

**Tsattine People and Bison:  
Pre-Colonial Relationships and Ancestral Territories**

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## Abstract

Traditional knowledge and historical records indicate that communal hunting was an important practice for subarctic Beaver people (Dunne-zaa / Dane-zaa / Tsattine) of northern Alberta and northeastern British Columbia. Prior to the 20<sup>th</sup> century Beaver people hunted a variety of animals, including American bison (plains bison [*Bison bison bison*] and wood bison [*Bison bison athabascaae*]), which were nearly eradicated in North America by the late 1800s due to colonial impacts associated with European settlement. My thesis explores traditional relationships Beaver people had with animals, possible Beaver communal hunting methods and locations, and the subarctic/northern plains range of bison. I explore the social relationships between Beaver people and animals through stories, ethnographic and historical records. I argue that acknowledging this social relationship with animals supports revitalization efforts by challenging Western standpoints that often view animals (particularly food animals) as non-sentient beings, which is in contrast to Beaver/Indigenous understandings of animals as persons. I describe five potential communal hunting sites that may have been utilized by Beaver people for bison drives and/or jumps. Oral accounts of bison jumps in these northern regions contradicts Western literature which suggest that jumps did not occur in these areas, so further examination of these sites is recommended. To better understand where bison ranged prior to European contact, I compile instances of bison art and skeletal remains in areas of Alberta, Saskatchewan, Manitoba and Ontario—areas that are in the periphery of the generally agreed-upon Late-Holocene subarctic bison range. I use morphometric analyses to determine whether the artistic depictions are more typical of plains or wood bison. The results indicate that both plains and wood bison were depicted in areas outside of their known Late-Holocene ranges. It is therefore possible that their ranges could have been broader than is currently recognized. Overall, this

thesis aims to support the revitalization initiatives of the Tsattine Resurgence Society by synthesizing historical and ethnographic information on human-animal relationships and communal hunting practices, and by acknowledging Indigenous knowledge of bison through artistic depictions in Alberta and beyond.

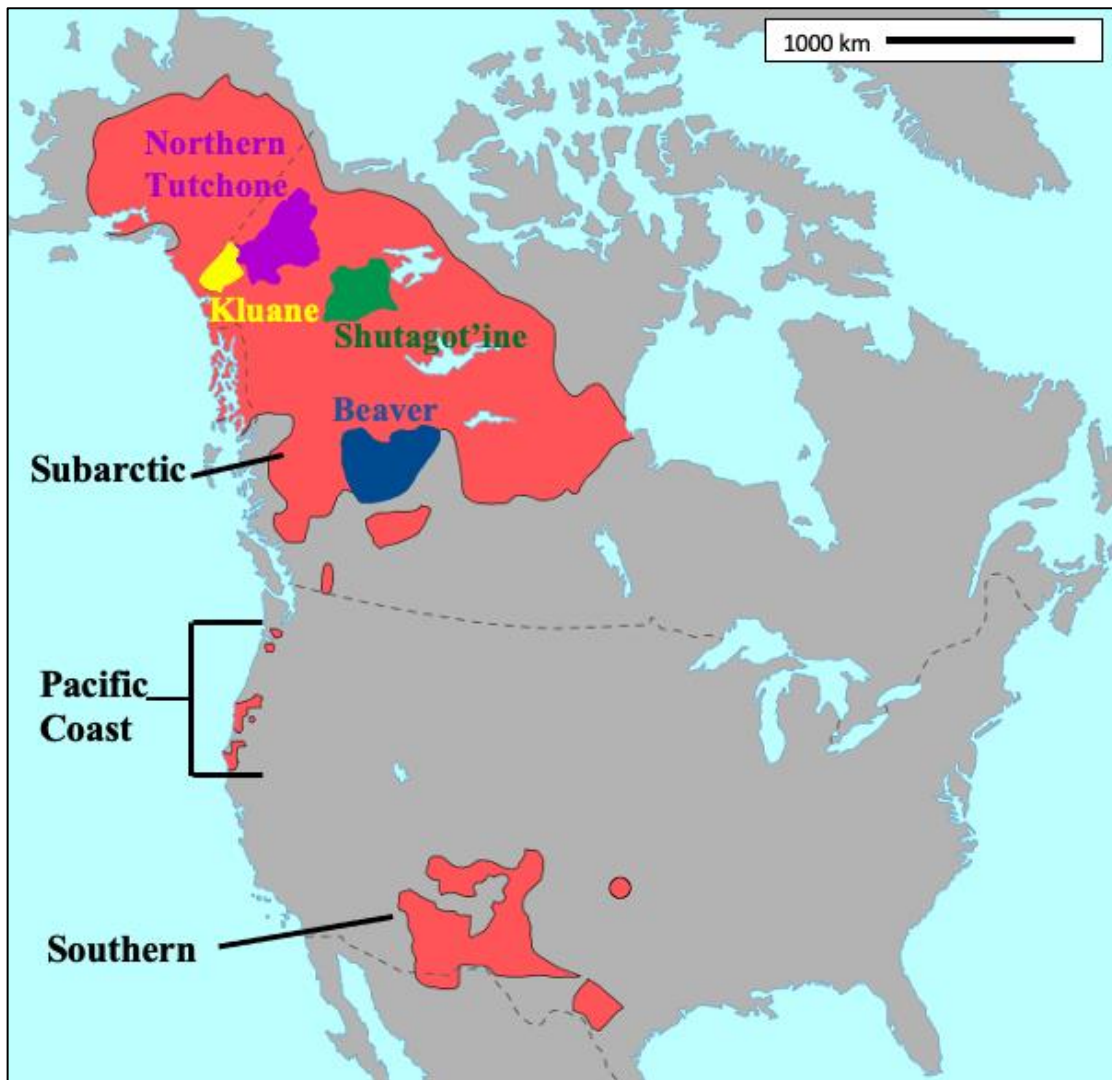


## Thesis Introduction

Historical communal hunting practices were important for reasons beyond resource procurement for many Indigenous groups across North America (Smith 2013). They were also used for maintaining and strengthening a society through “feasting, social networking, information exchange, mate selection and trade” (Smith 2013:11; Fawcett 1987). Methods used for communal hunting were diverse, including well-known uses of drive fences, jumps, pounds, and arroyo traps as well as lesser-known techniques such as driving animals onto water crossings, sand dunes, or large snowdrifts (Speth 2017:6; Hamilton & Nicholson 2006; Verbicky-Todd 1984). Both within and among groups, there was considerable complexity and diversity in the traps and techniques used (Hamilton & Nicholson 2006; Brink 2005; Brink 2013; Speth 2013; Ives 1990; Verbicky-Todd 1984). Ceremony, ritual and spirituality also underpinned many communal hunting practices. As Brink (2008:106) states, “everything about a buffalo hunt, from beginning to end, was steeped in spiritual beliefs and appropriate ceremony.” While my thesis focuses on bison, many other animal species (e.g., caribou, deer, pronghorn, small game, fish) were involved in communal hunting practices across North America (Brink 2005; Brink 2013; Burley et al. 1996; Brody 1988; Ives 1990). Communal hunting required extensive knowledge of the landscape, animal behaviour, as well as proper ceremony and spiritual support (Brink 2005; Brink 2008; Brink 2013; Ives 1990; Speth 2013; Hocket et al. 2013; Smith 2013; Hamilton & Nicholson 2006; Mills 1982; Ridington & Ridington 2013; Verbicky-Todd 1984).

Traditional knowledge and historical records indicate that the subarctic Beaver people (Dunne-zaa / Dane-zaa / Tsattine) of northern Alberta and northeastern British Columbia practiced communal hunting strategies. Beaver people are part of the Dene (Athapaskan) language family. Figure 1 shows the extensive distribution of Dene speakers throughout North

America, ranging from subarctic North America to the Pacific coast, and into the southwest (Ives 1990:53).



**Figure 1.** The Dene language family distribution throughout North America with Beaver, Kluane, Northern Tutchone and Shutagot'ine territories superimposed (adapted from Dene [Athapaskan] Languages Conference)

Knowledge about Beaver communal hunting in northern Alberta and northeastern British Columbia is both limited and contradictory. For example, some Western literature (Cooper 2008:216) states that bison jumps did not occur this far north, which goes against statements from Beaver Elders and community members from Treaty 8 First Nations (Doig River First Nations, Halfway River First Nations, Prophet River First Nations, West Moberly First Nations)

(T8FNs Community Assessment Team report 2012). Having limited and contradictory information about communal hunting practices, a foundational subsistence strategy and element of culture is problematic for Beaver people who are working to revitalize their traditional knowledge.

Relationships between Beaver people and animals are also important to explore so that they can be decolonized. Kinship was important among all subarctic forager societies, including Beaver society, and historical records indicate that Beaver people lived in and hunted with close-knit kin groups (Ives 1990:186,305). The connection of kinship was also extended to animals. Beaver stories indicate that animals were honored with various rituals and ceremonies and acted as teachers and caretakers; they were not just passive resources for hunters (Goddard 1916). This aligns with Nadasdy (2007 & 2016)'s work which states that subarctic hunters and their societies had *social relationships* with animals. This social relationship was based on reciprocity. Animals were considered "benefactors" to humans, and humans were expected to act respectfully towards animals and pay off spiritual debts acquired by hunting (Nadasdy 2016:7; Nadasdy 2007:27).

Beaver oral histories describe the intimate relationship between people and bison. Prior to European settlement, bison ranged over large areas of the north, including Beaver Territory and other subarctic regions. Bison were nearly eradicated prior to any scientific study of their range, and it is possible that the geographical range of bison during the Holocene epoch was even larger than scholars currently recognize. For example, some bison art images and skeletal remains have been found outside of bison's generally agreed-upon Late-Holocene territory. Colonial-era maps of bison's historic range rely on archaeological and historical records, as well as oral histories, and are a work in progress. Bison are an adaptable animal, and likely ventured beyond these boundaries based on the availability of ecological resources. Current efforts to physically return

bison to the landscape and re-centre bison culturally, economically, and spiritually demonstrate the link between decolonization and situating bison on the landscape.

My thesis also supports the Social Sciences and Humanities Research Council Insight Development Grant project, *Dene Bison Hunting and Migration: Western Science and Indigenous Perspectives*, co-led by Dr. Metcalfe (Lakehead University) and Beaver Knowledge Keeper Victoria Wanihadie (Tsattine Resurgence Society). This project explores Tsattine bison hunting strategies in northern Alberta using both traditional ways of knowing and Western science, and contributes to the revitalization efforts of the Tsattine Resurgence Society. A goal of my thesis is to support this revitalization work, and the information I have synthesized on Beaver human-animal relationships and communal hunting practices, as well as the potential limits of colonial-era maps, could be used to help with revitalization initiatives.

The first chapter of the thesis explores human-animal relations beyond a Western viewpoint, with particular emphasis on relationships between Beaver people and bison. The specific research questions include:

- What were some key characteristics of pre-colonial relationships between Beaver hunters and animals, especially bison?
- How were animals, with a focus on bison, situated as active agents in Beaver communal hunting practices?

This chapter has two parts. The first part explores a social human-animal relationship from a broad North American perspective using historical and ethnographic records of Plains peoples (Cree, Blackfoot, Cheyenne, Crow – see Figure 2 for approximate ancestral territories) and Subarctic Dene-speaking groups (Kluane First Nation, Northern Tutchone First Nation, Shutagot'ine, or Mountain Dene) (Figure 1). A social relationship will be explored through three

main concepts: relatedness (Govindrajana 2018; Carsten 2000) reciprocity (Nadasdy 2007; Nadasdy 2016) and teaching (Barsh & Marlor 2003; Arrows et al. 2010). The second part of the chapter explores these concepts in Beaver society. The chapter concludes with examples of how working from a social human-animal relationship perspective can help cultural revitalization efforts, and how this might be considered in Beaver cultural revitalization.



