

All kinds of seasons: articulating Labrador Inuit governance through crafting a seasonal calendar

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Abstract

Inuit have always worked within seasonal patterns, using ecological observations to make predictions about weather, ocean and ice conditions, species presence, and environmental change. Monitoring, intergenerational knowledge sharing, and strong relationships have supported Inuit as they have responded to environmental conditions through generations. This has informed a unique understanding of seasonal change that is reflective of Inuit knowledge and relationships to land, water, and ice. Calendars across Inuit Nunangat are unique to the social–ecological regions in which they were developed. In this collaboration between Inuit and non-Inuit researchers, artists, and knowledge holders, we developed a seasonal calendar for Nunatsiavut that is representative not only of activities and species harvested throughout the year, but that also depicts a Labrador Inuit relationship to seasonality. This research is part of the Imappivut Knowledge Study, a participatory research process designed by the Nunatsiavut Government to inform spatial planning in the marine environment of northern Labrador. The resulting calendar expresses an Inuit experience of the seasons as they are inexorably linked to life and wellbeing in Nunatsiavut. The calendar can be used to reframe Federal and Provincial environmental management policies, such as harvest regulations for Atlantic salmon, to align with Nunatsiavut-based indicators of seasonal change.

Key words: arts-based methods, Inuit Knowledge, phenology, seasonal change, environmental governance

Introduction

“When seals were getting handy, a whole lot of gulls would come around. And in the fall, when the foxes were handy, crows would come around. They used to let us know when animals were near” (Zack Torarak, Hopedale).

The quote above was recorded by Carol Brice-Bennett in her anthropological work *Our Footprints are Everywhere* (1977), gathered for the Labrador Inuit Association during the negotiations for the Labrador Inuit Land Claim Agreement which led to the establishment of Nunatsiavut in 2005. Nunatsiavut is an Inuit territory in Inuit Nunangat, the Inuit homelands on the lands known to some as Canada. These words from Inuit Knowledge holder Zack Torarak express how Inuit life and livelihoods are deeply connected to seasonal change. In northern Labrador, Inuit were traditionally nomadic, following Arctic char, harp seal, caribou herds, and beluga migrations across the mountains, ocean, and islands in the region (Brice-Bennett et al. 2023). Even after Labrador Inuit were relocated into permanent settlements, harvesting practices and cultural activities have persisted; to this day, families return to their ancestral harvesting places in the winters and summers (Oberndorfer et al. 2017; Cadman, Snook, et al. 2023).

Seasons and seasonal change have long dictated the social activities of Labrador Inuit, and are the measure around which life, harvesting, and family are organized (Woollett 2007). As such, seasons are a foundational part of Inuit Knowledge Systems, a logic through which Inuit maintain a relationship to the Land. To convey the place-based nuances of these changes to non-local audiences, many communities across Inuit Nunangat have created seasonal calendars that depict regionally specific climatic and ecological change (see, for example, a recently released calendar from Travel Nunavut (<https://travelnunavut.ca/story/a-plan-for-all-seasons>)). Observations and communication of seasonal change are essential for safety and wellbeing on the Land, but these observations embody much more than environmental knowledge; they are indicative of a particular experience and conceptualization of time, embedded in a unique cosmology, epistemology, and ontology (Aporta 2016). Thus, these calendars can be read not merely as communicating environmental observations, but also as illustrations of Inuit governance—of the logic, relationships, and rules that govern Inuit life (Chanteloup et al. 2018; Middleton et al. 2020; Salusky et al. 2022).

Calendars are ways of structuring our experience of time embedded in a particular socio-cultural context, which can

expose the power imbalances present in research and in policy-making (Kassam et al. 2018). The differences between calendars coming from distinct cultures, and their underlying conceptualizations of time and temporality, can cause friction when research and policy rely on Western ways of measuring and delineating time. The Gregorian calendar, which is the most commonly used calendar in the Western hemisphere, uses the movements of the sun, moon and stars and a linear, progressive numbering system to track the passage of time. Western societies conceive of time as linear and monochronic, delineated by dates and times that are not dependent on circumstance, and are the same each year (Ruelle et al. 2022). Inuit time, on the other hand, is regulated by climactic and social patterns and is responsive to the conditions of the moment (Stern 2003; Bates 2007). Smith (2021) points out that a Western concept of time provided an ideological justification for early colonists to dictate the “proper” times to eat meals, to go to work, and to sleep and that these assumptions continue to reorganize family patterns and compound colonial power over many Indigenous Peoples worldwide (Smith 2021).

Western conceptions of time are one (often invisible) facet of the way colonial society continues to control everyday life and decision-making in the north. For example, Stern (2003) argues that they have been used to frame Inuit as lazy or underperforming in wage jobs because Inuit work patterns and models of contributing to and supporting their communities does not map directly onto a 40 h 9-to-5 work week. The imposition of the Gregorian calendar on Inuit life is just one of the ways colonialism disrupts the relationship between Inuit and the Land, but because it is also deeply embedded in research and management practices, it is also a way that colonialism continues to enact power over Inuit, and limit Inuit sovereignty when it comes to governing their traditional territory according to their own knowledge system.

As we try to work across Indigenous and Western knowledge systems, we still often fail to acknowledge and understand how epistemological and ontological differences challenge our ability to share power and advance Indigenous sovereignty (Tester and Irniq 2008; Todd 2020). It is therefore critical that we continue to expose how colonial power is exercised on the lives of Inuit in the management of their territories and understand what culturally and regionally specific management, reflective of Inuit conceptualizations of seasons and time, would constitute.

This manuscript shares the development of a seasonal calendar in Nunatsiavut to explore Inuit seasonal relationships to Land and Inuit forms of governance. We examine the nature of seasons and seasonal change as it is expressed by Labrador Inuit and consider how a deeper acknowledgement of a unique understanding of time and seasonal change has implications for research and environmental management in the region. We engage with co-productive arts-based methods to deepen our understanding of the knowledge expressed by knowledge holder participants and reflect on how that process allowed us to create a more accessible, relevant, and legitimate outcome for Inuit research partners. Research has shown that arts-based methods can be used to convey some of the more intangible qualities of the Indigenous Knowl-

edge systems, in particular the expression of living knowledge of Indigenous life and experiences on the Land (Rathwell 2020; Strand et al. 2022). As such, art may act as an important bridge between Indigenous and Western Knowledge systems.

This research was done for the Imappivut Knowledge Study, a participatory research project undertaken by the Nunatsiavut Government in which spatial and qualitative interview data have been collected from Knowledge holders on how they use and value the coastal and marine environment of Nunatsiavut. This study was launched by the Nunatsiavut Government to inform decision-making and research in the marine and coastal areas of Nunatsiavut in accordance with Labrador Inuit Knowledge, interests, and priorities. During the interviews, seasons and seasonal change emerged as a defining feature of the relationship between Inuit and the Land. In this article, we share what we learned about Labrador Inuit conceptions of seasons as an expression of a Labrador Inuit Knowledge system, and the implications this seasonal understanding has for scientific research relationships in the region.

Our aim with this paper is not to contrast Indigenous and Western calendars to emphasize their difference and therefore their incommensurability. Instead, we are sharing insights into the specific relationships between Labrador Inuit and Land to reframe how Inuit sovereignty over environmental governance begins with regionally-specific, Inuit-led, and place-based research (Tuck and McKenzie 2015; Latulippe 2025). Thus, we report not only on the research findings and their implications for Labrador Inuit governance, but we also reflect on the importance of self-representation through culturally appropriate methods.

Positionality

This study and manuscript were created at the behest of the Nunatsiavut Government Research Centre (NGRC), which aims to facilitate interdisciplinary knowledge production at the research-policy interface that is appropriate and accountable to Nunatsiavut and its people. The Imappivut Knowledge Study is owned by the NG, nothing is done with the study that is not requested and supported by the NGRC.

