalk Territory. In the Wuikinuxv salmon management example, governance is rapidly improving with great promise of refining approaches toward stewarding salmon and the varied species connected to them, but does so against a backdrop of precipitous salmon declines across the bioregion. For example, local observers have observed the worst salmon returns on record during 2020, in line with the long term declining trend, highlighting the importance of effective salmon governance at other scales as well (see Atlas et al., 2021 for a regional discussion of resurgent Indigenous governance's role in salmon management).

Guardian programs provide a realization of Indigenous authority and presence on the landscape across both the region and the country, but their full potential too remains nascent. 'Coastal Guardians', who are based in (and led by) each First Nation on the Central Coast, monitor and conduct research throughout territories. They patrol

throughout the year and are often the only agencies on the lands and waters. Similar Guardian programs similarly exist across Canada and elsewhere and provide one mechanism by which decolonial management might be implemented across other varied geographies and cultural contexts (Artelle et al., 2019; Reed et al., 2021; Sheil et al., 2015; Social Ventures Australia, 2016; Trousdale & Andrews, 2016). However, at the moment, Guardians neither have powers of enforcement nor have the laws or legislations of their Nations recognized by provincial or federal agencies, who instead assert their own jurisdiction and enforcement of their own natural resource laws.

Although we draw extensively on our experience with grizzly bears on the Central Coast, the tenets of the Decolonial Model we present are broadly applicable. For example, the depth of Dene knowledge on their wildlife has been highlighted for its application in conserving culturally unique woodland caribou populations (Polfus et al., 2016), with similar parallels of moose co-management with Biigtigong Nishnaabeg, Gitanyow, Gwich'in, Mi'kmaq, and Tŝilhqot'in governments (Popp et al., 2019; Tŝilhqot'in Nation-BC moose co-management agreement, 2018). Examples of Indigenous models of fisheries management across the province highlight stewardship of interconnections among people, places, and ecology (Adams et al., 2021; Atlas et al., 2021, 2017; Beveridge, 2019; Gauvreau et al., 2017; Gottesfeld et al., 2009; Lee et al., 2019). More generally, land-use planning and environmental stewardship of lands, seas, fisheries, wildlife, and plant communities by Indigenous governments across Canada (and elsewhere) reflect local values and worldviews by managing for places and species of cultural significance alongside those of economic or ecological importance (Ban & Frid, 2018; Council of the Haida Nation, 2013; DeRoy et al., 2019; Moola & Roth, 2019; Stephenson et al., 2014).

Decolonization is a process with challenges that differ from location to location. We highlighted an example of Indigenous-led management in a remote region with relatively low levels of settlement (and private land ownership) by non-Indigenous people, and with consistent values as they pertain to grizzly bears among Nations involved. Some of the particularities of this region that helped facilitate success are not ubiquitous. For example, the research and management described herein was very expensive financially and logistically, but was supported by a variety of funders, university partners, established Nation-led stewardship offices, available local capacity, and intact Indigenous knowledge, all elements that might be unavailable or impacted in other contexts. The work here faced little opposition on the ground. Elsewhere, decolonial and resurgence efforts have been met with resistance from the state and even violence from settlers. For example, the Idle No More movement brought considerable attention to Canada's problematic relationship with Indigenous Peoples, acted as a rallying point for Indigenous Peoples and allies alike, and provided an example of a wide-scale decentralized resurgent movement (Coulthard, 2014; Manuel & Derrickson, 2017). However, it also spurred, or at least exposed, overt racism through responses from settlers across the Country (Blackburn, 2013; Canadian Press, 2013). In British Columbia, recent resistance to pipeline construction lacking consent from hereditary leadership in Wet'suwet'en territory was met with arrests to allow construction efforts to continue, carried out by the Royal Canadian Mounted Police, who instructed officers to 'use as much violence toward the [blockade] as you want' (Parrish, 2019). On the East Coast, the Sipekne'katik First Nation's recent opening of a small-scale 'moderate livelihood fishery' for lobsters (using <2% the number of traps of the mostly settler commercial fishery; Bailey, 2020) was met with racism from some settler fishers

including direct violence with total destruction through arson of a fishing vessel, a van, and a large lobster pound used to store catches (Mercer, 2020). Additional complexities might arise elsewhere, for example, in urban environments or when multiple cultures with varying viewpoints live in the same area, though in these contexts too decolonial and resurgent efforts are ongoing (L. B. Simpson, 2014; Corntassel, 2020; Simpson & Bagelman, 2018). Whereas contexts of decolonial and resurgent efforts across Canada and beyond vary substantially, and might pose unique obstacles beyond those seen in the grizzly bear governance described herein, the tenets of the Decolonial Model highlight some key considerations for co-governance even in these locations. For example, respect of diverse knowledge sources, respect for inherent rights, and the importance of governance configurations that make sense for a given place, all could help to guide respectful governance better suited to people, other species, and places alike.

As the resurgence and recognition of Indigenous authority continues to grow in many regions of North America and beyond, so too grows the recognition of the need for decolonial environmental management and conservation approaches (Artelle et al., 2019; Ban & Frid, 2018; Indigenous Circle of Experts, 2018; Moola & Roth, 2019; Witter & Satterfield, 2018). We offer the Decolonial Model to contribute toward this transition. We hope that the grizzly bear conservation bright spot story described herein might provide inspiration for similar work elsewhere.