**Figure 2.** General locations of the ancestral lands of the Plains people. Cree, Blackfoot, Cheyenne and Crow have been circled in blue (Encyclopedia Britannica 2022)

The second chapter explores Beaver communal hunting practices and locations. The specific research question include:

- How did Beaver people of northern Alberta and British Columbia engage in communal hunting practices (with a focus on bison hunting) before and during the fur trade?
- What communal hunting locations are known within Beaver Territory?

This chapter has three main parts. Similar to the previous chapter, the first part takes a broad North American perspective to define key aspects of communal hunting. This includes historical and ethnographic communal hunting records of Plains peoples (including the Cree, Blackfoot, Cheyenne, Crow) as well as subarctic hunters. The second part includes a review of the literature about Beaver communal hunting practices. The chapter concludes by describing five possible communal hunting sites (two possible drive sites, two possible bison jump sites, and one bonebed site) associated with Beaver people within Beaver Territory. (Cultural affiliations are difficult to determine based on archaeological evidence, and various groups of people have inhabited Beaver Territory over time. It may be difficult to determine which group built and/or used which site, yet there is ample evidence that Beaver people hunted communally in this area. Beaver people describe their presence in this area since time immemorial. Thus there is a high probability that communal hunting sites in Beaver Territory would have been used by Beaver people.)

The third chapter of this thesis examines the geographical range of prehistoric bison art and skeletal remains, focusing on examples found outside the typically-accepted bison range in Alberta, Saskatchewan, Manitoba, and Ontario. The specific research questions include:

- What examples of bison art and skeletal remains exist on the periphery (and outside) of the generally-accepted bison range in central Alberta, northern Saskatchewan, and parts of Manitoba and Ontario?
- Can the morphometric measurements of modern bison be used to effectively determine which subspecies of bison (i.e., wood vs plains bison) is depicted in art?

This chapter has two parts. The first part is an introduction to American bison and differences between the two subspecies (wood bison [*Bison bison athabasca*] and plains bison

[*Bison bison bison*]). This includes an overview of their physical characteristics and geographical distribution.

The second part of the chapter identifies and reviews bison art and skeletal remains from Alberta, Saskatchewan, Manitoba and Ontario. The determination of subspecies was important in this analysis because depictions of wood bison in boreal locations would be expected if bison lived in these areas, as opposed to images of plains bison being reproduced from memories of encounters further south. Wood bison may have lived in northern boreal forest and parkland regions where the art was found, even if these areas are outside those typically indicated as bison habitats on historical range maps. In most cases, the subspecies of skeletal remains was not determined in literature reports, but I have reviewed relevant interpretations, where possible. For the art images, a statistical analysis developed by bison expert Wes Olson was used (Olson 2013; Olson & Merkle n.d.; Olson n.d. a; Olson n.d. b). Olson's methodology used morphometric measurements from photographs of modern wood and plains bison, which differ in key aspects of hump and body morphology. I measured hump angles and areas from images of bison rock art and effigies, and compared them to the photographic reference dataset to make inferences about the bison subspecies depicted in bison art. The examination of subspecies will also help inform the possibility of bison (and the people who depended on them) living and moving across multiple ecological zones and biomes. Adapting to new ecological zones and biomes was a sophisticated endeavor, as it involved a shift in sustenance strategies (Nicholson 1988). Some theories postulate that one factor in Dene migrations was buffalo hunting and following bison into different regions (Ives 2010).

## Thesis Approach

My thesis recognizes the impact of colonialism, not only on communal hunting practices, human-animal relationships and Beaver society but also on historical and modern materials and resources. I have worked to decolonize my approach by using and disseminating the information by following steps outlined by the authors Geniusz (2009) *Our knowledge is not primitive* and Kovach (2009) *Indigenous methodologies: characteristics, conversations and contexts*. As a descendant of settlers, I acknowledge that I cannot fully decolonize materials, only contribute and support the process.

The materials and resources I have used for the first two chapters of my thesis focus geographically on two distinct locations, northern Alberta and northeastern British Columbia. As with all cultural groups, Beaver groups are not homogenous, and there are regional and local differences between and within groups. While certain beliefs and practices may be widespread among Beaver people, regional and group differences are expected.

It is also important to note that the first two chapters of this thesis highlight traditional human-animal relationships and communal hunting practices of other Indigenous groups beyond Beaver people, such as Cree, Blackfoot, Cheyenne, Crow, and Anishinaabe. These examples are not meant to suggest a universal Indigenous identity but are cited as broad examples that may illustrate similarities in practices, as Kovach (2009:37) states:

“As Indigenous people, we understand each other because we share a worldview that holds common, enduring beliefs about the world. As Indigenous scholar Leroy Little Bear states: ‘there is enough similarity among North American Indian philosophies to apply concepts generally [2000:79].’”

When broad examples are used, specific tribal affiliations are acknowledged. As Kovach (2009:110) emphasizes, the distinctions between tribes is necessary as it “shows respect to Elders and allows community to locate us.”



Oral knowledge from Elders and Knowledge Keepers is often cited as “personal communication” or “unpublished interview” in the academic literature, (Indigenous Research Support Initiative 2020). This referencing style can delegitimize Indigenous knowledge, suggesting that it is transitory, or less credible than other Western scientific sources (Indigenous Research Support Initiative 2020). In efforts to decolonize how Indigenous knowledge is cited, new referencing styles are being developed and used to ensure that Elders and Knowledge Keepers are properly acknowledged, and that Indigenous knowledge is recognized as a legitimate source (Kwantlen Polytechnic University 2022). I have used a referencing style provided by Kwantlen Polytechnic University (2022) to cite all oral knowledge I received from Elders and Knowledge Keepers throughout the development of my thesis. All primary oral knowledge is referenced with an author/date format within the text of my thesis, and with a corresponding full reference in the reference section.

I have also relied on Beaver stories as evidence of communal hunting and cultural practices. Kovach (2009:147) states that “Indigenous knowledges are holistic and encompass knowledge sources that Western science may not acknowledge as legitimate.” Both Kovach (2009) and Geniusz (2009) underscore the power of stories, how they exist as both knowledge and evidence. Stories are, as Kovach (2009:94) states “a culturally nuanced way of knowing.” Geniusz (2009:45) warns that when exploring stories, it is important not to be too extractive and overlook spiritual properties. Stories should be told in the storyteller’s own voice as much as possible and as accurately as possible (Kovach 2009:131). Throughout my thesis, I have worked to stay true to the stories when paraphrasing and not to overly interpret the stories. The use of stories as evidence and the value of subjective knowledge tends to differ between tribal and Western epistemologies. However, “tribal knowledge is not Western knowledge” (Kovach

2009:30). While the Beaver stories used in my thesis were recorded by early European explorers as well as modern academics, Geniusz (2009:108) states that colonized texts do not need to be disregarded if they provide helpful content. I also acknowledge that as a settler scholar, I only have an incomplete understanding of these stories, and there are also other meanings beyond what I am exploring in my thesis. As with all stories, growing up with their teachings and repetitive use in different context results in a deeper, more fulsome understanding.

As a part of my thesis involves subspecies designation between wood and plains bison, I also acknowledge that, while relationships between Indigenous groups and Western science continues to change, Western science has had a long, complicated and problematic history with the use of DNA and perceptions of genetic purity (Reardon & TallBear 2012). For example, as a means of implementing colonial policies and identities, the Canadian government historically used a blood quantum system which determined the extent of an individuals' Indigenous heritage based on tribal documentation (Schmidt 2011). The aim of my thesis is not to suggest that genetic differentiation between subspecies was important for Indigenous people or a priority in their art. Instead, my intent is to use a Western approach to better understand bison movement/migrations and how it can relate to Tsattine/Beaver/Dene movement/migration and their ancestral territory.

Knowing which subspecies lived in Beaver Territory is also important to understand Beaver interactions with bison. Most people assume that wood bison were the dominant subspecies throughout the Peace region, which is part of Beaver Territory. However, van Zyll de Jong (1986) presented evidence from skeletal morphology that hybrid forms between wood and plains bison existed in this region. This is not surprising, since the Peace region is a mix of parkland and open prairie, similar to plains bison habitats found in the grasslands further south,

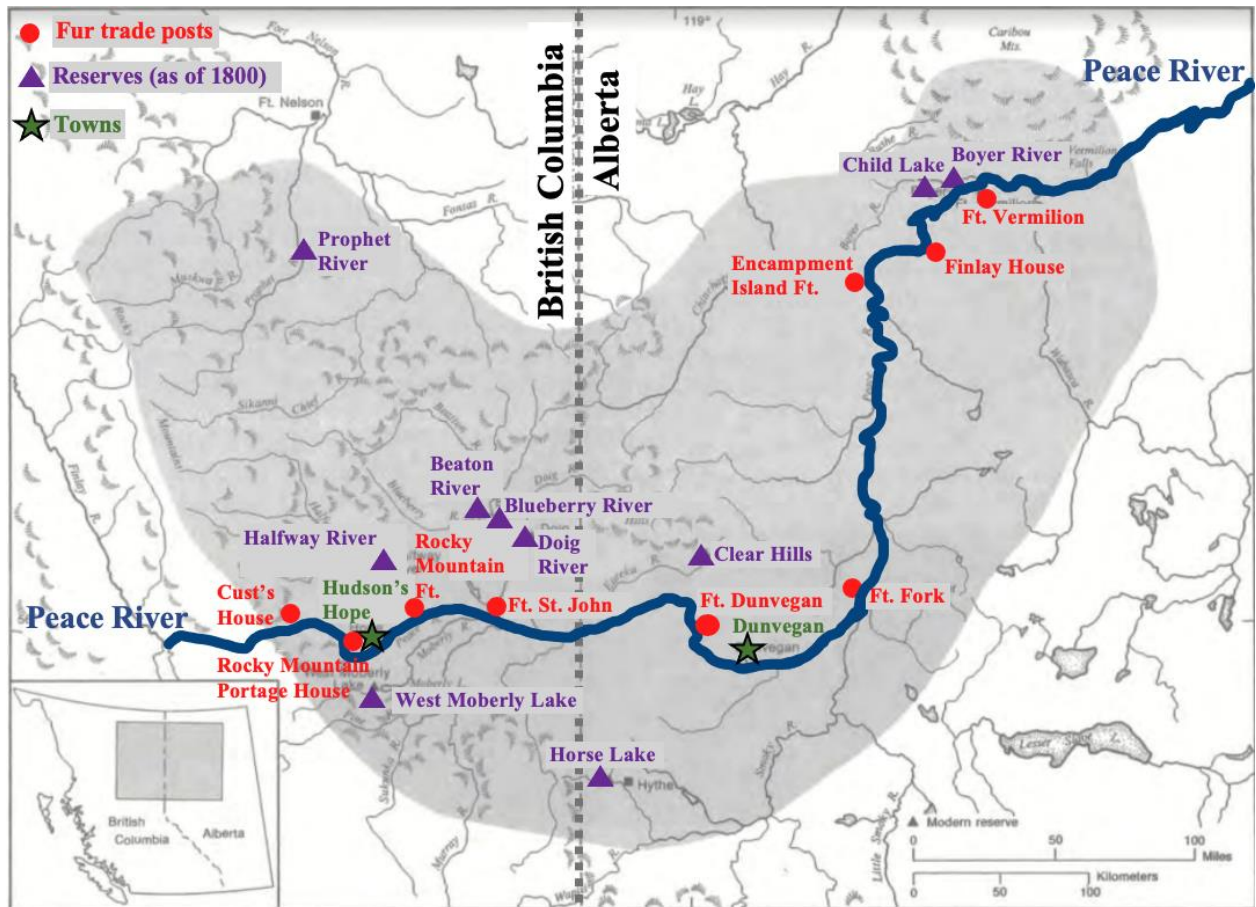
yet the surrounding areas are boreal forest (Alberta Parks 2015). In other words, the Peace region is a somewhat isolated instance of plains environments further north than other areas at the same latitude (e.g., eastern Alberta, Saskatchewan, Manitoba). Thus, the Peace region may have been inhabited by both plains and wood bison, and interbreeding in this area might be expected.