We believe it is important for the first author on this paper to provide clarity on her positionality because her voice plays a central role in how this manuscript is framed, reported, and contextualized (Cannon et al. 2024). I (RC) am a settler living in Kijipuktuk, Mi'kma'ki (Halifax, Nova Scotia, Canada). As a non-Inuk researcher leading a project that handles and interprets culturally important information, I have limited access to the lived experience of Labrador Inuit, including of their knowledge system. In my role as a visiting, non-Indigenous scholar, I also bring power and privilege that centres my voice above that of my colleagues, which risks causing new harms or reconcentrating power within southern academic institutions and with me—not with the People and Land that I have sought to support with this work. I try to address this by working closely with colleagues at the NGRC to underpin the research methods, storage, interpretation of significance, and communication in Labrador Inuit Knowledge and priorities throughout this research process. Reflex-

ive practice has been a core component of this collaboration and forms the basis for our working relationship (Cadman, Dicker, et al., 2023, Cadman et al. 2024).

CA, CP, LP, ET, and MS are all Labrador Inuit women living in Nunatsiavut, employed by the NGRC who conduct a wide range of research on environmental and social priorities for Labrador Inuit in Nunatsiavut, including through the Imappivut Knowledge Study. JW is an Inuk visual artist from Makkovik, Nunatsiavut. Her work is focused on the experiences of life, identity and family as an Inuk in Labrador. BB is a Post-doctoral Fellow working with the Nunatsiavut Government on mapping sea ice and seasonal change. She is a settler from Ja-dai-aich, known to some as Hornby Island, British Columbia, and the traditional territory of the K'ómoks First Nation. MB is a Professor at Dalhousie University, a settler originally from Anishinaabek, Haudenosaunee, Lūnaapēwak, and Attawandaron territory, what is currently known as London, Ontario. She has been working in research partnership with the Nunatsiavut Government since 2017. RL is the Director of Environment for the Nunatsiavut Government, originally from Alberta, Canada. JG is an Inuk born and raised in Postville (KipukKak) Nunatsiavut and is Deputy Minister of Lands and Natural Resources in the Nunatsiavut Government. EO is a Labrador Inuk, with roots in the Rigolet area of Nunatsiavut, currently living in Nova Scotia and working as a Professor in the Department of Oceanography, Dalhousie University.

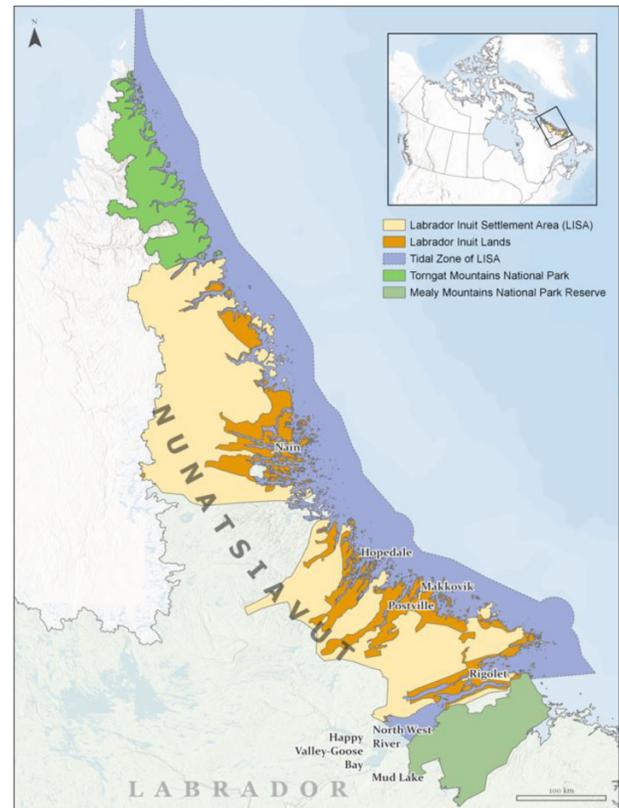
Background

Nunatsiavut and the Imappivut knowledge study

Nunatsiavut is an Inuit land claim area in northern Labrador, Canada. It is one of four regions of Inuit Nunangat, the Inuit homelands located in northern Canada. Nunatsiavut is a self-governed region, and the Labrador Inuit Land Claims Agreement (LILCA) recognizes Inuit ownership and/or jurisdiction of over 72 520 km² of land and 44 030 km² of sea in northern Labrador (see Fig. 1). The LILCA is, in part, what allows Inuit in Nunatsiavut to maintain close connections to Land. Ownership or jurisdiction over their traditional territory give Labrador Inuit some governing authority as it pertains to how species and spaces are managed, enabling continued access to Land for the purposes of strengthening and enriching a multigenerational relationship to the homeland. This relationship is practiced in part through domestic harvesting. Fishing berths, traplines and hunting areas are closely connected to traditional ancestral seasonal places. Many Inuit have cabins in the places where once their families would live in ice houses in the winter, and sod houses in the summer, and continue to harvest many of the same species their families have for generations.

The LILCA represented an important victory for Labrador Inuit gaining rights over their lands and waters; however, environmental governance and research in the region still tends to happen under the purview of the Canadian government, in alignment with colonial decision-making structures, prioritizing the values and evidence of Western knowledge systems

Fig. 1. Map of Nunatsiavut, reproduced from Bishop et al. (2021).



(Cadman et al. 2022; Snook et al. 2022; Ortenzi et al. 2025). Culturally salient governance that advances a Labrador Inuit knowledge system will support sovereignty for Nunatsiavut. Nunatsiavut is working to advance self-determination over research and management in the region through a number of important projects in the region including the Imappivut Knowledge Study.

Imappivut (“Our Ocean” in Inuttitit) is a large marine planning initiative run by the Nunatsiavut Government focused on the Labrador Sea and coast adjacent to Nunatsiavut. This project was initiated out of a desire to advance research sovereignty in the region, and to develop marine policy that aligned with the needs and values of Labrador Inuit. Imappivut includes multiple scientific research projects in the region. The goal of Imappivut is to implement Chapters 6 and 9 of the Labrador Inuit Land Claims Agreement, which concern Ocean Management and National Parks and Protected Areas. A core component of Imappivut is the Knowledge Study, which began in 2017 and has been gathering Inuit Knowledge about the coastal and marine environment through spatial mapping and unstructured interviews. The Knowledge Study is run by the Department of Lands and Natural Resources through the NGRC. The Knowledge Study is an ongoing project, and the Nunatsiavut Government plans to collect additional interview data from Labrador Inuit in the future to continue to inform marine planning.

Seasonal calendars

Many Indigenous and rural cultures have developed their own systems to recognize, record and predict seasonal and climatic trends based on multiple generations of living within their landscapes. These calendrical systems are unique to the place, ecosystem, and culture within which they are developed, and they are essential for a People to align their activities in synchrony with biotic and abiotic phenomena.

Recording these calendrical systems has emerged as an important way of organizing and expressing Indigenous Knowledge Systems in places across the world and have been widely taken up to support research and decision making. Ecological calendars provide insight into the physical and biological functions of a place and contribute to a better understanding of the local effects of climate change. Studies have shown that Indigenous Peoples use a variety of adaptive strategies to cope with the effects of climate change, and that many of these strategies are grounded in their intergenerational understanding of seasonal change (Chisholm Hatfield et al. 2018). This is frequently characterized in terms of seasonal indicators.

Seasonal indicators are predictable biophysical events that help to predict a change or to cue a Peoples' behaviour. For example, the day the spring peepers (frogs) are first heard in the northeastern states and provinces in North America is often characterized as the first day of Spring, regardless of the actual calendar day (Lovett 2013). Seasonal indicators are not exclusively biological but instead are embedded in human use and culture. Turner and Reid (2022), for example, record that for the Haida People, the blooming of Cowparsnip (*Heracleum maximum*) indicates that seagull eggs are no longer good to eat. Where these indicators involve the interaction between multiple biota and atmospheric conditions, they are referred to as phenological observations. The implicit and explicit connections between humans and lands that are present in seasonal calendars provide a lens for connecting traditional ecological knowledge of a place with the cultural, spiritual and ontological facets of a People (Turner and Reid 2022).