## Acknowledgement

Thank you to the enormous collaboration involved in the bear monitoring project, including the Central Coast Bear Working Group, Lauren Henson, Navarana Smith, Annah MacKay, Scott Rogers, Howard Humchitt, Harvey Brown, Doug Brown Jr., Collin Reid, Jess Brown, Ayla Brown, Ian C. Reid, Jeff Brown, Walter Campbell Jr., Anthony Campbell, Shelby Williams, Allie Housty, Bella Bella Community School, Heiltsuk Integrated Resource Management Department, Qqs Projects Society, Cody Caruso, Tyler Jessen, Chloe Wood, Ian Jansma, Rosemary Invik, Don Arney, Rosie Child, Hannah Kobluk, Alena Ebeling-Schuld, Lia Chalifour, Ashlene Aktarian, Jamie Yin, Kate Mills, Ilona Mihalik, Marlie van Roy, Diana Chan, Kelly Brown, Harvey Humchitt, Pauline Waterfall, Steve Leaver, Monique Arseneau, Emma Wilson, Ashley Stocks, Krista Duncan, Vernon Brown, Brandon Robinson, Medrick Robinson, Laura Grant, Chantal Pronteau, Santana Edgar, Jonny May, Mercedes Neasloss Robinson, Robbie Duncan, Mercy Mason, Evan Loveless, Charlie Mason, Dani Shaw, Blair Hans, Quentin Hans, Roger Harris, Angel Mack, Brandon Mack, Eddie Mack, Brandon Moody, Rhonda Morton, Ron Schooner, John Sampson, Charles Saunders, Peter Siwallace, Ernie Tallio, Keith Windsor, Julian Ehlers, Rachelle Beveridge, Nuxalk Stewardship Office, Chris Corbett, Patrick Johnson, Alec Willie, Brian Johnson, Lena Collins, Alexander Chartrand Jr., Josh Vickers, Dave Rolston, Gord Moody, Johnny Johnson, Diane Braithwaite, Danielle Buckle, Samantha Suddes, Brittany Buirs, Paige Lewis, Lili Simon, Marcus Atkins, Blake Danis, Finnerty Cunliffe, Miranda Hanuse, Jean-Marc Leguerrier, Dan Hunter, Bryn Armstrong, Colby Heddon, Amaya Black, Katarina Heim, Johanna Gordon-Walker, Kitasoo Xai'xais Stewardship Authority, Wuikinuxv Integrated Resource Stewardship Office, Hakai Institute, Tula Foundation, SkyeMikko Foundation, Willow Grove Foundation, Wilburforce Foundation, Tides Canada, Moore Foundation, Mitacs, Natural Sciences and Engineering Research Council, David Vernon, Rosemary Langford, Travis Muir, and the many other volunteers, mentors, and community members who have assisted this work since 2009. We thank the Wilburforce Foundation for their support, which allowed us to commission the illustrations for Table 1. We thank the anonymous reviewers whose insight improved this work considerably.

## Note

1. Relevant reading lists include the Open Source Indigenous Solidarity Working Group Decolonization Reading List (for Turtle Island) at https://docs.google.com/document/d/1Hrxir_IMWU48ye1_WuIEF4DvxQ1R7HOEY1kilaSk9Tk/edit, the Decolonization: Indigeneity, Education & Society journals' further readings at https://decolonization.wordpress.com/decolonization-readings/, and the Decolonization Conservation Reading List at https://docs.google.com/document/d/1FuplJt02tLda8N_zFDOWfw4ybcvBCEJ7gsetpdlComo/edit#heading=h.40sq92hlh3j3

## Disclosure Statement

No potential conflict of interest was reported by the author(s).

## ORCID

K. A. Artelle http://orcid.org/0000-0002-8399-5693

## References

Adams, M. S., Carpenter, J., Housty, J. A., Neasloss, D., Paquet, P. C., Service, C., Walkus, J., & Darimont, C. T. (2014). Towards increased engagement between academic and indigenous community partners in ecological research. *Ecology and Society*, *19*(3), 5. https://doi.org/10.5751/ES-06569-190305

Adams, M. S., Connors, B., Levi, T., Shaw, D., Walkus, J., Rogers, S., & Darimont, C. (2021). Local values and data empower culturally guided ecosystem-Based fisheries management of the Wuikinuxv Bear–Salmon–Human System. *Marine and Coastal Fisheries*, 13(4), 362–378. https://doi.org/10.1002/mcf2.10171 .

Adams, M. S., Service, C. N., Bateman, A., Bourbonnais, M., Artelle, K. A., Nelson, T., Paquet, P. C., Levi, T., & Darimont, C. T. (2017). Intrapopulation diversity in isotopic niche over landscapes: Spatial patterns inform conservation of bear–salmon systems. *Ecosphere*, *8*(6), e01843. https://doi.org/10.1002/ecs2.1843

Affolderbach, J., Clapp, R. A., & Hayter, R. (2012). Environmental bargaining and boundary organizations: Remapping British Columbia's Great Bear Rainforest. *Annals of the Association of American Geographers*, *102*(6), 1391–1408. https://doi.org/10.1080/00045608.2012.706567

Ahousaht Indian Band and Nation v. Canada (Attorney General). 2018. *BCSC 633*.

Alfred, T. (2005). *Wasáse: Indigenous pathways of action and freedom*. University of Toronto Press.

Armitage, D. R., Plummer, R., Berkes, F., Arthur, R. I., Charles, A. T., Davidson-Hunt, I. J., Diduck, A. P., Doubleday, N. C., Johnson, D. S., Marschke, M., McConney, P., Pinkerton, E. W., & Wollenberg, E. K. (2009). Adaptive co-management for social-ecological complexity. *Frontiers in Ecology and the Environment*, *7*(2), 95–102. https://doi.org/10.1890/070089

Armitage, D. (2005). Adaptive capacity and community-based natural resource management. *Environmental Management*, *35*(6), 703–715. https://doi.org/10.1007/s00267-004-0076-z

Artelle, K. A., Anderson, S. C., Cooper, A. B., Paquet, P. C., Reynolds, J. D., & Darimont, C. T. (2013). Confronting uncertainty in wildlife management: Performance of grizzly bear management. *PLOS ONE*, *8*(11), e78041. https://doi.org/10.1371/journal.pone.0078041

Artelle, K. A., Anderson, S. C., Reynolds, J. D., Cooper, A. B., Paquet, P. C., & Darimont, C. T. (2016). Ecology of conflict: Marine food supply affects human-wildlife interactions on land. *Scientific Reports*, *6*(1), 25936. https://doi.org/10.1038/srep25936

Artelle, K. A., Reynolds, J. D., Treves, A., Walsh, J. C., Paquet, P. C., & Darimont, C. T. (2018a). Hallmarks of science missing from North American wildlife management. *Science Advances*, *4*(3), eaao0167. https://doi.org/10.1126/sciadv.aao0167

Artelle, K. A., Zurba, M., Bhattacharrya, J., Chan, D. E., 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

Artelle, K., Stephenson, J., Bragg, C., Housty, J., Housty, W., Kawharu, M., & Turner, N. (2018b). Values-led management: The guidance of place-based values in environmental relationships of the past, present, and future. *Ecology and Society*, *23*(3), 35. https://doi.org/10.5751/ES-10357-230335

Atlas, W. I., Ban, N. C., Moore, J. W., Tuohy, A. M., Greening, S., Reid, A. J., Morven, N., White, E., Housty, W. G., Housty, J. A., Service, C. N., Greba, L., Harrison, S., Sharpe, C., Butts, K. I. R., Shepert, W. M., Sweeney-Bergen, E., Macintyre, D., Sloat, M. R., & Connors, K. (2021). Indigenous systems of management for culturally and ecologically resilient Pacific Salmon (Oncorhynchus spp.) Fisheries. *BioScience* 71(2), 186–204 . biaa144. https://doi.org/10.1093/biosci/biaa144

Atlas, W. I., Housty, W. G., Béliveau, A., DeRoy, B., Callegari, G., Reid, M., & Moore, J. W. (2017). Ancient fish weir technology for modern stewardship: Lessons from community-based salmon monitoring. *Ecosystem Health and Sustainability*, *3*(6), 1341284. https://doi.org/10.1080/20964129.2017.1341284

Atleo, E. R. (2011). *Princiles of Tsawalk. An Indigenous approach to global crisis*. University of British Columbia Press.