In the past, much research that involved Indigenous communities was harmfully extractive, often leaving a community disenfranchised (Kovach 2009:27). In relation to this issue, Kovach (2009:81-82) states that research that includes Indigenous communities should be useful for the community. Relationships with communities need to be made to ensure the product being produced will be of value to the community. Beyond my thesis, I have worked on the *Dene Bison Hunting and Migration: Western Science and Indigenous Perspectives* project as a Research Assistant to support the creation of a website that strives to decolonize knowledge about Beaver culture, traditional relationships and ways of knowing (*Tsattine Nisk'a: Preserving and Revitalizing Beaver Knowledge in Northwestern Alberta*). I was also asked to present on the work of my thesis at a virtual Facebook storytelling event hosted by the Tsattine Resurgence Society and the Historic Dunvegan Provincial Park. At this event, I shared the differences between Western human-animal relationships and those within Dene culture. In these ways, I have tried to ensure that the information explored throughout this thesis is of value to the Beaver community.

### **An Introduction to Beaver Territory**

Figure 3 shows the approximate extent of Beaver Territory in 1800 with locations of modern reserves, fur trade posts and towns superimposed over the historical range. This map was created by European scholar, Robin Ridington (1981), who worked primarily with Doig River

and Blueberry River First Nations communities in northeastern British Columbia. As a static map, this image cannot fully encompass the extensive territory where Beaver people have lived in North America since time immemorial and is only a snapshot in time from one perspective.



**Figure 3.** Traditional range of Beaver Territory in the 1800s with reserves, fur trade posts and towns depicted by Ridington (1981) (Documentation of Endangered Languages n.d.; Ridington 1981). However, Beaver Territory extended over a significantly larger area of Alberta, including at least as far south as the Grande Prairie region (not shown on map) (Dawson 1879).

In terms of the environmental conditions, Beaver Territory within northeastern British Columbia to northwestern Alberta experiences a subarctic climate with a mixed environment of boreal forest and aspen parklands (Ives 1990:56). The weather is unpredictable which demanded a lifestyle of constant adaptation (Ives 1990:59-60,306). Winters are long, cold and intense with game animals dispersed over large areas of land (Ives 1990:56). Beaver people hunted a variety

of animals including moose, caribou, bison, beavers, rabbits, bears and fish throughout the year (Goddard 1916:214-217; Ridington & Ridington 2013). Beaver people had extensive knowledge of the land's resources, and where to find resources within any season (Ridington & Ridington 2013:238).

The cumulative effects of European contact devastated traditional ways-of-life for Beaver people and other Indigenous cultures across North America. In the late 1780's, European explorer and trader Peter Pond may have been the first European to interact with Beaver people in northwestern Alberta in a trading capacity (Ives 1990:133-139). Following this first contact, and throughout the 1700 -1800's, the relationship between traders from the Northwest Company and Hudson's Bay Company, and Beaver people along with other Indigenous groups was economic in nature. During this time, the price of furs was higher than the cost of goods, giving Indigenous people considerable power in their relationships with European fur traders (Ives 1990:139). Beaver people on the upper and middle Peace River also had the option of two competing fur trading companies to work with and could therefore leverage their compensation (Ives 1990:138-139). While relationships began as economic in nature, due to unsustainable competition between fur trade companies, an ongoing demand for furs and provisions and a dwindling animal population led to increasing exploitation of Indigenous trappers (Burley et al. 1996; Ives 1990). Fur traders set up a system that indebted trappers and put enormous pressures on them to alter their modes of hunting (Burley et al. 1996; Brody 1988). As Ridington (1979:74) states, "...traditional relationships to the environment had been altered by 1799...[Beaver people] were evidently deployed for large-scale hunting and trapping, rather than communal subsistence activity...".

By the late 1800s, European settlers began displacing Indigenous groups, including Beaver people, from their ancestral lands. Settlement critically impacted Beaver culture, traditional relationships with animals, people and ways of life. Beaver people's rich spiritual life, beliefs and society were viewed as a threat to settlers. Beaver people endured horrific government-mandated practices designed to convert them to Christianity and assimilate them into settler-society, including, but not limited to, the residential school systems, forced removal of Indigenous children from their homes and families and placement into foster systems (i.e., the 60's scoop) and Indigenous hospitals (Morin 2015; Pelley 2018; Historic Dunvegan Provincial Park 2020; Brody 1988). Like other Indigenous groups, Beaver people were also exposed to and died from infectious diseases brought by Europeans (Burley et al. 1996).

The arrival of Europeans and establishment of the fur trade complicated and inflamed relationships between Beaver people and their neighbours, such as the Cree. Throughout the 1600s and 1700s, the Cree acted as middlemen between European traders and Indigenous trappers (Burley et al. 1996:13). This position with Europeans gave the Cree access to rifles, which allowed them to displace other groups to benefit themselves and European traders (Burley et al. 1996). The Cree eventually expanded into Beaver Territory in the Peace region, as they had been promised land by Europeans, at the expense of the current inhabitants (Wanihadie 2022b). This expansion resulted in the killing of Beaver people, and eventually a battle ensued between Cree and Beaver people, where many died (Wanihadie 2022b). Beaver people eventually called in medicine people, and a truce was made at Peace Point in Alberta, west of Lake Athabasca (Burley et al. 1996; Wanihadie 2022b). This truce is where the name "Peace River" comes from (Wanihadie 2022b; Burley et al. 1996).

Extensive settlement, agriculture and resource extraction have also occurred since the 1800s and has shifted the landscape. For example, the aspen parkland in northwestern Alberta underwent extensive modification through agriculture, with approximately 70% of the area now cultivated (Alberta Parks 2015:32). The northwest region of British Columbia has undergone natural gas and mining exploration and extraction, which has drastically altered the landscape and the ecosystem (Alberta Parks 2015:129).

The successive, cumulative effects of European settlement resulted in the destruction and marginalization of Indigenous people, their culture, traditional relationships and ancestral lands. However, powerful work by Indigenous groups to decolonize and heal from these events is taking place. I discuss some of this work in my thesis.

## Chapter One: Animals as Social Partners - Exploring Human-Animal Relationships in Traditional Hunting Practices

“One time there was a man who with many children was living by himself. In the middle of the winter his wife died, and he went to join the other people. He had been taking care of an orphan child, but now could do nothing for him, so he deserted him, leaving him alone in the camp. When he passed by the next spring, he found the child was still alive and took him along, “How did you get through the winter without freezing?” he asked the child. “A wolf took care of me. He slept with me and made a fire for me. That is why I did not freeze to death. He also fed me with meat,” the boy said. The boy lived long after this, until he was of middle age and finally died of some ailment.” (Goddard 1916:261)

This is a one of many Beaver stories shared with American ethnologist Pliny Goddard by people of Paddle River in 1913<sup>1</sup> (Goddard 1916). Far from being a passive resource for food and materials, animals are embedded within Beaver stories in complex and nuanced ways. These roles are reflected in Beaver society, where animals act as caretakers, persecutors, teachers, tricksters and protectors. Animals are considered sentient and are not dominated by humans. The roles and relationships with animals illustrate differences in human-animal relationships among the Beaver people and other Indigenous groups compared with those in Western society.

This chapter will explore human-animal relations beyond the dominant Western viewpoint by examining a *social relationship* between humans and animals that is evident in traditional knowledge and hunting practices (Nadasdy1999; Nadasdy 2007; Mullin1999). Specifically, this chapter seeks to answer the following questions: what are some key characteristics of pre-colonial relationships between Beaver hunters and animals, especially

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<sup>1</sup> While there are limited government records on the people and the reserve near Paddle River that Goddard visited in 1913, in he states that: “Near Vermillion are one hundred and forty-eight Beaver Indians forming one political unit under a chief recognized by the Canadian Government. They live on a reserve along Paddle River, and hunt and trap westward towards Hay Lake, and north an eastward toward the Caribou Mountains.” The reserve is no longer in existence. It may have been sold and its people relocated.



bison? How were animals, with a focus on bison, situated as active agents in Beaver communal hunting practices?

The chapter has two parts. The first part will explore social relationships between humans and animals from a broad North American perspective using historical records and modern accounts of Plains peoples (including the Cree, Blackfoot, Cheyenne, Crow) as well as subarctic and northern hunters. Social relationships between humans and animals will be explored through three main concepts: relatedness (Govindrajan 2018; Carsten 2000) reciprocity (Nadasdy 2007; Nadasdy 2016) and teaching (Barsh & Marlor 2003; Arrows et al. 2010). The second part of this chapter will explore how these concepts align with human-animal relationships in Beaver society. The chapter will conclude with examples of how working from a social relationship perspective could help cultural revitalization efforts, and how this might be considered in Beaver cultural revitalization.

### **Beyond A Western Vantage Point**

All human thought is situated in what Harding (1995) calls a ‘historical location’. This refers to “...not being able to be everywhere and see everything, and of being ‘contained’ by cultural assumptions that become visible only from outside that culture” (Harding 1995:341). One landmark of this locationality in Western society relates to the understanding of humans and animals. Historically, anthropology has assumed that only humans experience society and culture (Noske 1993; Safina 2020). It was only in 1964 that Jane Goodall provided the first account of chimpanzee culture, offering a different perspective of animals that situated them as having culture and personhood (Safina 2020:246). Since then, some anthropologists have begun to look beyond the human, engaging in ‘multispecies ethnography. Multispecies ethnography studies

how humans interact with plants and animals, and the rights of other species, beings, and landscapes (Kirksey & Helmreich 2010; Parathian et al. 2018; Kopnina 2017). Anthropology is slowly shifting away from views of ‘human exceptionalism,’ to explore the intimate and complex connections that humans have with their environments, including non-human persons, which encompasses animals, as well as plants and fungi (Kirksey & Helmreich 2010; Parathian et al. 2018).

Western relationships with animals are nuanced, with pets and livestock, for example, holding different social spaces. Many people in the West see their pets as part of the family exemplified by popular vernaculars such as “fur babies”, emphasizing the place of pets within the family structure (Magliocco 2018). Pets can also hold a spiritual place in Western households. For example, Kopnina (2017) shows that people following the Christian faith are willing to suspend traditional religious beliefs (i.e., that animals do not have souls and therefore cannot enter Heaven) and embrace the idea that they will meet their pet again when they die. When pets die, one belief is that they cross the Rainbow Bridge into a Heaven-like paradise for animals. When humans die, they can meet their pets on the Rainbow Bridge. For non-Christians, one study showed that many people believe that their pet is likely to reincarnate, or that loved ones can reincarnate into pets (Kopnina 2017).

As Kopnina (2017) states, while these attachments to pets can be powerful, the placement of pets within the family is still flexible, and pets are sometimes freely or forcibly abandoned under different circumstances. In contrast to Western views on companion animals such as cats and dogs, many other animals in Western society are treated as non-sentient and passive resources. While pets are welcomed into the family, livestock or other food animals often live outside of the public gaze and can be considered distinct and separate entities from humans. This

view of livestock as passive resources and the separation between (certain) animals and humans may have some roots in belief systems such as Christianity.