Researchers and knowledge holders alike have commented on the importance seasons play in Inuit culture, so much so that seasons are one of the organizing principles around which Inuit live: each season brings unique activities, harvesting activities, travel conditions, and social situations (Brice-Bennett 1977; Stuckenberg 2006; Oberndorfer et al. 2017). While Inuit across Inuit Nunangat share a general culture and language, there are plenty of differences that make each region unique, with distinct practices, dialects, and Knowledges tied to their environments (Stuckenberg 2006). There are multiple eco-regions across Inuit Nunangat, and each has unique environmental conditions. Inuit are deeply aware of natural changes like the movements of migratory species and the formation or break up of landfast sea ice, and these events typically indicate larger patterns of seasonal change for communities across the Arctic (Carter et al. 2025). Inuit Knowledge systems are embedded in the unique biophysical and ecological conditions of the Land and therefore geographically and culturally specific seasonal cal-

endars can help express the nuanced distinctions between places.

Methods

The Knowledge Study was launched in 2017 as part of the Imappivut Marine Spatial Planning Initiative, a project run by the Nunatsiavut Government designed to support the implementation of the LILCA towards ocean management and conservation (Denniston et al. 2021). It was prompted by feedback from LILCA beneficiaries, who advised that any marine management and conservation initiative undertaken in the region must be grounded in Labrador Inuit knowledge and priorities. The goal was therefore designed to gather Labrador Inuit perspectives on the uses and values of the marine and coastal environment, to embed Inuit knowledge into marine planning and decision-making.

Between 2017 and 2020, researchers from the NGRC travelled to each of the five communities of Nunatsiavut, as well as to Upper Lake Melville (ULM) region just outside the land claim area to interview Labrador Inuit on how they use and value the marine environment. This recruitment strategy was reflective of the Nunatsiavut Government legislative structure, where there are representatives for each community as well as for ULM and Canada. Forty-five interviews were conducted with 54 participants across the region. This discrepancy occurred because some families chose to be interviewed together, including married couples, parent and child, and siblings. Participants shared stories about their activities along the coast of Labrador, including harvesting, traveling, and recreation. Interview participants were offered access to an Inuttitut translator, however, none requested one during this phase of the project. These interviews are the main data source for this research. Ethics approval for this study was received through the Nunatsiavut Government Research Advisory Committee.

The method of participatory mapping used on this project was adapted from the Firelight Group's Direct-to-Digital mapping methodology and informed by Indigenous land use studies from across Canada. During the interviews, participants sat with two researchers in front of a Google Earth map, which was projected onto the wall in front of them. They were asked to share how they use the marine and coastal areas of Nunatsiavut. Using a laser pointer, participants would point out important locations, such as travel routes, harvesting and breeding places for local species, cabins, ancestral territories, and any other landscape features that were significant to them. As the participant spoke, one of the researchers recorded the information directly into the Google Earth map using points, lines, and polygons to indicate important places, and recording a brief description of the place in the notes. The second researcher would ask prompting questions to understand more about each location, such as "have you noticed any changes to the place or species over time?" or "what time of year do you usually visit this area?" These interviews were audio recorded and transcribed. Interviews lasted approximately 90 min. Participants were assigned an alphanumeric code based on the community where they lived (NN for Nain, HO for Hopedale, etc.).

As participants shared their activities and harvesting practices, they frequently specified the season when the activity was occurring. Interviewers occasionally prompted this information with questions about the season, the weather, or the presence or absence of sea ice. As interviews transcripts were reviewed, the research team (including RC and NGRC staff) identified that seasons and seasonal change were an important way that participants organized their responses. This emerging theme was identified as an important framework for organizing the data to better understand how participants were experiencing seasons and seasonal change. An initial analysis using qualitative analysis software NVivo and using the Framework Method (Cadman et al. 2023) was conducted to identify all mentions of seasons in the transcripts.

Every time a season was mentioned, it was coded to the general code of “seasonality” to capture both any description of a distinct season, and/or descriptions of environmental fluctuation that corresponded to seasonal change. A thematic content analysis was performed on these codes to glean an understanding of the relationship between Inuit and the Land as it is mediated by seasons and seasonal change. Preliminary results were presented to the rest of the research team for validation and clarification.

Once this general thematic analysis was completed, these sections of transcript were reviewed to look for how Inuit distinguish seasons, to identify distinct seasons from each other. Harvesting activities, modes of transportation, and species harvested were used to help distinguish one season from another, as were descriptions of the ice. As distinct seasons emerged, sub-codes were created. Verification was performed by looking to the Labrador Archive Inuttut Dictionary for Inuttut words distinguishing between seasons.

Finally, a thematic analysis was performed on each season to qualitatively describe the nature of those seasons—the species that were present, the activities undertaken, observations of climatic change were all recorded. A spreadsheet¹ was developed recording the species, activities, and environmental conditions in accordance with the season in which they were reported. Key indicators identifying a change between seasons was added to the spreadsheet as they emerged from the interviews. From this table, the design for a traditional harvest round was assembled by the research team drawing on similar seasonal calendars developed in Arctic Shipping Reports developed by Carter et al. (2019).

The research team met to discuss the content of each season. Through a series of collaborative conversations, it became clear that members of the research team felt dissatisfied with the traditional Western methods of analysis and communication for capturing the nature of this information. For example, questions were raised about the lack of human subjects in the calendar. Inuit team members felt it hard to see themselves depicted in the calendar, and hard to explain the significance of these species without understanding them in relationship with the whole. In creating the calendar, we had lifted individual species and occurrences out of the data and placed each of them on their own line in the circle. We had cut up a full lived experience of a system in flux, restruc-

tured it to form a kind of order, removed human presence to present something that was accurate to the data, and corresponded nicely with seasonal calendars elsewhere in the Arctic, but that ultimately, was not reflective of the Knowledge system that had produced the data in the first place.

To rectify this, we turned first to stories, and then to art to capture a deeper and more holistic representation of the data. Because stories are frequently used in many Indigenous cultures, including Inuit communities, to communicate vital advice and knowledge, storytelling has been recognized as a crucial approach for enhanced understanding of Indigenous values and perceptions (Martinez-Levasseur et al. 2020; Caughey et al. 2024). We began by crafting seasonal vignettes that described the activities, species and environmental conditions shared by participants for each season. These seasonal vignettes are presented as stories that set the scene for how the season is experienced by participants².

Arts-based methods have been recognized as a successful method for communicating thoughts, beliefs, and knowledge in Indigenous research that is not always accessible through traditional research methods (Zurba and Berkes 2014; Hammond et al. 2018; Strand et al. 2022). In the interest of processing and interpreting the data in a way that better represented the concepts emerging in this study, the research team partnered with Inuk artist Jessica Winters. Winters was given access to the seasonal stories and the harvest round, and through an iterative series of drafts, illustrated the calendar.

Results

In the following sections, we refer to species by the names that are used locally. Some of these names are English, some in Inuttut, and some are local dialect. For ease of understanding, we have created a table outlining the correlating common names in Canadian parlance (Table 1). Some participants used the Labrador name and the common names interchangeably. We have chosen to maintain their words, in acknowledgement that the names they use are an expression of meaning and relationship between the speaker and the species (Ljubicic et al. 2018). The list in Table 1 includes every species that was mentioned in the seasonal analysis, though more species were mentioned in the interviews overall. A full report of results from the Knowledge Study is currently being drafted for publication by the Nunatsiavut Government.

Seasonal understanding and relationship to land

When asked how they use and value the marine environment, many participants organized their answer around the seasons. A participant from Nain (NN02) explained how seasons are the foundation for activity on the Land:

“I guess you have to break it down in seasons. We do different stuff in the spring compared to winter or compared to summer or even fall. It’s almost like a different location each time. You’re hunting in one area you’re fishing in another area. For

¹ The spreadsheet is provided as Supplemental materials A.

² The seasonal vignettes are provided as Supplemental materials B.

Table 1. Species terms used in Nunatsiavut that were recorded in the seasonal analysis in the Imappivut interviews.