Augustine, S., & Dearden, P. (2014). Changing paradigms in marine and coastal conservation: A case study of clam gardens in the Southern Gulf Islands, Canada. *The Canadian Geographer/Le Géographe Canadien*, *58*(3), 305–314. https://doi.org/10.1111/cag.12084

Bailey, M. 2020. Nova Scotia lobster dispute: Mi'kmaw fishery isn't a threat to conservation, say scientists. *The Conversation*. http://theconversation.com/nova-scotia-lobster-dispute-mikmaw-fishery-isnt-a-threat-to-conservation-say-scientists-148396

Ban, N. C., & Frid, A. (2018). Indigenous peoples' rights and marine protected areas. *Marine Policy*, *87*, 180–185. https://doi.org/10.1016/j.marpol.2017.10.020

Bartlett, C., Marshall, M., & Marshall, A. (2012). Two-Eyed Seeing and other lessons learned within a co-learning journey of bringing together indigenous and mainstream knowledges and ways of knowing. *Journal of Environmental Studies and Sciences*, *2*(4), 331–340. https://doi.org/10.1007/s13412-012-0086-8

BC Wildlife Federation. (2017, December 18). *BCWF responds to Grizzly hunt ban*. https://bcwf.bc.ca/bcwf-responds-to-grizzly-hunt-ban/

Bears Forever. 2013. *Bear witness: A film by BC's*. Coastal First Nations.

Bennett, E. M., Solan, M., Biggs, R., McPhearson, T., Norström, A. V., Olsson, P., Pereira, L., Peterson, G. D., Raudsepp-Hearne, C., Biermann, F., Carpenter, S. R., Ellis, E. C., Hichert, T., Galaz, V., Lahsen, M., Milkoreit, M., López, B. M., Nicholas, K. A., Preiser, R., Vince, G., . . . Xu, J. (2016). Bright spots: Seeds of a good Anthropocene. *Frontiers in Ecology and the Environment*, *14*(8), 441–448. https://doi.org/10.1002/fee.1309

Berkes, F., Hughes, T. P., Steneck, R. S., Wilson, J. A., Bellwood, D. R., Crona, B., Folke, C., Gunderson, L. H., Leslie, H. M., Norberg, J., Nyström, M., Olsson, P., Österblom, H., Scheffer, M., & Worm, B. (2006). globalization, roving bandits, and marine resources. *Science*, *311*(5767), 1557–1558. https://doi.org/10.1126/science.1122804

Berkes, F., & Turner, N. J. (2006). Knowledge, learning and the evolution of conservation practice for social-Ecological system resilience. *Human Ecology*, *34*(4), 479–494. https://doi.org/10.1007/s10745-006-9008-2

Berkes, F. (2012). *Sacred ecology: Traditional ecological knowledge and resource management* (3rd ed.). Taylor and Francis.

Betts, M. G., Wolf, C., Ripple, W. J., Phalan, B., Millers, K. A., Duarte, A., Butchart, S. H. M., & Levi, T. (2017). Global forest loss disproportionately erodes biodiversity in intact landscapes. *Nature*, *547* (7664), 441–444. https://doi.org/10.1038/nature23285

Beveridge, R. 2019. *Standing up for sputc: The Nuxalk sputc project, eulachon management and well-being*. Thesis. University of Victoria.

Beveridge, R., Moody, M., Murray, G., Darimont, C., & Pauly, B. (2020). The Nuxalk sputc (eulachon) project: Strengthening indigenous management authority through community-driven research. *Marine Policy*, *119*, 103971. https://doi.org/10.1016/j.marpol.2020.103971

Bhattacharyya, J., & Slocombe, S. (2017). Animal agency: Wildlife management from a kincentric perspective. *Ecosphere*, *8*(10), e01978. https://doi.org/10.1002/ecs2.1978

Bird, R. B., & Nimmo, D. (2018). Restore the lost ecological functions of people. *Nature Ecology & Evolution*, *2*(7), 1050–1052. https://doi.org/10.1038/s41559-018-0576-5

Blackburn, M. 2013, January 3. Racial tensions rise along edges of Idle No More rallies. *APTN News*. https://www.aptnnews.ca/national-news/racial-tensions-rise-along-edges-of-idle-no-more-rallies/

Borrows, J. (2002). *Recovering Canada: The resurgence of indigenous law*. University of Toronto Press.

Borrows, J. (2018). Earth-Bound: Indigenous resurgence and environmental reconciliation. In M. Asch, J. Borrows, & J. Tully (Eds.), *Resurgence and reconciliation: Indigenous-settler relations and earth teachings* (pp. 49–82). University of Toronto Press.

Boulanger, J., McLellan, B. N., Woods, J. G., Proctor, M. F., & Strobeck, C. (2004). Sampling design and bias in DNA-based capture-mark-recapture population and density estimates of grizzly bears. *Journal of Wildlife Management*, *68*(3), 457–469. https://doi.org/10.2193/0022-541X(2004)068[0457:SDABID]2.0.CO;2

Breed, D., Meyer, L. C., Steyl, J. C., Goddard, A., Burroughs, R., & Kohn, T. A. (2019). Conserving wildlife in a changing world: Understanding capture myopathy—a malignant outcome of stress during capture and translocation. *Conservation Physiology*, *7*(1), coz027. https://doi.org/10.1093/conphys/coz027

British Columbia Ministry of Environment, Fish, Wildlife and Habitat Branch. (2010). *Grizzly bear hunting: Frequently asked questions*. http://www.env.gov.bc.ca/fw/wildlife/management-issues/docs/grizzly_bear_faq.pdf

British Columbia Ministry of Environment. (2008). *Grizzly Bear Habitat mapping for parks and conservancies for the North and Central Coast* https://www2.gov.bc.ca/assets/gov/farming-natural-resources-and-industry/natural-resource-use/land-water-use/crown-land/land-use-plans-and-objectives/westcoast-region/great-bear-rainforest/ei02a_grizzly_habitat_report.pdf .