Prior to Darwinism, the “great chain of being” expressed the Christian belief that humans and animals are at different levels in a divine hierarchy (DeMello 2012:37,49,51). The Bible clearly lays out this hierarchical structure in Genesis:

“26 And God said, let us make man in our image, after our likeness: and let them have dominion over the fish of the sea, and over the fowl of the air, and over the cattle, and over all the earth, and over every creeping thing that creepeth upon the earth.  
27 So God created man in his own image, in the image of God created he him; male and female created he them.  
28 And God blessed them, and God said unto them, Be fruitful, and multiply, and replenish the earth, and subdue it: and have dominion over the fish in the sea, and over the fowl of the air, and over every living thing that moveth upon the earth” (*King James Version Bible*, 1611, Genesis 1:26-28).

Along with enshrining a divine hierarchy and an explicit domination of man over other animals, the Bible does include passages about animal welfare, including but not limited to “A righteous man regardeth the life of his beast” (*King James Version Bible*, 1611, Proverbs 12:10) and “Be thou diligent to know the state of thy flocks and look well to thy herds” (*King James Version Bible*, 1611, Proverbs 27:23). While passages like these indicate the importance of caring for animals, the overarching message of this creation story maintains a strict human-animal hierarchy, the belief that animals are created *for* humans, and that humans have the right to control/dominate animals. As stated by Sorenson (2014:22), “conditions for violence flourish when the world is structured hierarchically...the further down the great chain of being a creature is placed, the lower the barriers to violence.” Although Christianity may uphold a hierarchal belief between animals and people, it does not condone animal abuse (Suhay 2021).

In contrast to Christian teachings, animals in Haudenosaunee and Beaver creation stories act as co-creators of the world, as well as protectors and teachers for humans. Kimmerer

(2013:4) outlines the Haudenosaunee creation story of Skywoman, who created the world with the help and guidance of animals. The animals took care of her and provided the necessary building materials:

“Skywoman bent and spread the mud [provided by Muskrat who had sacrificed his life to dive deep to the bottom of the water to get it] with her hands across the shell of the turtle. Moved by the extraordinary gifts of the animals, she sang in thanksgiving and then began to dance, her feet caressing the earth. The land grew and grew as she danced her thanks, from the dab of mud on the Turtle’s back until the whole earth was made. Not by Skywoman alone, but from the alchemy of all animals’ gifts coupled with her gratitude.”

Animals are also important agents in Beaver creation stories. As told by Dreamer Charlie Yahey of Blueberry First Nation, Yaak’ih Sadę (Sky Keeper) created the earth with the help of animals:

“When this world began, it was all covered with water.  
There were no people. There was only him [Sky Keeper].  
He made a big cross. He floated that cross on the water.  
From the centre of that cross,  
He sent all the water animals down to find earth.  
Many tried but couldn’t make it.  
The Chehk’aa, the little muskrat, tried.  
He went way down. He dove down deep into the water  
and came up with a little bit of dirt [beneath his nails].  
He just made it back up. He came back.  
Sky Keeper put the earth at the centre of the cross.  
“You are going to grow,” he told it.  
“You are going to grow into bigger and bigger ground.  
You are just going to keep on growing.”  
Sky Keeper made man, and he made woman  
to stay with him and work with him.” (Ridington & Ridington 2013:14-15)

Beaver people at Paddle River told a similar story in the early 20<sup>th</sup> century (Goddard 1916). This story recounts of the restoration of the earth following a flood, where people turned themselves into water birds and searched for land (Goddard 1916:256). The water birds tried to find a source of land below the water but struggled to dive deep enough.

“One of them [a water bird], named Xak’ale, also dived into the water saying he would look for land. He went down disappearing from sight. He was gone a long time and when he came up, he was on his back vainly trying to breathe. He breathed a little and said, “Look here under my finger nails.” They looked under his nails and found some earth there which they took out. Xak’ale who brought up the land was small. Trees began to grow again on the land which was taken from the water and the earth was made again. They say birds did this and the one who succeeded was named Xak’ale.” (Goddard 1916:256-257).

Different creation stories lay different foundations for cultural norms and expectations in society, including that of human-animal relations. Even though some Bible passages advise people to take responsibility and care for animals (*King James Version Bible*, 1611, Proverbs 12:10, 27:23), the Bible uniformly portrays animals as subordinate to humans. In contrast, animals in certain Indigenous creation stories animals are regarded and treated as sentient, intelligent beings with power and agency. They are not subordinate to humans, do not rely on humans for protection, and instead, they are the ones that watch over humans.

Vivieros de Castro (1998) argues that, broadly speaking, Indigenous and Western societies have opposing beliefs about the fundamental differences between animals and humans. For example, Vivieros de Castro (1998) posits that many Indigenous societies in the Americas believe that all living beings have a mind/spirit, or sentience. From a broad Indigenous perspective, having sentience is the fundamental commonality between animals and humans. The difference is their physical bodies. Physical bodies facilitate and limit how we experience the world, therefore, humans and animals experience the world differently because of their bodies (Vivieros de Castro 1998). Conversely, Western societies tend to view the physical body (or biology) as the main similarity between humans and animals, as all physical bodies are made up of the same substance - chemical elements (i.e., DNA) (Vivieros de Castro 1998:474). From a Western perspective, the fundamental difference between humans and animals is their mind/spirit, with humans having a superior mind/spirit (i.e., intellect and morality) than animals,

allowing humans to enter Heaven. This perspective can be explored through social Darwinism, which places animals and humans in the same biological arena, yet animals occupy a lower rank than humans based on a perceived lack of sentience, intelligence and morality (Yanagisako & Delaney 1995:5, from Mullin 1999:206). “Humans might be animals, but humans alone possessed rationality, language, consciousness, or emotions” (Mullin 1999:206). In modern science, animals are considered to be sentient only if they can prove themselves to be self-aware through scientific tests (DeGrazia 2007). Some tests, such as the Gallup mirror test, require animals to recognize themselves in a mirror. This level of self-awareness is thought to “correlate with higher forms of empathy and altruistic behaviour” (Plotnick et al. 2006:17053). In Western society, sentience is generally considered unique to humans, and only recently inclusive of some animals (Safina 2020; Bekoff 2007; Bekoff & Pierce 2010). In contrast, the sentience of animals tends to be assumed and unquestioned in Indigenous societies.

Although Western society may see biology as a key similarity between humans and animals, this similarity has historically been limited to only basic physiological elements. Humans and animals might have the same physiological building blocks, but their bodies are not to intermix. Medieval Europeans were deeply concerned with the negative impacts of the enmeshment of human and animal bodies, which is evident in popular villains (i.e., werewolves) that were central to medieval myths and stories (Cohen 1994:65 quoted from Mullin 1999:204; DeMello 2012:38). These fears, coupled with religious overtones of a divine separation between humans and animals help exemplify why a social relationship with animals (with the recent exception of pets) has historically been an unmanageable reach for Western society.

When Eurocentric perspectives about animal-human relations go unchallenged, it limits and influences how other cultures are understood. As Harding (1995) mentions “administrative-

managerial activities, including the work of the natural and social science, is the form of “ruling” in our contemporary modern societies, and the conceptual frameworks of our disciplines are shaped by managerial priorities” (Harding 1995:341). It cannot be assumed that dominant views of human-animal relations are universal or culturally neutral (Harding 1995:337). As Nadasdy (2007:30) states, “even the most sophisticated symbolic analysis of human-animal relations in the North tend to deny Indigenous hunters’ own understandings of the world by assuming that the social relationships with animals they describe are cultural constructs.” Nadasdy (2007) argues that social relationships with animals are a very real and intricate part of Indigenous groups’ worldview, and a Western human-animal perspective could undermine critical elements of Indigenous social structures. Exclusively looking to Western human-animal relations also undermines conservation and resource management, where different Indigenous groups view animals as an intricate part of their society, instead of a passive, non-sentient resource to be controlled and managed by humans (Schmidt & Dowsley 2010; Nadasdy 1999).

The following sections work to adopt a different vantage point by examining the social relationship of humans and animals through the concepts of relatedness, reciprocity and teaching. Western perspectives of human-animal relations provide only one standpoint, and in order to work towards meaningful reconciliation, revitalization and engagement with Indigenous communities, we need to ‘turn our gaze’ to see animals through a different cultural lens.

### **Relatedness: A Bedrock for Social Relationships**

The concept of relatedness helps uncover the foundation from which social relationships with animals are built. Govindrajana (2018) outlines the concept of relatedness as “the myriad ways in which the potential and outcome of a life always and already unfolds *in relation to* that

of another” (Govindrajan 2018:3; Carsten 2000). Brink (2008) describes different examples of intimate relations between bison and people, relations that deeply impact the senses, bodies and lives of both parties. These were not superficial or sterile relationships but involved intimate knowledge of each other, and at times, physical embodiment.

Bison were embodied by Plains people to help facilitate a successful hunt. For example, Buffalo Runners would gain proximity to bison herds by imitating other animals that were tolerated around the periphery (i.e., pronghorn, deer, elk, wolves and coyotes) (Brink 2008:124-130). The hunters would wear the hides of these other animals, skillfully mimicking their movements, and ultimately transforming themselves in order to get close to the herd. Once in close range, hunters could then shoot and kill a preferred bison (i.e., one with significant fat) with bows and arrows (Brink 2008; Brink 2016). Buffalo Runners would also use similar tactics to move a herd towards a desired location (i.e., a buffalo jump or pound). Hunters would wear bison or calf hides to get the attention of the herd. Once the herd saw another bison moving away from them or suspected that calves were in trouble (hunters would expertly mimic the cries of calves), the herd would soon follow. This gave the Buffalo Runners the opportunity to lead the herd towards the desired destination (Brink 2008:124-130).

Plains people were careful about using these tricks in case the bison learned them, which demonstrates their respect for the intelligence and sentience of these beings (Brink 2008:158-159). For example, after driving a herd over a buffalo jump, it was of utmost importance to ensure that none of the bison escaped alive. If they did, the bison could share their experiences with other bison, eventually making the hunters’ tricks ineffective (Brink 2008). It was not taken for granted that the bison were complacent and could always be tricked; great care was taken to ensure that bison did not learn.



Bison also took up significant physical space and had authority on the Great Plains. Free-roaming, they were not relegated to pastures nor hidden from view. Instead, their bodies and behaviour helped shape the landscape and the world inhabited by humans. The movement of bison across the landscape shook the ground for “kilometres around” (Brink 2008:148). “There are numerous testimonials from early fur traders, hide hunters, and pioneers attesting to the sheer physical chaos of a thundering bison herd” (Brink 2008:148). A thundering bison herd would have an affective impact on the humans sharing the land with and hunting these animals. The sound and feel of the earth-shaking wild bison helped create a different relationship than can be appreciated by the herding and handling of animals behind the closed doors of the Western industrial complex. Instead, the bodies of the bison permeated the lives of Indigenous groups in a visceral way.

These experiences challenge Western human/animal boundaries. A traditional hunter and the animal are not entirely separate entities, instead, their lives and deaths intimately hinge on each other – a hinge constructed through social relations.

### **Reciprocity and Violence**

In her multispecies ethnography, Govindrajan (2018) describes the concept of ‘life-death entanglement’ through the relationship between dogs and leopards in India’s central Himalayas. For leopards to survive, they must kill and eat villagers’ dogs. For one animal to live, another had to die. The villagers do not intervene, as they view this as a ‘natural’ relationship existing between the two animals (Govindrajan 2018:176). “This was not senseless violence, nor was it born of simple animal instinct. This was the violence at the heart of relatedness, the expected outcome of a difficult yet inevitable entangling of lives and fates” (Govindrajan 2018:176).