Commonly used in Nunatsiavut	Commonly used elsewhere
Ammomajuk	Clams
Appik	Bakeapple, Cloudberry
Bedlamer (sometimes Bellamer)	Harp seal
Black bear	Black bear
Blackberries	Crowberries
Blueberries	Blueberries
Capelin	Capelin
Char, iKaluk	Arctic char
Cod	Atlantic cod
Eider	Eider ducks
Flies	mosquitoes, horseflies, etc.
Fox	Arctic and red foxes
Goose	Canada goose
Grumpus	Minke whale
Herring	Herring
Itik	Sea urchin
Jar/jar seal	Ringed seal
Jumper	White-sided dolphin
Lynx	Lynx
Marten	Marten
Mink	Mink
Uviluk	Mussels
Nanuk	Polar bear
Partridge (sometimes Spruce partridge)	Spruce grouse
Partridge (sometimes White partridge)	Rock and/or Willow ptarmigan
Partridgeberries/Redberries	Lingonberry
Pigeon	Black guillemot
Porbeagle	Porbeagle shark
Porcupine	Porcupine
Porpoise	Porpoise
Rock cod/ogâtsuk	Greenland cod
Salmon	Atlantic salmon
Shrimp	Shrimp (various species)
Smelts	Rainbow smelt
Trout	Lake, Brook, Rainbow trout (sometimes Arctic char)
Tuttuk	Boreal caribou
Ukalik	Arctic hare
Wolf	Grey/Labrador wolf
Wolverine	Wolverine
Wrinkles	Sea snails

me, a lot of it is seasonal based, when I am out on the water. What time of year it is. Springtime for me out on the sea ice is more seal hunting and goose hunting, occasional trips to the cabin. In the summertime it could vary from fishing, early summer birds are nesting, you're gathering eggs. In the fall you're back to goose hunting, probably cod fishing, probably salmon fishing too. Bakeapple picking later. In wintertime,

not so much out on the outside [beyond the islands], my focus in the wintertime is within the bays, but I do occasionally go out onto the outside during the wintertime."

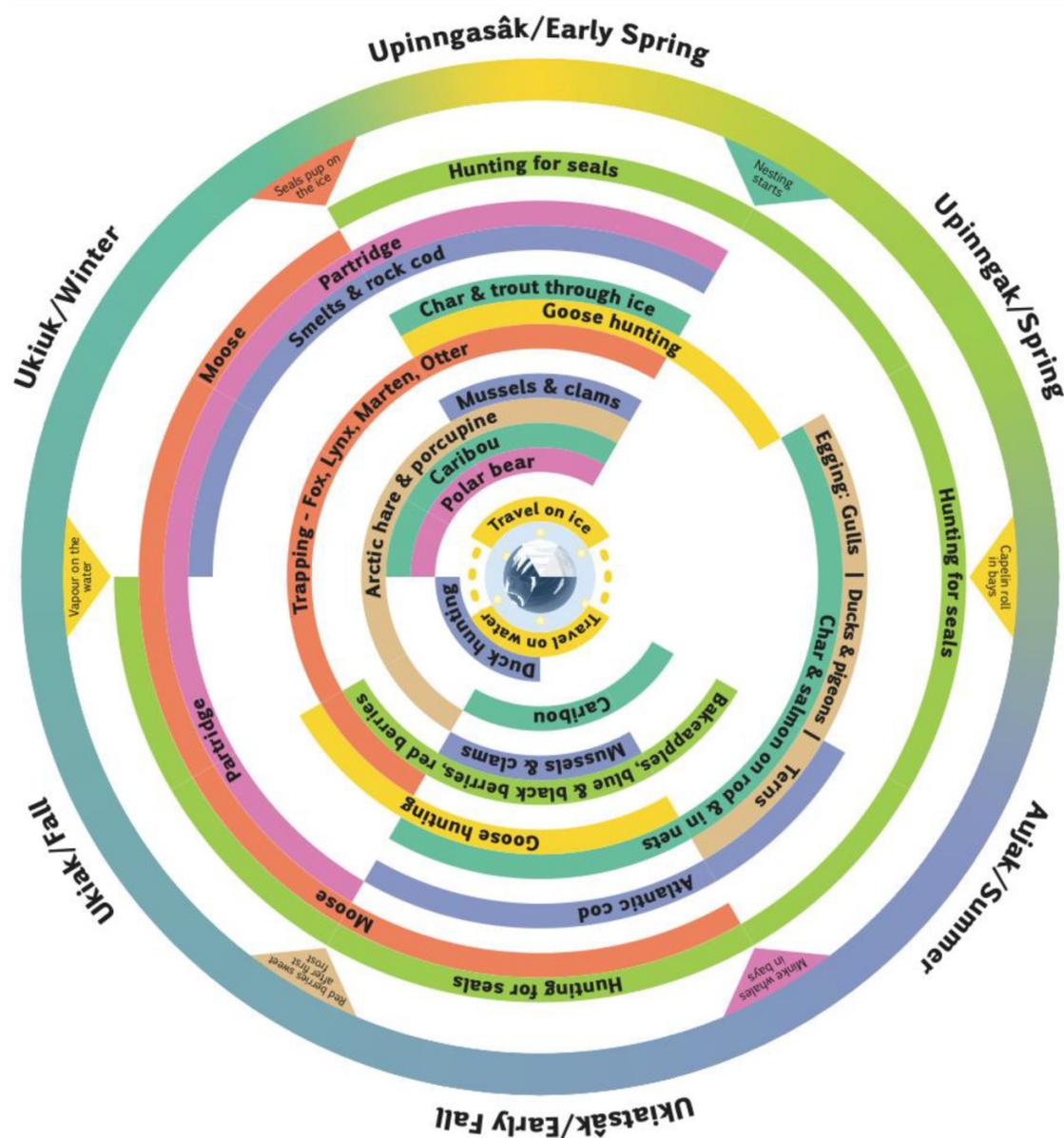
Participants in the Imappivut Knowledge Study described their knowledge of the Land as emerging from their experiences, long term harvesting and monitoring of important species, and from lessons taught by previous generations. This accumulation of knowledge over lifetimes and generations is not merely observational: it is an expression of the relationship between the Land and Labrador Inuit, and speaks to an ethic of care and mutual responsibility that characterizes an Inuit Knowledge system (Cadman, Snook, et al. 2023; Tester and Irniq 2008; Ljubicic et al. 2018). A participant from Nain (NN06) explained this relationship during their interview:

"It all depends on season. It's not much in the summer because I guess the animals are tending to their young ones. So, we don't try to disturb that as much. And in the fall, there's all kinds of wildlife that's out there and so we tend to go out on the Land and do a lot of things, like hunt and shoot the birds especially, and fish before the fish go away, and seal hunt. We like to get the seal as only what we need, because we find that when we freeze the seal meat in the freezer it don't take long to get bad. So, we only take what we need at the time. But I've been trying to dry things because it's a lot easier to keep longer. And first thing we do in the spring when the ice thaws out, we...get some uviluks and ammomajuk ... and itiks are really good, too. And in the fall, I always go with my youngest brother... and we go out to look for ukalikis, get more than we usually do since we can't get caribou, and even partridges when you're on a boat... We kind of stock up in the fall, and in the winter, we only get what we see, we don't usually go out hunting in the wintertime. We used to, when we used to get caribou. But once the freeze up happens, we usually go fishing, partridge hunting, in the springtime, that's when you get the seal, then. And geese - oh geese!... We always say that whatever moves, we eat...it, and it's good!"

There were two important ways that participants spoke about seasons during the interviews. The first was that people organized their stories around two times of the year—the time for traveling on the ice, and the time for traveling on the water. The second way that interviewees organized their stories was around six distinct seasons. Seasons were distinguished through the environmental conditions, as well as the harvesting activities that are occurring at each time of year. During the interviews, participants would distinguish between springtime on the ice (i.e., before ice break up), and springtime on the water (i.e., during and after ice break up). Participants would also specify that certain activities took place during "early fall" and "late fall" (when the winds pick up and it becomes difficult to travel). These distinctions were confirmed by Inuit team members, and further verified by an investigation into the Inuttut words for the seasons, of which there are six: upinngasâk (early spring), upinngak (spring), aujak (summer), ukiatsâk (early fall), ukiak (fall), and ukiuk (winter).

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Fig. 2. Harvest Round depicting ice conditions and harvesting activities and indicators of seasonal change, as recorded in the Imappivut Knowledge Study. The triangles on the outer rim depict indicators of changes between seasons, as identified in the Imappivut interviews.