Brown, F., & Brown, Y. K. (2009). *Staying the course, staying alive: Coastal First Nations fundamental truths: Biodiversity, stewardship and sustainability*. Biodiversity BC.

Bryan, H. M., Darimont, C. T., Paquet, P. C., Wynne-Edwards, K. E., & Smits, J. E. G. (2013). Stress and reproductive hormones in grizzly bears reflect the nutritional benefits and social consequences of a salmon foraging niche. *PLOS ONE*, *8*(11), e80537. https://doi.org/10.1371/journal.pone.0080537

Bryan, H. M., Darimont, C. T., Paquet, P. C., Wynne-Edwards, K. E., & Smits, J. E. G. (2014). Stress and reproductive hormones reflect inter-specific social and nutritional conditions mediated by resource availability in a bear–salmon system. *Conservation Physiology*, *2*(1), 1–18. https://doi.org/10.1093/conphys/cou010

Burt, J. M., K̲ii'iljuus Barbara, J., Wilson, T., Malchoff, W. A., Mack, S. H. A., Davidson, G., & Salomon, A. K. (2020). Enabling coexistence: Navigating predator-induced regime shifts in human-ocean systems. *People and Nature*, *2*(3), 557–574. https://doi.org/10.1002/pan3.10090

Calder v. British Columbia (AG). 1973. *SCR 313*.

Canadian Press. 2013, January 19. Stephen Harper accused of fostering racism, hatred of natives with silence over Idle No More. *National Post*.

Carroll, C., Noss, R. F., & Paquet, P. C. (2001). Carnivores as focal species for conservation planning in the Rocky Mountain region. *Ecological Applications*, *11*(4), 961–980. https://doi.org/10.1890/1051-0761(2001)011[0961:CAFSFC]2.0.CO;2

Cattet, M. R. L., Christison, K., Caulkett, N. A., & Stenhouse, G. B. (2003). Physiologic responses of grizzly bears to different methods of capture. *Journal of Wildlife Diseases*, *39*(3), 649–654. https://doi.org/10.7589/0090-3558-39.3.649

Cattet, M., Boulanger, J., Stenhouse, G., Powell, R. A., & Reynolds-Hogland, M. J. (2008). An evaluation of long-term capture effects in ursids: Implications for wildlife welfare and research. *Journal of Mammalogy*, *89*(4), 973–990. https://doi.org/10.1644/08-MAMM-A-095.1

Central Coast LRMP completion table. 2004. *Report of consensus recommendations to the provincial government and First Nations*. Central Coast LRMP.

Cinner, J. E., Huchery, C., MacNeil, M. A., Graham, N. A., McClanahan, T. R., Maina, J., Maire, E., Kittinger, J. N., Hicks, C. C., & Mora, C. (2016). Bright spots among the world's coral reefs. *Nature*, *535*(7612), 416–419. https://doi.org/10.1038/nature18607

Clark, D. A., & Slocombe, S. (2011). Adaptive co-management and grizzly bear-human conflicts in two northern Canadian aboriginal communities. *Human Ecology*, *39*(5), 627–640. https://doi.org/10.1007/s10745-011-9423-x

Clark, S. G., & Milloy, C. (2014). The North American model of wildlife conservation: An analysis of challenges and adaptive options. In S. G. Clark & M. B. Rutherford (Eds.), *Large carnivore conservation* (pp. 289–324). University of Chicago Press.

Claxton, N. X., & Price, J. (2020). WHOSE LAND IS IT? rethinking sovereignty in british columbia. *BC. Studies*, *204*, 115–138. http://search.proquest.com/docview/2369407699

Corntassel, J., & Holder, C. (2008). Who's sorry now? Government apologies, truth commissions, and Indigenous self-determination in Australia, Canada, Guatemala, and Peru. *Human Rights Review*, *9*(4), 465–489. https://doi.org/10.1007/s12142-008-0065-3

Corntassel, J. (2012). Re-envisioning resurgence: Indigenous pathways to decolonization and sustainable self-determination. *Decolonization: Indigeneity, Education & Society*, *1*(1), 86–101 https://jps.library.utoronto.ca/index.php/des/article/view/18627/15550 http://hdl.handle.net/1828/12471 .

Corntassel, J. (2020). Restorying indigenous landscapes: Community regeneration and resurgence. *Plants, People, and Places: The Roles of Ethnobotany and Ethnoecology in Indigenous Peoples' Land Rights in Canada and Beyond*, *96*, 350–365.

Coulthard, G. S. (2014). *Red skin, white masks: Rejecting the colonial politics of recognition*. University of Minnesota Press.

Council of the Haida Nation. (2013). *Cultural feature identification standards manual*. Council of the Haida Nation.

Cox-Rogers, S., & Sturhahn, J. (2005). *Biological escapement goals for Rivers Inlet (Owikeno Lake) sockeye*. Fisheries and Oceans Canada.

Cox, M., Arnold, G., & Tomás, S. V. (2010). A review of design principles for community-based natural resource management. *Ecology and Society*, *15*(4), 38. https://doi.org/10.5751/ES-03704-150438

Cuerrier, A., Turner, N. J., Gomes, T. C., Garibaldi, A., & Downing, A. (2015). Cultural keystone places: Conservation and restoration in cultural landscapes. *Journal of Ethnobiology*, *35*(3), 427–448. https://doi.org/10.2993/0278-0771-35.3.427

Cvitanovic, C., & Hobday, A. J. (2018). Building optimism at the environmental science-policy-practice interface through the study of bright spots. *Nature Communications*, *9*(1), 3466. https://doi.org/10.1038/s41467-018-05977-w

Daes, E. I. A. 2004. *Indigenous peoples' permanent sovereignty over natural resources: Final report of the special rapporteur, Erica-Irene A. Daes*. United Nations Economic and Social Council.