Through Govindrajan's (2018) example, it becomes clear that relatedness does not always mean the absence of violence. This is an important distinction between Western industrial practices of animal violence and the violence required for traditional hunting practices, and more generally, between ideas that 'relations' are those whom we love and would never harm. Violence is multifaceted and applying Western understandings of animal violence to traditional hunting undermines Indigenous knowledge and culture.

In the West, livestock and food animals are subjected to violence and suffering by the 'animal industrial complex' (Sorenson 2017:298 quoted from Noske 1989). The animal industrial complex is "the collective term used to describe the many traditions, institutions, and industries that transform animals into products and services for human consumption..." (Sorenson 2014:298). This industrial complex has normalized an attitude of indifference towards and ignorance of animals that are actively exploited. Problems arise when the violence animals endure within these industries is compared to Indigenous hunting practices. While hunting involves a level of violence, this section argues that not all violence is equal.

Traditional hunting practices of northern Indigenous communities exist within a reciprocal social relationship between humans and animals. This aligns with the concept of the Honorable Harvest articulated by Anishinaabe botanist Robin Wall Kimmerer (2013:194), in which she states "a harvest is made honorable by what you give in return for what you take." She also poses the question, "...how do we consume in a way that does justice to the lives that we take?" (Kimmerer 2013:177). Although violence, as well as trickery and manipulation are part of the traditional hunting relationship, it is not a one-way affair (Nadasdy 2007:27). Nadasdy (2007) defines the relationship as "a long-term relationship of reciprocal exchange between animals and the humans who hunt them" (Nadasdy 2007:25). Animals are not passive victims

taken at will and dominated by the hunter. Animals give their bodies as gifts to the hunters, and these gifts are not taken lightly (Nadasdy 2007). Reciprocal exchange requires a *social* dimension to the relationship. This contrasts with the slaughter of Western livestock, which may occur without remorse and is certainly not thought of as a gift freely given by the animals. Indigenous hunters must also repay spiritual debts to the animals. If a hunter fails to repay their debts, there can be serious consequences (Nadasdy 2007:28). These consequences can include “causing the hunter to lose his or her luck in hunting, or they [the animal] may cause misfortune, sickness, or even death to the hunter or members of the family” (Nadasdy 2003: chapter 2 quoted from Nadasdy 2007:28).

In stark opposition to Western views, Nadasdy (2016) states that hunters typically view the relationships between humans and animals as being unequal, with animals holding the advantage (Nadasdy 2016:7). The very survival of humans depends on the goodwill of their animal benefactors (Nadasdy 2007:7). Animals are considered “powerful and dangerous trading partners” (Nadasdy 2007:28). Therefore, although violence is enacted on the animals, they are not without agency. Traditional hunting is not an act of violence void of love, respect and relatedness, instead it is centered around these values. As Govindrajan (2018:176) states, “perhaps this recursive play between life and death, regeneration and degeneration, is what ties lives together in knots of relatedness.”

### **Teaching: Social Relationships in Action**

The social relationship between humans and animals extends beyond hunting. Animals are also teachers. As Arrows et al. (2010:3) states, “non-human entities, from rocks to raccoons, have an intelligence equal to or greater than that of humans and should serve as “teachers” for

us.” Barsh and Marlor (2003) provide evidence to support the Blackfoot contention that their people learned bison hunting practices from wolves. “Blackfoot learned to live together and hunt bison in social groups from wolves and refer to their ancestors as “the wolf people” (Barsh & Marlor 2003:581). Barsh and Marlor (2003) describe how wolves would use the landscape to their advantage, and drive bison towards areas where hunts were more likely to be more successful (Barsh & Marlor 2003:583).

This act of learning from wolves implies that *what wolves did* has inherent value, not just what they could provide materially. As Noske (1993) mentions, “in addition to a *human-animal* relationship there also exists something like an *animal-human* relationship, and that totally ignoring the latter will lead to a one-sided subject-object approach...” (Noske 1993:186, original italics). Social relationships have an element of two-way exchange, and animals as teachers support this type of interaction. Although animals acting as teachers may be an unusual role for them in Western society, “all traditional education of Indigenous Peoples, including rituals, ceremonies, storytelling, art etc., express partnerships with plants and animals” (Arrows et al. 2010:11).

### **Beaver People and Human-Animal Relationships**

This section explores human-animal relationships from a historical perspective among the Beaver People of Paddle River, Doig River and Blueberry First Nations.<sup>2</sup> Animals were not only required for food and materials but they were also woven into the social fabric of Beaver people’s lives. Utilizing only a Eurocentric human-animal perspective causes us to overlook key (animal) actors within the Beaver social network.

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<sup>2</sup> Doig River and Blueberry First Nation were known as the Fort St. John Beaver Band until they were divided in 1977 (Ridington & Ridington 2013:xi).

Hunting was critical for survival, and many stories highlight the dangers and social disapproval associated with hunting and living alone (Goddard 1916). Although Beaver people tended to live in and rely on close-knit groups (Ives 1990:306), the concept of kinship was not limited to immediate family. “Beings with whom the Dane-zaa have relationships include the animals who provide them with life’s necessities...” (Ridington & Ridington 2013:197). Animals are included as part of Beaver people’s relational network, providing evidence of a social human-animal relationship.

Similar to the Indigenous groups living on the Great Plains, materials for tipis, clothing and other products were obtained from animal hides. Animals also acted as guides in children’s vision quests, or *Shin kaa* which means “to seek a song or power from an animal friend” (Ridington & Ridington 2013:45). These powers do not only come from individual animals but are also connected with giant animals that were banished a long time ago for terrorizing people, and now live under the earth (Ridington & Ridington 2013:43-44).

The concept of animals as powerful entities is evident in historical accounts of Beaver hunting practices. Hunting was not taken lightly and required good character, respect, and at times, spiritual ceremony to gain advantages over the animal. For example, community members from Paddle River state that Beaver hunters would attempt to get the advantage over a moose or bison by seeking assistance from supernatural helpers and engaging in ritual eating and drinking rituals and observing food taboos prior to hunting (Goddard 1916:226). Beaver hunters also relied on their dreams to help guide their hunting practice. “The hunter dives into his dream to discover an animal who is willing to give himself to the people. The hunter cannot take an animal’s life without its consent. Animals do not consent unless they know the hunter has a good

and generous spirit” (Ridington & Ridington 2013:45). This aligns with Nadasdy (2016)’s mention of humans and animals being “unequal”, with animals having the advantage.

The following section will review stories and key findings from stories told by Beaver People at Paddle River to explore the social relationship they had with animals (Goddard 1916; Ridington & Ridington 2013).

### *Beaver Stories about Human-Animal Relations*

The story *The Equally Matched Magicians* describes a conflict between two men. To physically confront each other, one man changes himself into a buffalo and the other man changes into a bear. Yet, “neither could get the advantage over the other because they were afraid of each other” (Goddard 1916:258). The story concludes with the bear and the buffalo becoming friends because they were “both alike in power” (Goddard 1916:258). This story provides an example of the interchangeability between the bodies of animals and people, with the animal body being more powerful. The two men relied on the bodies of animals to gain the advantage over the other, however, both animals were alike in strength, which resolved the conflict.

In the story, *The Moose That Had Been a Man*, a powerful man with supernatural powers sets out to hunt two moose. He kills one moose and searches for the second one. When the second moose realizes he has been found, he chooses the location in which he will be killed by the hunter. “Seeing a small open space, the moose said to himself, “Let him kill me there.” Seeing that there was nothing more that he could do, he ran to the open place, jumped to the spot, and fell” (Goddard 1916:245). But the hunter stops himself from killing the second moose when he realizes it is his younger brother who had previously disappeared with a herd of moose. “The

man did not kill him for he knew it was his younger brother” (Goddard 1916:245). A similar story, *The Man who Married a Buffalo* describes how a young man ran off and joined a herd of buffalo. People used to see a bull with hair like the young man’s, and they knew it was him. (Goddard 1916:262).

These stories provide examples of the interchangeability between the bodies of people and animals. These stories do not indicate that this interchangeability was bad or taboo, but instead, that people could still be recognized in their animal form and were treated as family. In both stories, the animals who were once human continued to be important, familial and protected kin. *The Man who Married a Buffalo* demonstrates how human/animal interchangeability is not always transient, as he decided to live permanently as a buffalo. *The Moose that Had Been a Man* suggests that becoming an animal can give an individual power or agency. For example, the second moose (the younger brother) chose the place where he wanted to be killed, suggesting he had control even as he was hunted.

However, such use of medicine power and the transformation into animals could also be very dangerous. The misuse of personal power or disrespecting another’s power could have grave consequences such as sickness or cannibalism (Mills 1982:42-43; Ridington & Ridington 2013:62-63). Boasting about or disclosing personal power was seen as dangerous for the individual as well as the community (Ridington & Ridington 2013; Mills 1982). If a person’s power was intentionally violated, the disrespected person risked their power becoming “too strong”, and they might transform into the human form of their medicine animal (Ridington & Ridington 2013:62). (This may have been the nature of the fight in *The Equally Matched Magicians*.) This state of power could be empowering in the moment, but it was also dangerous in everyday life. A human could become a cannibalistic being, called a *wehch ’uuge* (Ridington

& Ridington 2013:62). Only someone with stronger power could heal the person when they were in this state (Ridington & Ridington 2013:62-63).

Beaver stories also support Nadasdy (2007:28)'s statement that animals are viewed as "powerful and dangerous trading partners". For example, the story, *The Revenge of Wonyoni*, begins with Wonyoni's brother-in-law being described as a "bad man" who had just killed two of Wonyoni's three children. Wonyoni was an old man and was in "pitiful condition" unlike his brother-in-law (Goddard 1916:247). Regardless, Wonyoni travels to his brother's camp to confront him. In preparation for a fight, Wonyoni took beaver skins and a buffalo jawbone and his brother-in-law took buffalo rawhide and a backbone (Goddard 1916:247-248). The buffalo jawbone and backbone were used as weapons while the beaver and buffalo hides were used for physical protection and supernatural help (Goddard 1916:248). Despite his pitiful condition, Wonyoni struck his brother-in-law with the jawbone, breaking both his legs and killing him (Goddard 1916:248). In this story, both men turned to animals for strength and protection. In this story, the men did not rely only on their own strength to fight, instead, they used the bodies and essence of animals to gain power and supernatural advantage over each other.

Other stories exemplify how animals, as powerful trading partners, have the upper hand over hunters (Nadasdy 2016). In the story *The Hunting Fetish*, a man dies from starvation while hunting moose. He was a powerful man who had an image of a little moose that he would pull out and show to the moose he wanted to hunt. "The little moose was the same as his own flesh. They say he was using it to hunt with at the time when people were hunting with arrows" (Goddard 1916:262). A moose had given him this image to help him with hunting because he liked the man (Goddard 1916:262). At one point, when the man showed the moose he wanted to hunt the image, they ran off and he could not hunt them. The man ended up dying of starvation.



It was suspected that he died because he had somehow angered the moose who had given him the image, and the other moose refused to be hunted (Goddard 1916:262). Ridington and Ridington (2013:46) state that “to the Dane-zaa, there is no such thing as luck in the hunt. A hunter is successful because the animal recognizes him as a good person. People say that a hunter who is unsuccessful must have treated animals and his fellow humans with disrespect”. In a story told by Beaver Elder Nache from Doig River First Nation, a young man lost his wife and children and lived in the bush by himself, waiting for an animal to kill him. However, the animals avoided the young man because he wanted them to kill him rather than sustain him (Ridington & Ridington 2013:51).