Harvest Round

Based on the thematic analysis, the research team designed a seasonal calendar, depicting ice conditions and harvesting activities, and indicators of seasonal change throughout the year (Fig. 2). It features a seasonal “round”, centred around marine conditions and associated mode of travel throughout the six seasons, and surrounded by harvesting activities that are occurring on the Land. These bands focus on the species most frequently mentioned in the Imappivut interviews, indicating that they are particularly significant species for Labrador Inuit.

This calendar has been generalized for the whole of Nunatsiavut’s coastline, and it was therefore decided that the calendar would not dictate the months of the year, as

seasonal changes, in particular weather events, ice conditions, and climate vary between different communities. In addition, the Imappivut interviews were largely centred on harvesting activities, and thus the data for this calendar is also focused on human–nature interactions. As a result, the calendar is framed around the Inuit experience of seasons, and the activities being performed in each season. For example, polar bear is shown on the calendar in ukiuk, because that is when it is harvested, but polar bears stay in the region all year round, and Inuit have many interactions with polar bear outside of ukiuk months. Thus, this calendar is best understood as a harvest round, rather than as a document capable of predicting species presence or availability.

Fig. 3. “A Labrador Inuit Year” a seasonal calendar by Inuk artist Jessica Winters, developed based on the results of the Imapivut Knowledge Study interviews.



A Labrador Inuit Year by Jessica Winters

The results of the seasonal analysis were also provided to Inuk artist Jessica Winters, who created her own version of the seasonal calendar. Working iteratively, with feedback from Inuit team members, Winters workshopped the data into a complex illustration. Her version of the calendar (Fig. 3) depicts the same data points (the same species, indicators, and activities), but imagined as a more organic, fluid cycle, centred around the relationship between Inuit and their territory. The calendar visualizes the passage of time with Inuit embedded in the landscape, expressing a geography of place that connects the more academic calendar in Fig. 2 more profoundly to the landscape that it depicts. This work draws on the unique art history from the region, with the design referencing embroideries made by Labrador Inuit artists in the first half of the twentieth century (LeMoine and Kaplan 2022).

Discussion

Significance of the calendars

The iterative analysis process allowed for the creation of two seasonal calendars which are useful for different

functions. The harvest round provides important insight into the harvest and travel activities taking place across Nunatsiavut throughout the year. It points to some of the subtleties of seasonal change, such as the cascading ripening of berries. It is also easy to interpret for anyone who is unfamiliar with the region, and it makes some of the species interactions clear through the seasons. *A Labrador Inuit Year* may be more difficult for a non-Inuit audience to interpret, but it offers a glimpse into the ontological and epistemological experience of seasons and seasonal change for Inuit, expresses a unique Knowledge system, and celebrates Inuit life on the Land.

Significance of the Harvest Round

The Harvest Round depicted at Fig. 2 is a typical design for a seasonal calendar, seen in many depictions of Indigenous Knowledge of seasons and seasonal change both in other regions of Inuit Nunangat (Carter et al. 2019; Dubos et al. 2023) and elsewhere in the world (Woodward and Marrfurra McTaggart 2019; McKemey et al. 2020; Ruelle et al. 2022). The centre of the round shows marine conditions throughout the year, as well as the position of the sun because ice and weather conditions dictate access to the Land. Because of the extreme con-

ditions in the Eastern Arctic, Inuit have always been required to have a deep knowledge of geographic and oceanographic conditions such as wind direction, ice formation, snow cover, and bitter cold to plan travel (Aporta 2016; Middleton et al. 2020).

Access to harvest can be limited due to safety concerns. For example, some participants explained that geese and gulls lay their eggs out on the islands in late spring, but the unpredictable nature of the sea ice break up may prevent Inuit from harvesting eggs. Prediction of ice conditions begin in late fall as the temperature falls and vapour starts to rise from the water, the first sign of ice formation. Precipitation patterns, melt and freeze cycles, and cloud cover all affect how and when the ice forms. Travel along the coast is essential for Inuit to make observations about seasonal change, and to gain knowledge of long term spatial and climatic patterns on the Land.

The harvest round shows ecological and phenological observations made by Inuit who are out on the Land. The calendar also features indicators of seasonal change that are noted by Inuit as marking the transition between seasons. These indicators feature the appearance of new species (migratory birds laying eggs), atmospheric and oceanographic conditions (vapour on the water indicates the air temperatures are cool enough for sea ice start to form), and interactions between climate, species, and human experience (redberries taste sweeter after first frost). Other seasonal research has demonstrated that where relationality is a central feature of a knowledge system, it predisposes people to be more observant of, and more sensitive to, small scale examples of climate change in action (Chisholm Hatfield et al. 2018; Kimmerer 2020).

Inuit have a deep insight into the localised experience of climate change impacts. For example, one seasonal indicator that emerged from the interviews was the appearance of minke whales, coming close to shore feeding on forage fish and shrimp at the end of summer. However, discussions among the author team emphasized that Minke whales appeared as early as June in Nain Bay in the summer of 2024, clashing with the general understanding of these whales as a portent of ukiatsâk. Where Inuit safety and wellbeing is built on an understanding of how this system moves in relation to its parts—when to expect strong winds, when to put out nets for capelin, when mussels will be inedible in hot weather—this deviation from expectations can be disturbing and dangerous (Wilson et al. 2021). A harvest round like the one depicted here can provide essential context for the expectations and habits of Inuit as they exercise their rights and nurture their relationships on the Land.

Significance of a Labrador Inuit Year

Inuit Knowledge is often conveyed through stories, in which contextual and experiential information are conveyed to teach others (Pfeifer 2018; Pedersen et al. 2020). *A Labrador Inuit Year* brings the experiences of being on the Land into a narrative, an unbroken cycle bursting with colour and abundance, in which Inuit and animals are embedded in the landscape, drawn together by the marine space.

This depiction of seasonal change shows it as emergent: it understands the year as an interconnected system that shifts in relation to its parts. From this calendar, it becomes clear that environmental change affects the activities, travel, monitoring, storing, processing, and consuming of species (Turner and Reid 2022). Inuit life and seasonal change are intertwined. This is an intimate relationship between Inuit and the Land, where activities are responsive to change on the ground. While six seasons are visible, it is also clear that change is constant in this system. As one participant from Hopedale observed: “there’s four seasons on the calendar, but for we fellows there’s more than four seasons. There’s all kinds of seasons” (HO01).

This work of art also depicts how resilient and resourceful Inuit are in a landscape that is constantly changing. The practical skills needed for navigating the marine environment, staying safe, warm and fed come to life in this image. During a discussion of *A Labrador Inuit Year* in the summer of 2024, author CA explained that “no matter what goes wrong, we will always figure it out.” This flexibility and ingenuity are characteristics of a People who are responsive to change, and can adapt to environmental and social conditions as they arise (Kaplan 2012). This calendar communicates that resilience and is therefore also an empowering representation of the strength and capacity of Labrador Inuit in the face of great uncertainty.

This version of the calendar brings new insight into the value of a seasonal calendar. A calendar is a structure that helps construct a particular understanding of time and seasonal change. It expresses the ontological and phenomenological experience of time. The Gregorian calendar, for example, marks the passage of time with numbered days, months, and years, and frames time as a linear progression, and it therefore remains the same regardless of the place or context. By contrast, the calendar shown in Fig. 3 is highly place-based. The passage of time is marked by changes to species and climate. By emphasising indicators that mark the arrival of seasons, time is situated with a flexibility that allows for seasonal nuances to be revealed through engagement with the Land. It revolves around travel conditions on the ice and on the water, when travel is possible, and by what means. One rotation of the calendar is completed when conditions return to the same point, which may or may not be equal to a calendar year in the Gregorian sense. The relationship between the sun and the ice was also seen as important to Inuk team members, who wished to express that the placement of the sun (and corresponding weather conditions) were key factors in ice formation and break up.

In some ways what is most significant about this calendar is the way that it resists a Western scientific understanding of “use”. Many Indigenous scholars have taught that knowledge must have a use or a function to be meaningful (Wilson 2008; Kovach 2009; Kimmerer 2020). But this use is understood as more than its unidirectional utility for human benefit. Instead, the utility of seasonal knowledge is understood as an expression of the connections between Inuit, seasonal change and how Inuit exist in relation to the Land. In creating this work, our goal was to express an Inuit experience of the seasons as they are inexorably linked to life and well-

being in Nunatsiavut. More than solely expressing observed changes of use over the seasons, this calendar depicts how they are experienced in terms of aesthetics, memory, kinship, and values (Oberndorfer et al. 2017). Rather than providing a straightforward utilitarian function for Western scientific research purposes, such as predicting and measuring change in the region, this calendar is useful for Inuit in Nunatsiavut as they articulate their experience of seasons and seasonal change and break from the constraints of neocolonialism.