Darimont, C. T., Bryan, H. M., Carlson, S. M., Hocking, M. D., MacDuffee, M., Paquet, P. C., Price, M. H. H., Reimchen, T. E., Reynolds, J. D., & Wilmers, C. C. (2010). Salmon for terrestrial protected areas. *Conservation Letters*, *3*(6), 379–389. https://doi.org/10.1111/j.1755-263X.2010.00145.x

Delgamuukwv v. British Columbia. 1997. *3 S.C.R. 1010*.

DellaSala, D. A., Moola, F., Alaback, P., Paquet, P. C., Schoen, J. W., & Noss, R. F. (2011). Temperate and Boreal Rainforests of the Pacific Coast of North America. In D. A. DellaSala (Ed.), *Temperate and Boreal Rainforests of the World: Ecology and conservation* (pp. 42–81). Island Press.

DeRoy, B., Darimont, C., & Service, C. (2019). Biocultural indicators to support locally led environmental management and monitoring. *Ecology and Society*, *24*(4), 21. https://doi.org/10.5751/ES-11120-240421

Dietz, T., Ostrom, E., & Stern, P. C. (2003). The struggle to govern the commons. *Science*, *302*(5652), 1907–1912. https://doi.org/10.1126/science.1091015

Domínguez, L., & Luoma, C. (2020). Decolonising conservation policy: How colonial land and conservation ideologies persist and perpetuate indigenous injustices at the expense of the environment. *Land*, *9*(3), 65. https://doi.org/10.3390/land9030065

Eichler, L., & Baumeister, D. (2018). Hunting for justice: An indigenous critique of the North American model of wildlife conservation. *Environment and Society*, *9*(1), 75–90. https://doi.org/10.3167/ares.2018.090106

Garibaldi, A., & Turner, N. (2004). Cultural keystone species: Implications for ecological conservation and restoration. *Ecology and Society*, *9*(3), 1. https://doi.org/10.5751/ES-00669-090301

Gauvreau, A., Lepofsky, D., Rutherford, M., & Reid, M. (2017). "Everything revolves around the herring": The Heiltsuk–herring relationship through time. *Ecology and Society*, *22*(2), 10. https://doi.org/10.5751/ES-09201-220210

Gayeski, N. J., Stanford, J. A., Montgomery, D. R., Lichatowich, J., Peterman, R. M., & Williams, R. N. (2018). The failure of Wild Salmon management: Need for a place-Based conceptual foundation. *Fisheries*, *43*(7), 303–309. https://doi.org/10.1002/fsh.10062

Geist, V., Mahoney, S. P., & Organ, J. F. 2001. Why hunting has defined the North American model of wildlife conservation. 175–185 *Transactions of the 66th North American Wildlife and Natural Resources Conference*. Wildlife Management Institute.

Gitxaala Nation v. Canada. 2016. FCA 187.

Gottesfeld, A., Barnes, C., & Soto, ca. 2009. Case history of the Skeena Fisheries commission: Developing aboriginal fishery management capacity in northern British Columbia.921–939 *American Fisheries Society Symposium*. Citeseer.

Government of Canada. (2017). *Principles Respecting the Government of Canada's relationship with Indigenous peoples*. Department of Justice.

Grizzly Bear Habitat Mapping Technical Review Team. (2010). *Coastal Grizzly Bear habitat mapping and review methods*. British Columbia Ministry of Environment; British Columbia Ministry of Forests and Range.

Groot, C., & Margolis, L. (1991). *Pacific salmon life histories*. UBC press.

Haida Nation v. British Columbia (Minister of Forests). 2004. *3 SCR 511*.

Harrer, L. E. F., & Levi, T. (2018). The primacy of bears as seed dispersers in salmon-bearing ecosystems. *Ecosphere*, *9*(1), e02076. https://doi.org/10.1002/ecs2.2076

Heiltsuk Nation c/o Heiltsuk Integrated Resource Management Department. (n.d.). *Heiltsuk traditional use study (Map Biography), 1998-present*.

Held, M. B. (2019). Decolonizing research paradigms in the context of settler colonialism: An unsettling, mutual, and collaborative effort. *International Journal of Qualitative Methods*, *18*, 1609406918821574. https://doi.org/10.1177/1609406918821574

Hessami, M. A., Bowles, E., Popp, J. N., & Ford, A. T. (2021). Indigenizing the North American Model of Wildlife Conservation. *FACETS*, *6*, 1285–1306. https://doi.org/10.1139/facets-2020-0088

Honey, M., Johnson, J., Menke, C., Cruz, A. R., Karwacki, J., & Durham, W. H. (2016). The comparative economic value of bear viewing and bear hunting in the Great Bear Rainforest. *Journal of Ecotourism*, *15*(3), 199–240. https://doi.org/10.1080/14724049.2016.1142554

Horn, H., Arcese, P., Brunt, K., Burger, A., Davis, H., Doyle, F., Dunsworth, K., Friele, P., Gordon, S., Hamilton, T., MacHutchon, Mahon, T., McClaren, E., Michelfelder, V., Pollard, B., Sutherland, G., Taylor, S., & Waterhouse, L. 2009. *Knowledge base for focal species and their habitats in coastal BC*. Nanaimo, BC: Integrated Land Management Bureau.

Housty, W. G., Noson, A., Scoville, G. W., Boulanger, J., Jeo, R. M., Darimont, C. T., & Filardi, C. E. (2014). Grizzly bear monitoring by the Heiltsuk people as a crucible for First Nation conservation practice. *Ecology and Society*, *19*(2), 70. https://doi.org/10.5751/ES-06668-190270

Indigenous Circle of Experts. 2018. *We rise together: Achieving pathway to Canada target 1 through the creation of Indigenous protected and conserved areas in the spirit and practice of reconciliation: The Indigenous circle of experts' report and recommendations*. Parks Canada.

Jasanoff, S. (2007). Technologies of humility. *Nature*, *450*(7166), 33. https://doi.org/10.1038/450033a

Kimmerer, R. W., & Lake, F. K. (2001). The role of Indigenous burning in land management. *Journal of Forestry*, *99*(11), 36–41. https://academic.oup.com/jof/article/99/11/36/4614303

Kimmerer, R. (2013). *Braiding sweetgrass: Indigenous wisdom, scientific knowledge and the teachings of plants*. Milkweed Editions.

Kovach, M. (2010). *Indigenous methodologies: Characteristics, conversations, and contexts*. University of Toronto Press.