These stories speak to the intricate relations between animals and people. When people do not treat animals with respect, or violate expected roles, animals are able to decide the outcome of their relationship. This type of animal agency is not typically exemplified in Western culture, particularly for livestock. This aligns with Nadasdy (2016)’s argument that traditional hunters view their relationship with animals as being unequal, with animals having the advantage (Nadasdy 2016). “Northern First Nations people have long regarded themselves as among the *least* powerful of all the various kinds of persons inhabiting the landscape” (Nadasdy 2016:7). Among Anishinaabe people, Kimmerer (2013) describes this unequal relationship where humans need the help of animals because they cannot survive on their own. “We must look to our teachers among other species for guidance. Their wisdom is apparent in the way they live. They teach us by example. They’ve been on earth far longer than we have been, and have had time to figure things out” (Kimmerer 2013:9). Since humans have the least amount of experience about how to live successfully, they are referred to as the “younger brothers of Creation” (Kimmerer 2013:8).

The concept of reciprocity was also evident in stories told by Beaver people of Paddle River. For example, in the story *The Loaned Dog*, a young man asks his grandfather if he can borrow his hunting dog because he was unsuccessful at hunting. The grandfather agreed but gave his grandson strict instructions on how to treat the dog, “If you kill a moose the first thing you must do is to give the dog the end of the tongue” (Goddard 1916:261). The dog and the young man went out hunting and killed a moose. Yet the young man defied his grandfather, and instead of giving the dog the tongue, he gave him the liver. The dog “jumped on the man as he drank and disemboweled him, killing him. He ate all the man’s ribs. Neither the man nor the dog returned” (Goddard 1916:261). When they did not return, the grandfather was worried about how he would live without the dog. Eventually, the dog returned and “he lived with the help of the dog again...They say that was a very good dog” (Goddard 1916:262).

In this story, giving the dog the tongue was likely a sign of deep respect and gratitude. The tongue of the buffalo is also an important part of the animal for the Cheyenne. After a successful hunt, “the first order of business was to give thanks to those exceptional people who, through their ability to commune with the spirit world, had made success possible” (Brink 2008:112-113). The tongue is often given to the medicine people and hunt directors out of respect and thanks (Brink 2008:113). In the story told by Beaver people of Paddle River, the dog was disrespected when he was not gifted the tongue, and this had grave consequences for the hunter. As mentioned, Dane-zaa state that hunters are unsuccessful not because they lack skill, but because they treat animals and humans with disrespect (Ridington & Ridington 2013:46). The young man’s disrespectful nature may have also been the underlying reason for his previous unsuccessful hunts. After killing the disrespectful hunter, the dog continued its role as caretaker for the grandfather, who relied on the dog for survival and treated it with respect (Goddard

1916:261-262). The dog's conflicting identities of caretaker and prosecutor exemplify the complex social roles and relationships animals had with people in Beaver society, as well as the power and danger of animal relations.

There are many layers, themes and lessons in Beaver stories, including those that encompass social relationships with animals. In many stories, human and animal bodies can be interchangeable, and humans and animals interact by talking to each other. Animals freely give themselves to human hunters and consent to being killed – animals are not passive victims of the hunter. Disrespecting an animal can result in a hunter being unsuccessful and risking starvation. Far from being a non-sentient resource, animals are woven into Beaver stories as powerful agents with complex and nuanced relationships to humans.

### **Importance of Human-Animal Social Relationships for Revitalization**

Colonialism deeply impacted traditional human-animal relationships. Beaver Knowledge Keeper Victoria Wanihadie has suggested that the relationships between Beaver people and animals was disrupted and potentially broken by colonialism (Wanihadie 2022a). Ongoing work to decolonize and revitalize traditional human-animal relationships can be seen in Dene nations, and across North America.

In the Yukon, the Northern Tutchone First Nation (a Dene nation, see Figure 1), follow the laws of Doo'Li to guide their relationships with the world around them. Doo'Li is “based on reciprocity and exchange...a means by which social relationships, both human and non-human, are maintained and respected” (Natcher et al. 2005:245; Yukon First Nation Self-Government 2017). The Doo'Li laws guide the Northern Tutchone First Nation members' input on public policies and decision-making made by non-First Nations and government officials. For example,

during a Fish and Wildlife Planning Workshop with government officials, the latter suggested catch-and-release practices as a solution to the overfishing problem that was occurring at roadside lakes that were easily accessible to tourists. A catch-and-release policy means that any fish caught would be immediately returned to the water, unharmed (Natcher et al. 2005:245-6). This would allow a greater number of fish to survive and reproduce, supporting the overall growth of the fish population. The catch-and-release policy would also be financially beneficial as having a greater number of fish in the lakes would draw more tourists (and tourist money) to the area. However, Northern Tutchone First Nations representatives pushed back against this policy as it went against Doo'Li laws of treating the fish with respect. For example, Doo'Li laws state that fishes' eyes should never be touched (Natcher et al. 2005:246). However, this could easily occur with catch-and-release when fish are being taken off hooks. Fish should be treated with respect and having them treated as a target in a sport, and not being able to monitor how they are being handled (i.e., being released back into the water in a respectful and careful way) undermines Doo'Li laws.

Catch-and-release not only undermined these laws but threatened the Northern Tutchone First Nation's long-term relationship with fish and their relationship with the sentient world (Natcher et al. 2005:246). The Doo'Li laws between fish and humans are not centered on biology or protectionism, but on a social relationship. Although these laws can be at odds with government policy, when the Doo'Li laws are upheld, it helps to recognize and revitalize traditional values.

The Doo'Li laws also inform community revitalization. Little Salmon First Nation is part of the Northern Tutchone First Nation group and has been working on cultural revitalization projects centred around Doo'Li. For example, the Northern Tutchone Doo'Li Project began in

2000 and works to connect “Little Salmon First Nation citizens to their identity.” (Yukon First Nation Self-Government 2017). The project has produced a variety of resources about Doo’Li’s teachings, including illustrated books (over 20 in print) (Yukon First Nation Self-Government 2017). The project also hosts various events such as annual retreats with Elders, language instruction and lessons on hide tanning and birch bark carrier construction (Nation Self-Government 2017). The Doo’Li laws and Northern Tutchone Doo’Li project demonstrate how social relationships with animals (and other sentient beings) are foundational for Indigenous revitalization.

Animal-human social relationships are also foundational in the revitalization project called The Buffalo Treaty (2014). This initiative was created by numerous Indigenous communities in both Canada and the United States, whose goal is to work collaboratively to restore bison to their ancestral lands across North America. This is a treaty among First Nations, in the tradition of pre-colonial treaties, and not a treaty between First Nations and settlers. For many North American Indigenous groups, the near eradication of bison due to colonization is intimately connected with their own colonial oppression and injustice. As Brink (2008:251) states, “as the prairie winds swept aside the bones of the mighty beasts, so too went the culture of people who for more than five hundred generations had thrived on their bounty.” Revitalization of bison occurs in tandem with the revitalization of many Indigenous communities.

The language of the Treaty emphasizes a social relationship between Indigenous communities and bison. It states that:

“Since time immemorial, hundreds of generations of the first peoples of the FIRST NATIONS of North America have come and gone since before and after the melting of the glaciers that covered North America. For those generations, BUFFALO has been our relative. BUFFALO is part of us and WE are part of the BUFFALO culturally, materially, and spiritually. Our on-going relationship is so close and so embodied in us

that Buffalo is the essence of our holistic eco-cultural life-ways” (The Buffalo Treaty 2014).

The Treaty also refers to the buffalo as “our brother” (The Buffalo Treaty 2014). Dr. Leroy Little Bear, member of the Blood Tribe of the Blackfoot Confederacy and one of creators of the Buffalo Treaty, discusses how bison disappeared and hid from humans because they were being mistreated:

“Indigenous knowledge and paradigms are very important. One of those paradigms is that everything is animate. Everything is a being. It has a spirit, say, so we relate to the land as our mother, as another being...In our stories, Napi the Tricker ended up hiding the buffalo because we weren’t treating the buffalo very well. So it might be the reason why it disappeared from here. But in their predictions, they said those buffalo are going to be coming out of the mountains...So it makes it all the more rewarding to see the buffalo out on the plains and mountains again.” (Climate Atlas of Canada 2019).

The effect of bison returning to their traditional lands has already had other impacts. In Wanuskewin Heritage Park in Saskatoon, bison were returned to their ancestral lands in the park in 2019. In 2021, through their natural wallowing behaviours (e.g., rolling and digging in the ground) they unearthed an ancient petroglyph. The petroglyph was identified as a ribstone which are often associated with bison kills (Dayal 2021). Researchers found three other petroglyphs over the subsequent weeks. These petroglyphs led to a pathway near a bison jump and were dated between 300 to 1,800 years old (Dayal 2021). These petroglyphs will be used to help the park apply for UNESCO status (Dayal 2021). The return of the bison to their ancestral land allowed bison to be an active part of the revitalization process. At the core of the Buffalo Treaty and bison rematriation<sup>3</sup> is a social relationship between humans and buffalo underscoring how a non-Western human-animal relationship are essential for effective revitalization initiatives.

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<sup>3</sup> The term ‘rematriation’ is used instead of the term ‘repatriation’ to acknowledge and highlight the matriarchal social structure which underpins bison society. It also challenges the overemphasis and often default position of Western science which focuses on male individuals within a species (Hubbard et al. 2022). The term rematriation also “highlights Indigenous selfhoods understood through kinship webs and social organization passed on through the knowledge of women’s communities” (Nixon 2018:v).

## Conclusion

Western and Indigenous human-animal relations have fundamental differences. These differences are reflected in different creation stories that inform beliefs about sentience. The Bible normalizes a human-animal hierarchy where animals are created *for* humans, and humans have dominance over animals. In Western science, sentience has typically been seen as a feature unique to humans and has only recently been associated with animals who can prove self-awareness through specific tests. In the West, human-animal relationships are primarily anthropocentric. With the exception of certain classes of animals (i.e., pets), animals tend to be situated as non-sentient and passive resources that are used and exploited by the animal industrial complex. In contrast, animals are central and powerful agents in many Indigenous societies and play a variety of important roles, including teaching humans how to live in the world. As exemplified throughout the history and stories of the Plains and Beaver people, human-animal relationships were socially defined.

This chapter has examined social relationships between animals and traditional hunters through the themes of relatedness, reciprocity and teaching. Animals give their bodies as gifts to Indigenous hunters. These gifts are met with respect, gratitude, ritual and spiritual indebtedness. The Beaver people held a deep respect for animals. Proper ceremonies were required as an essential sign of respect for animals, prior to interactions with animals via a hunt or vision quest. Bad luck with hunting was associated with bad character and disrespect towards people or animals. Animals also led children through vision quests, giving them songs and powers that would be with them and help guide their lives. On the Plains, Blackfoot related to wolves as teachers, looking to them for hunting tactics. The social relationships Indigenous groups had, and

continue to have, with animals are nuanced and complex and fundamentally different than Western human-animal relationships.

In conclusion, when exploring communal hunting practices among Beaver people and other Indigenous societies, a Western perspective of animals and should not be assumed because it risks denying critical aspects of Indigenous culture. I argue that acknowledging the social relationship that Indigenous people have with animals supports reconciliation and revitalization efforts by challenging Western standpoints.