A Labrador Inuit Year belongs to the people of Nunatsiavut. A large, framed copy of the calendar will be hung in the Nunatsiavut Research Centre, which is open to the public and can be visited by members of the community at any time.

Applications of this project

The importance of pairing Indigenous ways of knowing with science and management is recognized not only for its ability to bring new tools, data, and perspectives into marine management, but also to advance decolonial and reconciliatory objectives by addressing uneven and unjust power relations between Indigenous and Western researchers (Reid et al. 2021). To do this requires that we challenge the assumption of Western science as the superior epistemology (Pfeifer 2018; Held 2019). These calendars highlight the complexity of weaving multiple knowledge systems together, and the depth of unlearning that is required for management to uphold Indigenous responsibilities to, relationships with, and conceptualizations of, Land. We explore some of the challenges and opportunities indicated by these calendars for pairing knowledges towards better research and management processes.

Applications in research

This project has implications of the practical and methodological applications of arts-based methods for working between Western and Indigenous knowledge systems. Many scholars have identified arts-based methods as a possible avenue for decolonizing, empowering or emancipating research processes (Cunsolo Willox et al. 2013; Smith 2021). As researchers who rely mostly on Western research methods and approaches, we often find it difficult to faithfully express Inuit Knowledge and create outputs that resonate with Inuit ways of knowing.

Environmental research more broadly has been critiqued for cherry picking aspects of Inuit Knowledge that can be more readily represented in Western applications (David-Chavez and Gavin 2018; Inuit Tapiriit Kanatami 2018). The creation of the more academically traditional “harvest round” was able to convey important aspects of these results, such as the temporality, timing, and species availability through the year, but it has limited ability to convey the relationships between the physical, biological, and human phenomena. Arts-based methods can more closely align with Indigenous Knowledge because they engage experiential approaches that mirror many Indigenous ontologies (Hammond et al. 2018).

Rathwell (2020) argues that art can be a way of expressing Inuit experiences of change beyond their observational value,

such that the knowledge is infused with the emotionality and knowledge system that underpin that experience. The use of art to create an Inuit seasonal calendar is a different facet of the data than a traditional scientific output: it is an expression of joy, of wonder, and of love for the lands and waters of Nunatsiavut. It depicts multiple generations of Inuit embedded in the landscape, as active participants in seasonal change. It celebrates the relationship between Inuit, the marine environment, and the interconnections between the entire system that is present in northern Labrador. Representing and communicating these more intangible and relational aspects of the Inuit year is made possible through art-based methods, speaking to the ability of arts-based methods to improve the salience of research that attempts to express Inuit ways of knowing.

Many have noted the challenges of working across multiple knowledges, pointing out that the power differential between Indigenous and Western knowledge often results in Indigenous knowledge being minimized and simplified, reduced to data that can inform the Western framework, but never allowed to challenge its supremacy (Agrawal 1995; Whyte 2017; Latulippe and Klenk 2020). *A Labrador Inuit Year* provides an alternative approach to understand the significance of place-based research. It draws connections between Inuit, harvested species, and the Land that are difficult to express in an English language academic paper. It is an expression of the passage of time as manifest in relationships. The year is not made up of a collection of individual activities or interspecies interactions, it is the kinship that connects those things. It is a collective, not a collection.

The seasonal calendar not only helps us to understand relationships and seasons, but the act of making the calendar/watching the calendar be made disrupted the assumptions we have as researchers about time, and makes the coloniality of our approaches transparent. It thus changes who we are as researchers and puts at the forefront the responsibilities we carry to do ethical research that pushes away from us holding all the power. This calendar provides us with an opportunity to guide a more relational approach to our research in Nunatsiavut. It makes clear that our responsibilities as researchers in the region are not only to the people of Nunatsiavut, but also to the reciprocal relationships between them and the Land: to find ways to nurture and protect that collective. As such, this artwork does more than communicate the results of this study. It also raises new questions about what it means to be accountable in our work.

Applications in management

The understanding of seasons depicted in these calendars has implications for how we consider species and land management practices. The Gregorian calendar is favoured for environmental governance in the Western colonial world. This is a way of measuring time that works well to assert power over an ecosystem because it implies a kind of universality. It divides the calendar into dates that are not determined by local conditions. This is a useful framing for the development of large-scale modelling, such as mathematical weather pre-

dictions, but it leaves little room for different perceptions and experiences of time and change. In Canada, harvest control rules are determined centrally in federal government offices hundreds of kilometers away, based on the date on the calendar, and not through a careful observation of the landscape. This is fundamentally incommensurable with how Inuit interact with the Land, make predictions, and respond to change.

Current harvest rules that are tied to dates on a calendar are not responding to conditions on the Land. For example, Fisheries and Oceans Canada (DFO) currently control the harvest of Atlantic salmon in the region (known as Salmon Fishing Area 1). DFO have implemented harvest control rules that are underpinned by the Gregorian calendar: Inuit in Labrador are allowed to harvest seven salmon between 15 June and 15 September. This rule imposes a Western colonial logic onto the harvest of salmon. It considers salmon in isolation from its environment, and from its relationships to the land and to the harvester. This rule has consequences for other aspects of travel out on the land: for example, if the harvest dates do not coincide with the times appik are ripening, it will mean that Inuit have to travel out twice to harvest their salmon and berries, reducing the efficiency of time on the land (which has already been constrained by the expectations of work schedules aligned with the Gregorian calendar).

By contrast, *A Labrador Inuit Year* does not use dates to describe the salmon run, nor does it depict salmon as a species in isolation. In the seasonal calendar, salmon is embedded in the landscape, its appearance coinciding with the ripening of bakeapples, and portrayed as being hunted by white-sided dolphins and Inuit in a speedboat. As noted in *A Labrador Inuit Year*, a trip out onto the Land to catch salmon is also an opportunity to observe co-occurrent events, such as how appik are ripening, and whether geese and ducks have matured and are preparing for their southern migration. Where the rule from DFO is proactive and monochronic, guidance for harvesting salmon that respected the Inuit calendar would be responsive to conditions on the ground, dependent on when the salmon run occurred, on which rivers appear healthy and on the relative success of the spawning season. Rules grounded in an Inuit calendar would rely on the judgement of Knowledge holders, and would emerge from long term experience, observation, and relationship and responsibilities to the Land and to one another. An Inuit model for harvest policy could embrace a more localized and adaptive response, and support Inuit sovereignty in their territory: this is the governance model that emerged from this research process.

Conclusion

In this research, we have expressed a Labrador Inuit understanding of time, drawn from the Imappivut Knowledge Study. The results of the study are communicated first through textual explanations of the seasons, and then through two seasonal calendars: a traditional harvest round, and an artwork from Inuk artist Jessica Winters. These framings of seasons in Nunatsiavut each have implications for research and policy in the region and raise new questions about what it means to work in relational accountability to the Peo-

ple and Land. The use of art-based methods to refract the data allowed us to better understand and express the legitimacy and relevance of the research in accordance with Inuit knowledge as it was expressed both in the interviews and by our co-authors on this manuscript. Arts-based seasonal calendars will be useful for those who are looking to gain a better understanding of the context of their work on Indigenous territories, to keep safe the unique knowledge systems and relationships between Indigenous Peoples and their lands.

The creative collaboration made possible through this iterative arts-based process demonstrates how Inuit leadership—not only participation in data collection, but leadership in the design, analysis, and communication of research—is crucial for understanding the depth of meaning present in this study. It is our hope that other collaborative teams see the value in arts-based methods for a shared understanding of environmental research across knowledge systems.

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Data availability

Data generated or analyzed during this study are owned by the Nunatsiavut Government and remain with the knowledge holders and communities that participated in this work. Access to data generated and analyzed during this work will be determined by the Nunatsiavut Government Research Advisory Committee on behalf of those communities.