Kutz, S., & Tomaselli, M. (2019). "Two-Eyed Seeing" supports wildlife health. *Science*, *364*(6446), 1135–1137. https://doi.org/10.1126/science.aau6170

Latulippe, N., & Klenk, N. (2020). Making room and moving over: Knowledge co-production, Indigenous knowledge sovereignty and the politics of global environmental change decision-making. *Current Opinion in Environmental Sustainability*, *42*, 7–14. https://doi.org/10.1016/j.cosust.2019.10.010

Lee, L. C., Reid, M., Jones, R., Winbourne, J., Rutherford, M., & Salomon, A. K. (2019). Drawing on Indigenous governance and stewardship to build resilient coastal fisheries: People and abalone along Canada's northwest coast. *Marine Policy*, *109*, 103701. https://doi.org/10.1016/j.marpol.2019.103701

Lemelin, R. H., Koster, R., & Youroukos, N. (2015). Tangible and intangible indicators of successful aboriginal tourism initiatives: A case study of two successful aboriginal tourism lodges in Northern Canada. *Tourism Management*, *47*, 318–328. https://doi.org/10.1016/j.tourman.2014.10.011

Levi, T., Darimont, C. T., MacDuffee, M., Mangel, M., Paquet, P., & Wilmers, C. C. (2012). Using grizzly bears to assess harvest-ecosystem tradeoffs in salmon fisheries. *PLoS Biology*, *10*(4), e1001303. https://doi.org/10.1371/journal.pbio.1001303

Mack, C., & Thommasen, H. (1993). *Grizzlies and white guys: The stories of Clayton Mack*. Harbour Pub Co.

Manuel, A., & Derrickson, G. C. R. (2017). *The reconciliation manifesto: Recovering the land, rebuilding the economy*. James Lorimer & Company Ltd.

Marshall, K. N., Levin, P. S., Essington, T. E., Koehn, L. E., Anderson, L. G., Bundy, A., Carothers, C., Coleman, F., Gerber, L. R., & Grabowski, J. H. (2018). Ecosystem-based fisheries management for social–ecological systems: Renewing the focus in the United States with next generation fishery ecosystem plans. *Conservation Letters*, *11*(1), e12367. https://doi.org/10.1111/conl.12367

Marshall, M., Marshall, A., & Bartlett, C. (2015). Two-eyed seeing in medicine. In M. Greenwood, S. D. Leeuw, N. M. Lindsay, & C. Reading (Eds.), *Determinants of Indigenous peoples' health in Canada: Beyond the social* (pp. 16–24). Canadian Scholars' Press Toronto.

McKinnell, S. M., Wood, C. C., Rutherford, D. T., Hyatt, K. D., & Welch, D. W. (2001). The demise of Owikeno Lake sockeye salmon. *North American Journal of Fisheries Management*, *21*(4), 774–791. https://doi.org/10.1577/1548-8675(2001)021<0774:TDOOLS>2.0.CO;2

Mclellan, B. N., Mowat, G., Hamilton, T., & Hatter, I. (2017). Sustainability of the grizzly bear hunt in British Columbia, Canada. *The Journal of Wildlife Management*, *81*(2), 218–229. https://doi.org/10.1002/jwmg.21189

Mercer, G. 2020, October 18. 'We're being targeted now': Mi'kmaq chief wants military called in to N. S. lobster clashes, attacks. *The Globe and Mail*. https://www.theglobeandmail.com/canada/article-rcmp-deployed-in-ns-lobster-war-but-mikmaq-chief-wants-military/

Moola, F., & Roth, R. (2019). Moving beyond colonial conservation models: Indigenous protected and conserved areas offer hope for biodiversity and advancing reconciliation in the Canadian boreal forest. *Environmental Reviews*, *27*(2), 200–201. https://doi.org/10.1139/er-2018-0091

Nelson, M. P., Vucetich, J. A., Paquet, P. C., & Bump, J. K. (2011). An inadequate construct? *The Wildlife Professional, Summer*, *5*, 58–60. https://isleroyalewolf.org/sites/default/files/Nelson%20et%20al%202011-An%20Inadequate%20Construct.pdf

Noss, R. F., Quigley, H. B., Hornocker, M. G., Merrill, T., & Paquet, P. C. (1996). Conservation biology and carnivore conservation in the Rocky Mountains. *Conservation Biology*, *10*(4), 949–963. https://doi.org/10.1046/j.1523-1739.1996.10040949.x

Omand, G. (2017, December 18). *B.C. bans grizzly bear hunt, effective immediately*. *CTV News* . https://www.ctvnews.ca/Canada/b-c-bans-grizzly-bear-hunt-effective-immediately-1.3726402

Organ, J. F., Geist, V., Mahoney, S. P., Williams, S., Krausman, P. R., Batcheller, G. R., Decker, T. A., Carmichael, R., Nanjappa, P., Regan, R., Medellin, R. A., Cantu, R., McCabe, R. E., Craven, S., Vecellio, G. M., & Decker, D. J. (2012). *The North American model of wildlife conservation*. The Wildlife Society.

Ostrom, E. (1990). *Governing the commons: The evolution of institutions for collective action*. Cambridge university press.

Parrish, J. D. W. 2019, December 20. Exclusive: Canada police prepared to shoot Indigenous activists, documents show. *The Guardian*. https://www.theguardian.com/world/2019/dec/20/canada-indigenous-land-defenders-police-documents

Pasternak, S., King, H., & Yesno, R. (2019). *Land back: A yellowhead institute red paper*. Yellowhead Institute.

Peterson, M. N., & Nelson, M. P. (2017). Why the North American model of wildlife conservation is problematic for modern wildlife management. *Human Dimensions of Wildlife*, *22*(1), 43–54. https://doi.org/10.1080/10871209.2016.1234009

Polfus, J., Manseau, M., Simmons, D., Neyelle, M., Bayha, W., Andrew, F., Andrew, L., Klütsch, C., Rice, K., & Wilson, P. (2016). Łeghágots'enetę (learning together): The importance of indigenous perspectives in the identification of biological variation. *Ecology and Society*, *21*(2), 18. https://doi.org/10.5751/ES-08284-210218

Popp, J. N., Priadka, P., & Kozmik, C. (2019). The rise of moose co-management and integration of Indigenous knowledge. *Human Dimensions of Wildlife*, *24*(2), 159–167. https://doi.org/10.1080/10871209.2019.1545953

Price, K., Roburn, A., & MacKinnon, A. (2009). Ecosystem-based management in the Great Bear Rainforest. *Forest Ecology and Management*, *258*(4), 495–503. https://doi.org/10.1016/j.foreco.2008.10.010

Price, M. H. H., English, K. K., Rosenberger, A. G., MacDuffee, M., & Reynolds, J. D. (2017). Canada's Wild Salmon policy: An assessment of conservation progress in British Columbia. *Canadian Journal of Fisheries and Aquatic Sciences*, *74*(10), 1507–1518. https://doi.org/10.1139/cjfas-2017-0127

Province of British Columbia. 2016. *2016 Great Bear Rainforest Land Use Objectives Order: Background and Intent*.