## Chapter Two: Communal Hunting in Beaver Territory

*“...[Dunne-zaa] power lay in the controlled and intelligent application of knowledge”  
(Ridington 1982 b:475)*

Communal hunting is a complex and nuanced practice that differs between cultural groups. Beyond resource procurement, communal hunting was an opportunity for social and political gatherings, celebrations, and rituals (Brink 2008; Speth 2013; Lupo and Schmitt 2016; Carlson and Bement 2013; Hockett et al. 2013). Often, the skill and knowledge required to stage communal hunts came from cumulative knowledge passed down through generations. Among Beaver people, as with many other cultural groups, a successful hunt also hinged on proper and respectful relationships with humans and animals (Ridington & Ridington 2013; Goddard 1916; Nadasdy 2007; Nadasdy 2016; Schmidt & Dowsley 2010). The aim of this chapter is to explore key aspects of Beaver communal hunting practices and to identify known communal hunting locations used by Beaver people in Alberta. This chapter seeks to answer the following questions: How did Beaver people of northern Alberta and British Columbia engage in communal hunting practices (with a focus on bison) before and after the fur trade? What communal hunting locations are known within Beaver Territory?

To explore these questions, I first examine key tenants of communal hunting (focusing on bison) among Indigenous societies in the interior North American Great Plains, including Cree, Blackfoot, Cheyenne, and Crow. This section includes a discussion of the definition of communal hunting, descriptions of impoundments and traps, seasonality and communal hunting motivations. I will then explore communal hunting practice of Beaver people by exploring their stories, ethnographic and historical records. Within this section, I discuss tools, traps and impoundments used by Beaver people. I also explore the spiritual power that was required for a

successful a hunt. Finally, I describe five possible communal hunting sites within Beaver Territory including two buffalo jump sites, two drive sites and a bonebed site. It is important to recognize that one chapter cannot fully describe Beaver communal hunting practices. Instead, this chapter works to summarize existing historical and ethnographic records about Beaver communal hunting practices.

### **Defining Communal Hunting**

As Speth (2013:177) states, “communal hunting can mean many different things to archaeologists.” There is a lack of consensus about exactly how many hunters are necessary for a hunt to be ‘communal,’ and about the specific circumstances that constitute a communal hunt. While archaeological definitions of communal hunting are discussed below, for many Indigenous groups throughout North America, the number of hunters may not be an essential component of a communal hunting definition. For example, as discussed in Chapter 1, many Indigenous worldviews consider animals part of the hunt, acting with personal agency (Goddard 1916; Ridington & Ridington 2013; Nadasdy 2017; Nadasdy 2007; Schmidt & Dowsley 2010). If animals were active participants in the hunt, then arguably all hunts were communal.

From an archaeological perspective, there is no standard number of human individuals needed to constitute a ‘communal’ rather than an ‘individual’ hunt. Definitions of communal hunting vary in the archaeological literature. For example, Driver (1990:12) states that communal hunting requires at least two cooperating individuals (Driver 1990:12). Speth (2013:182) refers to communal hunting as “large-scale activities, separate from individual hunters, or hunters working in pairs or small groups.” Hockett et al. (2013:64) states that “‘communal’ means multiple family members or groups working together for a common purpose

or goal.” Brink (2008:128) states that large communal hunts were a special event (occurring maybe once a year) where groups of people gathered to kill many animals. Whereas Brink (2008) emphasizes that many animals were killed in large communal hunts, other authors have stated that communal hunting pertains to the number of humans participating, not the number of animals hunted or killed (Cooper 2008:122; Driver 1990:12).

Ives (1990) highlights the use of structures, impoundments and land-based traps as a key component of communal hunting. Ives (1990:308) estimates that 15 or more hunters were necessary to drive animals, refurbish or create new impoundments, thus capturing multiple animals in a single hunt. Smaller groups of people, such as four to five hunters, could work together to use existing impoundments or hunting locations, but they were not numerous enough to drive animals or create new impoundments (Ives 1990:307). Therefore, Ives (1990) suggests that four to five people would not be numerous enough to constitute a communal hunt; at least 15 were needed.

The exact number of hunters needed for a communal hunt is both situationally and culturally dependant. However, sources refer most often to large groups of people, typically multiple-family units (Brink 2008; Hockett et al. 2013; Ives 1990). Determining an exact number of people needed to constitute a “communal hunt”, at least in archaeological literature, may not be possible or even necessary. Instead, an emphasis on *communal* hunting may be used to signal a departure from the individual hunt—a norm of hunting that reflects a decidedly Western standard. In contrast, Indigenous societies that consider animals as autonomous and contributing members of the hunt may not find a distinction between “communal” or “individual” hunting relevant or even factual. As discussed in chapter 1 and stated by Ridington (1988:106), “social life and communication among subarctic hunter-gatherers includes a wider range of “persons”

than the language and culture of social science generally admits.” Nadasdy (1999) also argues that it is important to recognize and acknowledge traditional knowledge, particularly in Western science institutions (such as universities or bureaucratic organizations) where traditional knowledge has often been distilled or overlooked.

### *Impoundments and Traps*

There are various forms of impoundments and traps that can be used for communal hunting purposes. In general, ‘jumps’ involve drive lanes that converge at a cliff. The landscape leading up to the jump was a critical feature and typically involved a gently rising slope hiding the final precipice from view (Hamilton 2018:59; Arthur 1975, cited in Cooper 2008:120; Verbicky-Todd, E. 1984). This allowed animals to be directed towards the cliff without being able to see the final drop until it was too late for the herd to stop (Brink 2008). Even if the animals at the front of the group tried to stop before falling over the cliff, they would be pushed over by the animals stampeding behind them (Brink 2008; Hamilton & Nicholson 2006). A study of 146 jumps in the northwest plains (Alberta, Montana and Wyoming) revealed that the majority of the jumps had heights under 20 meters, while none had a height greater than 50 meters (Polk 1979:62). If a cliff was too low to kill the animals, a pound or corral could be used in conjunction with the jump to trap the animals so they could be killed (Arthur 1975, as quoted from Cooper 2008:128). A jump that was too high could result in extensive damage to the carcass of the animal, rendering it of minimal use to hunters (Polk 1979).

Drives were tactically designed by hunters to guide or herd animals towards specific intercept points (e.g., a stream or river crossing), landscape features (e.g., frozen lakes, snowbanks, low vegetation, cliffs, marshes), or structures (e.g., impoundments) where they could

be hunted more easily (Birket-Smith 1930:22-23, as quoted from Ives 1990:217; Hamilton & Nicholson 2006). Some drives involved the use of fences to help guide the animals to a final kill spot. For example, the Shutagot'ine people of Northwest Territories used kilometres of fencing to bring caribou to corrals where they were snared or shot with arrows or bullets (Van der Sluijs et al. 2020).

Cairns (also called 'deadmen' by Europeans [Brink 2008:99]) were used to help guide animals to the end of the drive lane to the final a kill site (Hamilton 2018; Brink 2008; Cooper 2008; Verbicky-Todd 1984). Cairns were constructed along drive lanes and consisted of materials such as piles of rock or dried dung, clumps of bush, tree limbs festooned with streamers, or wood fencing (Hamilton 2018; Brink 2008; Cooper 2008). When cairns were in use, the rocks or dung could hold up brush, tree limbs or streamers, mimicked people from a distance (Brink 2008:99). This allowed for the illusion of more people along the drive lanes and helped drive the animals towards a final destination (Figure 4).



**Figure 4.** “The Buffalo Pound” ca. 1846-1849 by Paul Kane (1810-1871). (Art Canada Institute n.d.). Cairns can be seen on the ground leading up to the corral.

Corrals or pounds are oval structures made from a variety of materials including wood, stone, rawhide and brush (Brink 2008:87-89; Cooper 2008:128,219; Hamilton & Nicholson 2006; Verbicky-Todd 1984). They were used to contain the animals at the end of a drive lane, allowing for people to kill them more easily, particularly in areas where cliffs and arroyos were not available. In the archaeological record, pound sizes typically vary from 15 – 36 meters in diameter (Arthur 1975; Kehoe 1973:176, as quoted from Cooper 2008:128).

Cooper (2008:246) states that bison traps and impoundments did not occur haphazardly across the landscape but were typically situated beside rivers or major bodies of water. Bison would be often found near water, not only because it was a critical resource, but they could move easily up and down river valleys (S. Hamilton, personal communication, March 11, 2022; Cooper 2008;). Hunting sites situated close to riverbeds also offered advantages such as trees to build impoundments (Cooper 2008:117, 225). River crossings could also be used as intercept points if hunters knew of water crossings that bison used frequently (Cooper 2008:117). Being close to a water source also helped with the processing of bison following a mass kill. For example, at Head-Smashed-in-Buffalo Jump in Alberta, water once flowed from an underground spring located underneath the cliff (Brink 2008:182). Water was not only necessary to keep people alive and functioning, but it was also required for processing the meat and hides (Brink 2008). Polk (1979:102) states that of the 146 jumps included in his study in the northwest plains (Alberta, Montana and Wyoming) approximately 84% of were found within 400 meters of a water source, and approximately 12% were found within 800 meters (Polk 1979:102).

Buffalo jumps and drives using intercept points have also been associated with extensive bonebeds. Dense bonebeds are good indicators (although not diagnostic) of communal hunting sites in the archaeological record (Ives 1990:316; Driver 1990:12).

Another type of communal hunting technique was the surround. The surround involved a large group of hunters (sometimes up to 80-100 people) encircling an animal, or a herd of animals (Verbicky-Todd 1984). The hunters would gradually move closer together to make the circle smaller (Verbicky-Todd 1984). During this process, if the animals detected the hunters, they would flee the opposite direction and to be met by hunters on the opposite side of the circle. Eventually the circle of hunters became smaller until the animals could be more easily killed (Verbicky-Todd 1984). This type of technique involved a distinct leader(s) who would organize and instruct everyone beforehand (Verbicky-Todd 1984). This method of communal hunting would not produce an archeological record (i.e., no fences, drive lane markers etc.) other than the possibility of bones from animals.

### *Motivations and Seasonality*



**Figure 5.** “Buffalo Chase and Encampment” created in 1875-1878 by Cheyenne artist, Bear Heart (1918-2008). (Gambino 2010)

Cheyenne artist Bear Heart's "Buffalo Chase and Encampment" (1875-1878) depicts men (in black) courting women (in blue and green) in the foreground, while in the background a buffalo hunt is occurring (Gambino 2010) (Figure 5). This painting was completed during 1875 and 1878 when Plains people were imprisoned for their involvement in the Red River Wars in Oklahoma. The painting is considered 'ledger art' as the people who were imprisoned had to use any materials that were available to them, which was often old ledger paper (Gambino 2010). The picture suggests that communal hunts were associated with important social events beyond resource procurement.

Speth (2013:182) states that "in many contexts, communal hunting may have been oriented more toward social and ritual functions than daily sustenance..." Beyond food procurement, large communal hunts with numerous people and groups joining together were used to develop and maintain group alliances, reinforce social structure, exchange knowledge, partake in feasts, rotate hunting localities, find marriage opportunities and trade, among other motivations (Lupo & Schmitt 2016; Walde 2006; Carlson & Bement 2013:93; Speth 2013; Fawcett 1987). As Walde (2006:299) states, "communal bison hunting...was an enterprise that involved entire communities in secular and sacred activities." The seasonality of communal hunts allowed groups to meet regularly, such as during migration (Lupo & Schmitt 2016).