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The authors declare there are no competing interests.

Supplementary material

Supplementary data are available with the article at <https://doi.org/10.1139/as-2025-0037>.

References

- Agrawal, A. 1995. Dismantling the divide between indigenous and scientific knowledge. *Development and Change*, **26**(3): 413–439. doi:10.1111/j.1467-7660.1995.tb00560.x.
- Aporta, C. 2016. Markers in space and time: reflections on the nature of place names as events in the Inuit approach to the territory. *In* *Marking the Land*. Routledge.
- Bates, P. 2007. Inuit and Scientific Philosophies about Planning, Prediction, and Uncertainty. *Arctic Anthropology* **44**: 2 87–100. doi:10.1353/arc.2011.0065
- Bishop, B., Oliver, E.C.J., and Aporta, C. 2021. Co-producing maps as boundary objects: bridging Labrador Inuit knowledge and oceanographic research. *Journal of Cultural Geography*, **39**(1): 55–89. doi:10.1080/08873631.2021.1998992.
- Brice-Bennett, C. 1977. Our Footprints are Everywhere: Inuit Land Use and Occupancy in Labrador. Labrador Inuit Association.
- Brice-Bennett, C., Onalik, L., and Procter, A. 2023. Avanimiut: a history of Inuit Independence in Northern Labrador. Memorial University Press. doi:10.1515/9781990445163.
- Cadman, R., Dicker, M., Denniston, M., McCarney, P., Laing, R., Oliver, E.C.J., and Bailey, M. 2023. Using the Framework Method to support collaborative and cross-cultural qualitative data analysis. *FACETS*, **8**: 1–13. doi:10.1139/facets-2022-0147.
- Cadman, R., Snook, J., and Bailey, M. 2022. Ten years of Inuit co-management: advancing research, resilience, and capacity in Nunatsiavut through fishery governance. *Regional Environmental Change*, **22**(4): 127. doi:10.1007/s10113-022-01983-3.
- Cadman, R., Snook, J., Gilbride, J., Goudie, J., Watts, K., Dale, A., et al. 2023. Labrador Inuit resilience and resurgence: embedding indigenous values in commercial fisheries governance. *Ecology and Society*, **28**(2): doi:10.5751/ES-14110-280211.
- Cadman, R., Syliboy, A., Saunders, M., Denny, S., Denniston, M., Barry, E., et al. 2024. Using positionality and reflexivity to support equity

- in partnership-driven research. *Conservation Biology*, **38**(6): e14396. doi:10.1111/cobi.14396. PMID: 39587030.
- Cannon, S.E., Moore, J.W., Adams, M.S., Degai, T., Griggs, E., Griggs, J., The Indigenous Data Sovereignty Workshop Collective, et al., The Indigenous Data Sovereignty Workshop Collective. 2024. Taking care of knowledge, taking care of salmon: towards indigenous data sovereignty in an era of climate change and cumulative effects. *FACETS*, **9**: 1–21. doi:10.1139/facets-2023-0135.
- Carter, N., Dawson, J., and Cook, A. 2019. Arctic corridors and northern voices: governing marine transportation in the Canadian Arctic (Resolute, Nunavut community report). Université d'Ottawa /University of Ottawa. doi:10.20381/RUOR39361.
- Carter, N.A., van Luijk, N., Dawson, J., Parker, C., Grey, K., Provencher, J., et al. 2025. Niqivut (our food)–dimensions of Inuit country food harvesting and significance in Arctic Canada: bountiful, seasonal, “soul food”. *Arctic Science*, **11**: 1–15. doi:10.1139/as-2024-0007.
- Caughey, A., Kilabuk, P., Koonoo, T., Sanguya, I., Jaw, M., Allen, J., et al. 2024. We call it “soul food”: Inuit women and the role of country food in health and well-being in Nunavut. *Arctic Science*, **10**: 321–331. doi:10.1139/as-2023-0038.
- Chanteloup, L., Joliet, F., and Herrmann, T.M. 2018. The environment of the Nunavimmiut as seen through their own eyes. *Écoscience*, **25**(4): 359–379. doi:10.1080/11956860.2018.1517631.
- Chisholm Hatfield, S., Marino, E., Whyte, K.P., Dello, K.D., and Mote, P.W. 2018. Indian time: time, seasonality, and culture in Traditional Ecological knowledge of climate change. *Ecological Processes*, **7**(1): 25. doi:10.1186/s13717-018-0136-6.
- Cunsolo Willox, A., Harper, S.L., and Edge, V.L. 2013. Storytelling in a digital age: digital storytelling as an emerging narrative method for preserving and promoting indigenous oral wisdom. *Qualitative Research*, **13**(2): 127–147. doi:10.1177/1468794112446105.
- David-Chavez, D.M., and Gavin, M.C. 2018. A global assessment of Indigenous community engagement in climate research. *Environmental Research Letters* **13**: 12. doi:10.1088/1748-9326/aaf300.
- Denniston, M., Cadman, R., Dicker, M., McCarney, P., Laing, R., Oliver, E.C.J., and Bailey, M. 2021. Imappivut: Sustenance, culture and livelihood. Nunatsiavut Government Department of Lands and Natural Resources, Nain NL. pp. 21.
- Dubos, V., May, P., Gillis, C.-A., St-Hilaire, A., and Bergeron, N. 2023. Nunavik anadromous Arctic char life histories, behaviour, and habitat use informed by both Inuit knowledge and western science: a year in Ungava Bay. *Arctic Science*, as-2022-0019. doi:10.1139/as-2022-0019.
- Hammond, C., Gifford, W., Thomas, R., Rabaa, S., Thomas, O., and Domecq, M.-C. 2018. Arts-based research methods with indigenous peoples: an international scoping review. *AlterNative: An International Journal of Indigenous Peoples*, **14**(3): 260–276. doi:10.1177/1177180118796870.
- Held, M.B.E. 2019. Decolonizing research paradigms in the context of settler colonialism: an unsettling, mutual, and collaborative effort. *International Journal of Qualitative Methods*, **18**: 160940691882157. doi:10.1177/1609406918821574.
- Inuit Tapiriit Kanatami. 2018. National Inuit Strategy on Research. Inuit Tapiriit Kanatami. Available from https://www.itk.ca/wp-content/uploads/2018/04/ITK_NISR-Report_English_low_res.pdf.
- Kaplan, S.A. 2012. Labrador Inuit Ingenuity and resourcefulness: adapting to a complex environmental, social and spiritual environment. *In* *Settlement, subsistence and change among the Labrador Inuit*. Edited by D.C. Natcher, L. Felt and A. Procter. University of Manitoba Press. doi:10.1515/97808887554193.
- Kassam, K.-A.S., Ruelle, M.L., Samimi, C., Trabucco, A., and Xu, J. 2018. Anticipating climatic variability: the potential of ecological calendars. *Human Ecology*, **46**(2): 249–257. doi:10.1007/s10745-018-9970-5.
- Kimmerer, R.W. 2020. The Serviceberry: an economy of abundance. *Emergence Magazine*. Available from <https://emergencemagazine.org/story/the-serviceberry/> [accessed April 2025].
- Kovach, M. 2009. *Indigenous methodologies: characteristics, conversations and contexts*. University of Toronto Press.
- Latulippe, N. 2025. Race, indigenous knowledge, and a relational alternative in fisheries policy research. *Marine Policy*, **175**: 106600. doi:10.1016/j.marpol.2025.106600.
- Latulippe, N., and Klenk, N. 2020. Making room and moving over: knowledge co-production, indigenous knowledge sovereignty and the poli-