R. v. Gladstone. 1996. *2 S.C.R 723*.

R. v. Sparrow. 1990. *1 S.C.R. 1075*.

Reed, G., Brunet, N. D., Longboat, S., & Natcher, D. C. (2021). Indigenous guardians as an emerging approach to indigenous environmental governance. *Conservation Biology*, *35*(1), 179–189. https://doi.org/10.1111/cobi.13532

Reid, A. J., Eckert, L. E., Lane, J.-F., Young, N., Hinch, S. G., Darimont, C. T., Cooke, S. J., Ban, N. C., & Marshall, A. (2021). "Two-Eyed Seeing": An Indigenous framework to transform fisheries research and management. *Fish and Fisheries*, 22(2), 243–261 . https://doi.org/10.1111/faf.12516

Reo, N. J., & Whyte, K. P. (2012). Hunting and morality as elements of traditional ecological knowledge. *Human Ecology*, *40*(1), 15–27. https://doi.org/10.1007/s10745-011-9448-1

Rumsey, C., Ardon, J., Ciruna, K., Curtis, T., Ferdaña, Z., Hamilton, T., Heinemeyer, K., Iachetti, P., Jeo, R., Kaiser, G., Narver, D., Noss, R., Sizemore, D., Tautz, A., Tingey, R., & Vance-Borland, K. (2004). *An ecosystem spatial analysis for Haida Gwaii, Central Coast, and North Coast British Columbia*. Coast Information Team.

Safari Club International. (2017). *Politics Trump science in British Columbia Grizzly Bear Hunting Ban*. https://www.safariclub.org/blog/politics-trump-science-british-columbia-grizzly-bear-hunting-ban

Salomon, A. K., Quinlan, A. E., Pang, G. H., Okamoto, D. K., & Vazquez-Vera, L. (2019). Measuring social-ecological resilience reveals opportunities for transforming environmental governance. *Ecology and Society*, *24*(3), 16. https://doi.org/10.5751/ES-11044-240316

Salomon, A., Lertzman, K., Brown, K., Wilson, K. B., Secord, D., & McKechnie, I. (2018). Democratizing conservation science and practice. *Ecology and Society*, *23*(1), 44. https://doi.org/10.5751/ES-09980-230144

Sánchez-Bayo, F., & Wyckhuys, K. A. G. (2019). Worldwide decline of the entomofauna: A review of its drivers. *Biological Conservation*, *232*, 8–27. https://doi.org/10.1016/j.biocon.2019.01.020

Saraux, C., Le Bohec, C., Durant, J. M., Viblanc, V. A., Gauthier-Clerc, M., Beaune, D., Park, Y.-H., Yoccoz, N. G., Stenseth, N. C., & Le Maho, Y. (2011). Reliability of flipper-banded penguins as indicators of climate change. *Nature*, *469*(7329), 203–206. https://doi.org/10.1038/nature09630

Secretariat of the Convention on Biological Diversity. (2020). *Global biodiversity outlook 5*. Secretariat of the Convention on Biological Diversity

Serfass, T. L., Brooks, R. P., & Bruskotter, J. T. (2018). North American model of wildlife conservation: Empowerment and exclusivity hinder advances in wildlife conservation. *Canadian Wildlife Biology & Management*, *7*(2), 101–118. https://cwbm.ca/wp-content/uploads/2018/11/Serfass-et-al-Vol-7-2.pdf

Service, C. N., Adams, M. S., Artelle, K. A., Paquet, P., Grant, L. V., & Darimont, C. T. (2014). Indigenous knowledge and science unite to reveal spatial and temporal dimensions of distributional shift in wildlife of conservation concern. *PLoS ONE*, *9*(7), e101595. https://doi.org/10.1371/journal.pone.0101595

Sheil, D., Boissière, M., & Beaudoin, G. (2015). Unseen sentinels: Local monitoring and control in conservation's blind spots. *Ecology and Society*, *20*(2), 39. https://doi.org/10.5751/ES-07625-200239

Simpson, L. B. (2014). Land as pedagogy: Nishnaabeg intelligence and rebellious transformation. *Decolonization: Indigeneity, Education & Society*, *3*(3), 1–25 https://jps.library.utoronto.ca/index.php/des/article/view/22170 .

Simpson, L. (2011). *Dancing on our turtle's back: Stories of Nishnaabeg re-creation, resurgence and a new emergence*. Arbeiter Ring Publishing.

Simpson, M., & Bagelman, J. (2018). Decolonizing urban political ecologies: The production of nature in settler colonial cities. *Annals of the American Association of Geographers*, *108*(2), 558–568. https://doi.org/10.1080/24694452.2017.1392285

Sinclair, M., and TRC members. 2015. *Final Report of the Truth and Reconciliation Commission of Canada*. 388. Truth and Reconciliation Commission of Canada.

Smith, L. T. (2013). *Decolonizing methodologies: Research and indigenous peoples*. Zed Books Ltd.

Social Ventures Australia. (2016). *Analysis of the current and future value of Indigenous guardian work in Canada's Northwest territories*. Dehcho First Nations, Lutsel K'e Dene First Nation, Indigenous Leadership Initiative.

Stephenson, J., Berkes, F., Turner, N., & Dick, J. (2014). Biocultural conservation of marine ecosystems: Examples from New Zealand and Canada. *Indian Journal of Traditional Knowledge*, *13*(2), 257–265. http://nopr.niscair.res.in/handle/123456789/27907

Stephenson, J., & Moller, H. (2009). Cross-cultural environmental research and management: Challenges and progress. *Journal of the Royal Society of New Zealand*, *39*(4), 139–149. https://doi.org/10.1080/03014220909510567

Stueck, W. 2013. Coastal First Nations prepare to enforce B.C. bear-hunting ban. *Globe and Mail*. https://www.theglobeandmail.com/news/british-columbia/coastal-first-nations-prepare-to-enforce-bc-bear-hunting-ban/article13521123/

Talaga, T. (2018). *All our relations: Finding the path forward*. House of Anansi.