- tics of global environmental change decision-making. *Current Opinion in Environmental Sustainability*, **42**: 7–14. doi:[10.1016/j.cosust.2019.10.010](https://doi.org/10.1016/j.cosust.2019.10.010).
- LeMoine, G., and Kaplan, S.A. 2022. 100 Unidentified embroideries: investigating the Nunatsiavut textile tradition. Inuit Art Foundation. Available from <https://www.inuitartfoundation.org/jiaq-online/100-unidentified-embroideries> [accessed April 2025].
- Ljubicic, G., Okpakok, S., Robertson, S., and Mearns, R. 2018. Inuit approaches to naming and distinguishing Caribou: considering language, place, and homeland toward improved Co-management. *Arctic*, **71**(3). doi:[10.14430/arctic4734](https://doi.org/10.14430/arctic4734).
- Lovett, G.M. 2013. When do peepers peep? Climate and the date of first calling in the spring peeper (*Pseudacris crucifer*) in southeastern New York State. *Northeastern Naturalist*, **20**(2): 333–340. doi:[10.1656/045.020.0209](https://doi.org/10.1656/045.020.0209).
- Martinez-Levasseur, L.M., Simard, M., Furgal, C.M., Burness, G., Bertrand, P., Suppa, S., et al. 2020. Towards a better understanding of the benefits and risks of country food consumption using the case of walrus in Nunavik (Northern Quebec, Canada). *Science of The Total Environment*, **719**: 137307. doi:[10.1016/j.scitotenv.2020.137307](https://doi.org/10.1016/j.scitotenv.2020.137307). PMID: [32143094](https://pubmed.ncbi.nlm.nih.gov/32143094/).
- McKemey, M., Ens, E., Rangers, Y.M., Costello, O., and Reid, N. 2020. Indigenous knowledge and seasonal calendar inform adaptive savanna burning in Northern Australia. *Sustainability*, **12**(3): 995. doi:[10.3390/su12030995](https://doi.org/10.3390/su12030995).
- Middleton, J., Cunsolo, A., Jones-Bitton, A., Shiwak, I., Wood, M., Pollock, N., et al. 2020. We're people of the snow:" weather, climate change, and Inuit mental wellness. *Social Science & Medicine*, **262**: 113137. doi:[10.1016/j.socscimed.2020.113137](https://doi.org/10.1016/j.socscimed.2020.113137).
- Oberndorfer, E., Winters, N., Gear, C., Ljubicic, G., and Lundholm, J. 2017. Plants in a "Sea of relationships": networks of plants and fishing in Makkovik, Nunatsiavut (Labrador, Canada). *Journal of Ethnobiology*, **37**(3): 458–477. doi:[10.2993/0278-0771-37.3.458](https://doi.org/10.2993/0278-0771-37.3.458).
- Ortenzi, K.M., Flowers, V.L., Pamak, C., Saunders, M., Schmidt, J.O., and Bailey, M. 2025. Good data relations key to indigenous research sovereignty: a case study from Nunatsiavut. *Ambio*, **54**(2): 256–269. doi:[10.1007/s13280-024-02077-6](https://doi.org/10.1007/s13280-024-02077-6).
- Pedersen, C., Otokiak, M., Koonoo, I., Milton, J., Maktar, E., Anaviapik, A., et al. 2020. SciQ: an invitation and recommendations to combine science and Inuit Qaujimagatuqangit for meaningful engagement of Inuit communities in research. *Arctic Science*, **6**(3): 326–339. doi:[10.1139/as-2020-0015](https://doi.org/10.1139/as-2020-0015).
- Pfeifer, P. 2018. From the credibility gap to capacity building: an Inuit critique of Canadian Arctic research. *Northern Public Affairs*, **7**.
- Rathwell, K.J. 2020. "She is Transforming:" Inuit Artworks Reflect a Cultural Response to Arctic Sea Ice and Climate Change. *Arctic*, **73**(1). doi:[10.14430/arctic69945](https://doi.org/10.14430/arctic69945).
- Reid, A.J., Eckert, L.E., Lane, J.-F., Young, N., Hinch, S.G., Darimont, C.T., et al. 2021. "Two-Eyed Seeing": an indigenous framework to transform fisheries research and management. *Fish and Fisheries*, **22**(2): 243–261. doi:[10.1111/faf.12516](https://doi.org/10.1111/faf.12516).
- Ruelle, M.L., Skye, A.J., Collins, E., and Kassam, K.-A.S. 2022. Ecological calendars, food sovereignty, and climate adaptation in Standing Rock. *GeoHealth*, **6**(12): e2022GH000621. doi:[10.1029/2022GH000621](https://doi.org/10.1029/2022GH000621).
- Salusky, I.R., Kral, M., Amarak, B., and Wexler, L.M. 2022. Navigating between two the worlds of school and 'being on the land': Arctic indigenous young people, structural violence, cultural continuity and selfhood. *Journal of Youth Studies*, **25**(2): 170–192. doi:[10.1080/13676261.2020.1858040](https://doi.org/10.1080/13676261.2020.1858040).
- Smith, L.T. 2021. Decolonizing methodologies: research and Indigenous Peoples. Bloombury Publishing. doi:[10.5040/9781350225282](https://doi.org/10.5040/9781350225282).
- Snook, J., Cunsolo, A., Ford, J., Furgal, C., Jones-Bitton, A., and Harper, S. 2022. "Just because you have a land claim, that doesn't mean everything's going to fall in place": an Inuit social struggle for fishery access and well-being. *Marine Policy*, **140**: 105071. doi:[10.1016/j.marpol.2022.105071](https://doi.org/10.1016/j.marpol.2022.105071).
- Stern, P. 2003. Upside-Down and Backwards: Time Discipline in a Canadian Inuit Town. *Anthropologica* **45**(1):147–161. doi:[10.2307/25606121](https://doi.org/10.2307/25606121).
- Strand, M., Rivers, N., and Snow, B. 2022. Reimagining Ocean stewardship: arts-based methods to 'hear' and 'see' Indigenous and local knowledge in Ocean management. *Frontiers in Marine Science*, **9**. doi:[10.3389/fmars.2022.886632](https://doi.org/10.3389/fmars.2022.886632).
- Stuckenberger, A. 2006. Sociality, temporality and locality in a contemporary Inuit community. *Études/Inuit/Studies*, **30**(2): 95–111. doi:[10.7202/017567ar](https://doi.org/10.7202/017567ar).
- Tester, F.J., and Irniq, P. 2008. Inuit Qaujimagatuqangit: social history, politics and the practice of resistance. *Arctic*, **61**: 48–61. Canadian Business & Current Affairs Database.
- Todd, Z. 2020. The Rideau Canal in fall: understanding ontology and epistemology with Indigenous ways of knowing. In *Seasonal Sociology*, Edited by T. Davidson and O. Park. University of Toronto Press.
- Tuck, E., and McKenzie, M. 2015. Place in research: theory, methodology, and methods. Routledge.
- Turner, N.J., and Reid, A.J. 2022. "When the wild roses bloom": indigenous knowledge and environmental change in Northwestern North America. *GeoHealth*, **6**(11): e2022GH000612. doi:[10.1029/2022GH000612](https://doi.org/10.1029/2022GH000612).
- Whyte, K. 2017. Indigenous Climate Change studies: indigenizing futures, decolonizing the anthropocene. *English Language Notes*, **55**(1): 153–162. doi:[10.1215/00138282-55.1-2.153](https://doi.org/10.1215/00138282-55.1-2.153).
- Wilson, K.J., Arreak, A., Itulu, J., Committee, S.C.M., Ljubicic, G.J., and Bell, T. 2021. When we're on the ice, all we have is our inuit: mobilizing inuit knowledge as a sea ice safety adaptation strategy in. *Arctic*, **74**(4): 525–549. doi:[10.14430/arctic74212](https://doi.org/10.14430/arctic74212).
- Wilson, S. 2008. Research is ceremony: Indigenous research methods. Fernwood Publishing.
- Woodward, E., and Marrfurra McTaggart, P. 2019. Co-developing indigenous seasonal calendars to support 'healthy country, healthy people' outcomes. *Global Health Promotion*, **26**(3_suppl): 26–34. doi:[10.1177/1757975919832241](https://doi.org/10.1177/1757975919832241).
- Woollett, J. 2007. Labrador Inuit Subsistence in the context of environmental change: an initial landscape history perspective. *American Anthropologist*, **109**(1): 69–84. doi:[10.1525/aa.2007.109.1.69](https://doi.org/10.1525/aa.2007.109.1.69).
- Zurba, M., and Berkes, F. 2014. Caring for country through participatory art: creating a boundary object for communicating indigenous knowledge and values. *Local Environment*, **19**(8): 821–836. doi:[10.1080/13549839.2013.792051](https://doi.org/10.1080/13549839.2013.792051).