The 180. 2016. The 180: We need decolonization before reconciliation, argues Ryan McMahon. *CBC News*.

Treves, A., Chapron, G., López-Bao, J. V., Shoemaker, C., Goeckner, A. R., & Bruskotter, J. T. (2017). Predators and the public trust. *Biological Reviews*, *92*(1), 248–270. https://doi.org/10.1111/brv.12227

Trousdale, W., & Andrews, H. (2016). *Valuing Coastal Guardian watchmen programs: A business case*. The Coastal Steward Network and TNC Canada.

Tsilhqot'in Nation v. British Columbia. 2014. *2 SCR 257*.

Tŝilhqot'in Nation-BC moose co-management agreement. 2018. *Moose co-management agreement between the Tŝilhqot'in Nation as represented by the Tŝilhqot'in national government and her majesty the Queen in right of the province of British Columbia*.

Tsleil-Waututh Nation v. Canada. 2018. *FCA 153*.

Tuck, E., & Yang, K. W. (2012). Decolonization is not a metaphor. *Decolonization: Indigeneity, Education & Society*, *1*(1), 1-40. https://jps.library.utoronto.ca/index.php/des/article/view/18630

Turner, K., & Bitonti, C. (2011). Conservancies in British Columbia, Canada: Bringing together protected areas and First Nations' interests. *The International Indigenous Policy Journal*, *2*(2), Art 3. https://doi.org/10.18584/iipj.2011.2.2.3

Turner, N. J., Berkes, F., Stephenson, J., & Dick, J. (2013). Blundering intruders: Extraneous impacts on two Indigenous food systems. *Human Ecology*, *41*(4), 563–574. https://doi.org/10.1007/s10745-013-9591-y

Turner, N. J., & Berkes, F. (2006). Coming to understanding: Developing conservation through incremental learning in the Pacific Northwest. *Human Ecology*, *34*(4), 495–513. https://doi.org/10.1007/s10745-006-9042-0

Turner, N. (2014). *Ancient pathways, ancestral knowledge: Ethnobotany and ecological wisdom of Indigenous peoples of Northwestern North America*. McGill-Queen's University Press.

UN General Assembly. 2007. *United Nations declaration on the rights of Indigenous Peoples*.

Van Daele, M. B., Robbins, C. T., Semmens, B. X., Ward, E. J., Van Daele, L. J., & Leacock, W. B. (2013). Salmon consumption by kodiak brown bears (*Ursus arctos middendorffi*) with ecosystem management implications. *Canadian Journal of Zoology*, *91*(3), 164–174. https://doi.org/10.1139/cjz-2012-0221

Vucetich, J. A., Bruskotter, J. T., Nelson, M. P., Peterson, R. O., & Bump, J. K. (2017). Evaluating the principles of wildlife conservation: A case study of wolf (Canis lupus) hunting in Michigan, United States. *Journal of Mammalogy*, *98*(1), 53–64. https://doi.org/10.1093/jmammal/gyw151

Walters, C., Goruk, R. D., & Radford, D. (1993). Rivers Inlet sockeye salmon: An experiment in adaptive management. *North American Journal of Fisheries Management*, *13*(2), 253–262. https://doi.org/10.1577/1548-8675(1993)013<0253:RISSAE>2.3.CO;2

Watson, A., & Huntington, O. H. (2008). They're here—I can feel them: The epistemic spaces of indigenous and western knowledges. *Social & Cultural Geography*, *9*(3), 257–281. https://doi.org/10.1080/14649360801990488

Watson, A. (2013). Misunderstanding the "Nature" of co-management: A geography of regulatory science and indigenous knowledges (IK). *Environmental Management*, *52*(5), 1085–1102. https://doi.org/10.1007/s00267-013-0111-z

Wehi, P. M., Cox, M. P., Roa, T., & Whaanga, H. (2018). Human perceptions of megafaunal extinction events revealed by linguistic analysis of indigenous oral traditions. *Human Ecology*, *46*(4), 461–470. https://doi.org/10.1007/s10745-018-0004-0

Weiser, E. L., Lanctot, R. B., Brown, S. C., Alves, J. A., Battley, P. F., Bentzen, R., Bêty, J., Bishop, M. A., Boldenow, M., & Bollache, L. (2016). Effects of geolocators on hatching success, return rates, breeding movements, and change in body mass in 16 species of Arctic-breeding shorebirds. *Movement Ecology*, *4*(1), 12. https://doi.org/10.1186/s40462-016-0077-6

Whyte, K. P., Brewer, J. P., & Johnson, J. T. (2016). Weaving Indigenous science, protocols and sustainability science. *Sustainability Science*, *11*(1), 25–32. https://doi.org/10.1007/s11625-015-0296-6

Whyte, K. P. (2013). On the role of traditional ecological knowledge as a collaborative concept: A philosophical study. *Ecological Processes*, *2*(1), 7. https://doi.org/10.1186/2192-1709-2-7

Whyte, K. P. (2020). Environmental Justice, Indigenous Peoples, and Consent. In M. Mascarenhas (Ed.), *Lessons in environmental justice: From civil rights to black lives matter and idle no more* (pp. 35-49). SAGE Publications.

Whyte, K. (2018). Settler colonialism, ecology, and environmental injustice. *Environment and Society*, *9*(1), 125–144. https://doi.org/10.3167/ares.2018.090109

Wildcat, M., McDonald, M., Irlbacher-Fox, S., & Coulthard, G. (2014). Learning from the land: Indigenous land based pedagogy and decolonization. *Decolonization: Indigeneity, Education & Society*, *3*(3), I–XV.https://jps.library.utoronto.ca/index.php/des/article/view/22248

Witter, R., & Satterfield, T. (2018). The ebb and flow of indigenous rights recognitions in conservation policy. *Development and Change Early*, *50*(4), 1083–1108. https://doi.org/10.1111/dech.12456 .

WWF. 2018. *Living Planet Report - 2018: Aiming Higher*.

Zurba, M., Beazley, K., English, E., & Buchmann-Duck, J. (2019). Indigenous Protected and Conserved Areas (IPCAs), Aichi Target 11 and Canada's Pathway to Target 1: Focusing conservation on reconciliation. *Land*, *8*(1), 10. https://doi.org/10.3390/land8010010