Ceremony, ritual and spirituality underpinned many communal hunting practices (Brink 2008; Walde 2006; Fawcett 1987). Brink (2008) states that among Plains people, ceremony, offerings and prayers were critical for executing a successful hunt. Through the use of ceremony, shamans and medicine people would locate bison, and could lure or call them into traps (Brink 2008:107). Activities of the large-scale hunt were directed by a leader "with strong acquired skills and religious authority" (Walde 2006:299). Prior to a bison hunt, people would require the



appropriate ceremonies to occur (i.e., tobacco ceremonies), even if it delayed the hunt or killing the bison (Brink 2008:111-112). The Plains Cree would place offerings of important objects (i.e., bridles, horns, tobacco, beads [Brink 2008:111]) at the entrance of the corral to entice the bison to enter. There was also a pole or tree in the centre of the corral where offerings to the bison would be made, and medicine man would often be up the pole, calling and luring bison into the trap and hanging offerings (Figure 4) (Brink 2008:111).

Many factors affected the timing of communal hunts, including weather, length of daylight, and season, which affected migration patterns, behaviour, herd sizes and physiology (i.e., fat content) of large game (Driver 1990:13; Brink 2007; Brink 2016; Fawcett 1987). On the Great Plains, Brink (2008) states that communal hunts typically occurred in the fall, to secure the highest quality of hides and highest fat content from female bison (Brink 2008:39-42; Brink 2016). Speth (2013:117) also refers to the 'overwintering model' where plains people would communally hunt large groups of bison in the late fall or early winter to help ensure adequate amounts of meat and hides throughout the winter. In the fall, cows were preferred as they carried the most amount of fat during this time, and fat was important for a variety of reasons, including nutritional content and taste (Driver 1990:14; Brink 2008:222; Brink 2007; Brink 2016). However, Plains people were highly adaptable and skilled and would engage in bison hunting throughout all seasons (Brink 2008:69).

### **Communal Hunting in Beaver Territory**

Compared to other areas across North America, relatively little is known about Beaver communal hunting practices. Here, I review literature descriptions of communal hunting in

Beaver territory based on historical and ethnographic records. I also describe five potential Beaver communal hunting locations.

### *Communal Hunting Methods*

In their work with Beaver people of Doig River and Blueberry River First Nation, Ridington and colleagues state that Dreamers would dream ahead to see “the pattern of trails made by people and game animals as they carried out communal hunts using drives and surrounds” (Ridington 1982 b:476). Before European contact and the use of firearms, Beaver people would use their extensive expertise of the landscape and animal migration patterns to capture and kill animals using drive techniques (Ridington & Ridington 2013:69). Stories and oral histories of communal hunting indicate that Beaver people used buffalo jumps and corrals (T8FN 2012), as well as drives and surrounds for buffalo, moose, bears, beavers and muskrats (Goddard 1916:237,241,255,285; Ridington & Ridington 2013:69,142; Ridington 1982 b:476; T8FN 2012). There are two stories from Beaver people of Paddle River that reference driving animals. These stories suggest that drives required at least two people to operate. For example, in the story *A Man Marries the Daughter of a Bird*, a man and his father-in-law are out hunting moose together. The father-in-law states, “There are some moose that live over here...you stand here and watch that big tree and I will drive the game to you” (Goddard 1916:255).<sup>4</sup> The story suggests that a drive hunting technique required at least two people and impoundments were not always necessary. However, Goddard’s (1916:214) opinion was that the most common method that Beaver people used in communal bison hunting was to drive bison into a pound/corral. This

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<sup>4</sup> This may be an example of the hunters using the landscape and the wind. For example, wind could be used by a hunter standing upwind of the animal, making the animal uneasy and move towards an ambushed hunter further downwind (Hamilton & Nicholson 2006; Brink 2005).

is documented in Beaver stories. For example, in the story, *Atceco Kills Buffalo*, Atceco's people find a group of buffalo and "decided to wait until the next day when they could make a fence and drive them into a corral" (Goddard 1916:241). In this story, the number of people in this group are referred to as a 'band', which was likely around 25-35 people (Ridington 1982 b:472).

In terms of tools, Beaver people had extensive knowledge of their environment and did not require elaborate tools that were difficult to move from one location to another. For Beaver people, "flexibility of movement was of paramount importance...the most valuable technology would be one that required no material encumbrance whatsoever" (Ridington 1983:57). For example, snares are mentioned most often in the stories and accounts of Beaver people from Paddle River (Goddard 1916). This reliance on snares aligns with other Dene groups, specifically the Shutagot'ine. Snares were used for both large and small animals and were an integral part of their oral traditions, in which people were able to survive when "left behind with nothing but a strand of sinew" (Andrews et al. 2012:26). Beaver people used snares for both small and large prey (e.g., rabbits and moose) (Ridington 1983:62; Goddard 1916). For small prey such as rabbits, snares were set up by "placing a slip noose stretched in the runways and attached to a spring pole so that the heedless rabbit pulls it loose and is thrown into the air" (Goddard 1916:214). For the larger animals, "... they used to put trees in a row, leaving a passageway between. When the moose passed along there, they were caught in the snares" Goddard (1916:290). As Ridington (1983:62) states "the snare hunt's complexity lay not in the complexity of the artifact itself, but in the knowledge and skill with which it was deployed." This knowledge encompassed not only how to use the landscape and manipulate animal behaviour, but also how to perform proper ceremonies, rituals and attain spiritual support (Mills 1982; Ridington & Ridington 2013).

The bow and arrow were also mentioned frequently in stories told by the Beaver people of Paddle River (Goddard 1916). Bows and arrows were used for larger animals such as caribou, moose, wolves, buffalo and beaver with both individual and communal hunting (greater than two hunters) (Goddard 1916:238,240,241,244,245,274). Spears were used to hunt (both individually and communally) beaver, buffalo, moose, and bears (Goddard 1916:214,262,260). One Beaver story describes an axe being used as tool during a communal hunt. Makenunatane, who was a Dreamer and a Hunt Chief during the early fur trade, dreamt “of a moose and the precise location of every person taking part in the hunt. When all people were in place following his vision, the moose was unable to move in any direction. One man walked right up to him and brought him down with an axe” (Ridington 1979:75). Although axes as communal hunting tools are not mentioned apart from this story, Ives (1990:308) notes that “the prophet [Makenunatane] ate meat only from an animal killed with an axe.” Killing animals with an axe helped Makenunatane gain the trust of his community because it exemplified that the animal had given itself to him, and that he had the help of supernatural powers (Ridington 1987:13-14).

The stories told by Beaver people of Paddle River also tell of taboos and rules associated with communal bison hunting, such as bison being hunted exclusively on a communal basis. For example, there are two stories where buffalo were hunted by individuals, instead of communally (Goddard 1916:240-241,284). In both circumstances, the community threatened the lives of the individuals who undertook solo buffalo hunts. In the story, *Atceco Kills Buffalo*, it states that “Atceco started after the buffalo by himself, and the people were all angry. “Let us kill him,” they were saying” (Goddard 1916:241) His community waited for Atceco. His grandmother warned Atceco of the attack, “These people say they are going to kill you...” (Goddard

1916:241). This backlash is also exemplified in the story *Agait'osdûnne, The Hair Scraping Man* (more distinctly in the second version):

“A famine was killing the people when someone saw a herd of buffalo. There were many people camping there who decided to go together and kill the buffalo. The boy saw the buffalo and at night, while the people were asleep, took an arrow from each man's supply. He went to the buffalo during the night and shot them all because they were not afraid of him. "The buffalo will belong to the man whose arrow is on it," he said to himself, and distributed the arrows on the dead buffalo.... He went back to the camp to find someone had built a big fire. His grandmother was sitting on the wood, crying. "What is the matter, grandmother?" he asked. "You went for the people's animals and they say they will burn you." "Who says that about me?" he asked. "They all say it of you. They are not pleased" (Goddard 1916:240-241).

Throughout this story, *Agait'osdûnne's* actions of hunting bison alone as an individual were harshly judged and his life threatened, even though his intention was to share the meat with others. This underscores the importance and social expectations tied to communal bison hunting.

In Beaver customs, “buffalo seem to be hunted solely on a community basis. The story of *Agait'osdûnne* indicates very grave penalties for anyone who interfered with the community rights” Goddard (1916:214). The requirement to hunt bison communally did not seem to apply to other animals. Small animals such as birds, beaver, porcupine, as well as larger animals such as moose and bear were hunted on an individual basis without repercussions (Goddard 1916), although there here may have been culturally-mandated requirements to share the meat if it was needed by others. It may have been that herding nature of certain animals, such as bison, culturally prescribed a communal effort (Ives 1990).

Beaver people moved regularly, and on a seasonal basis, to areas with abundant plants and animals (Ridington & Ridington 2013:69). Throughout the fall, winter and spring, Beaver people travelled in small family bands, likely around 25-35 people (Ridington & Ridington

2013:197; Ridington 1982 b:472). Multiple groups of closely-related people met annually in the summer in large groups, often for celebration and dancing (Ridington & Ridington 2013:197; Ridington 1968 b:33, as quoted from Ives 1990:98; Ridington 1982 b:472). These seasonal gatherings were called *wutdunne*, or *wudune* (Ridington 1968 b:33, as quoted from Ives 1990:98; Mills 1982:73).

There was likely regional variation in the timing of these gatherings. Dawson (1881) states that Beaver people gathered in the Grande Prairie, Alberta region during the summer for berry-picking. Once enough berries had been collected and dried, Beaver people dispersed into smaller bands for the Fall hunt (Dawson 1881:53). Mills (1982:73) also states that bands of Beaver people gathered in the late-summer to early autumn. Summer gatherings were associated with leisure, but the fall gatherings included feasting and thanksgiving:

“The late summer or early fall gathering is seen as the gathering of plenty, as a coming together of peoples after the hard work of the summer has laid enough dry meat and pemican away to allow some leisure time. The fall gathering was traditionally seen as a time of feasting and thanksgiving” (Mills 1982:73).

European missionary Henry Faraud<sup>5</sup> (1866:228-230) recorded an autumn gathering at Dunvegan of Beaver people from “all around” (« de tous les points environnants ») which involved dancing and feasting. Similar to hunting on the plains, Fall may have been an ideal time for a communal hunt, as bison cows were at their fattest during this season (Brink 2008; Brink 2007; Brink 2016; Driver 1990).

Also similar to the plains, the value placed on the fat of the animal was evident among Beaver people. Fat was a crucial part of the diet for Indigenous groups across North America. In northern subarctic and arctic hunter-gatherer societies, protein constituted the main part of the

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<sup>5</sup> Henry Faraud was one of the first missionaries to arrive in Beaver Territory near Dunvegan, Alberta. His primary goal was to convert Beaver people to Christianity. Faraud’s work, although he had a first-hand experience living among Beaver people, is highly ethnocentric and hyperbolic.

diet. Fat is needed in the diet, to help provide energy and metabolize high-protein diets (Brink 2008:40; Speth 2010:149). High-protein diets alone without any fat intake can have detrimental effects on the body, such as weight loss, lethargy, weakness and even death (Speth 2010:149). Killing fat animals was a main objective to hunting, as lean animals did not provide the required nutrients for proper bodily functioning (Brink 2008:40; Brink 2016; Speth 2010). Faraud (1866:230) recorded a prayer during a Fall gathering by Dunvegan Beaver Chief prior to an offering of fat:

“Receive, O All-Powerful, the offering we your children make, give them always good hunting of fat animals, guard their lives so that reunited another autumn, they can again offer you the gift of the best grease” (Mills 1982:48).”

« Reçois, ô Redoutable, l'offrande que te font «tes enfants, accorde - leur à jamais bonne chasse d'animaux bien gras, veille sur leur vie afin que, réunis un autre automne, ils puissent de nouveau t'offrir un don de plus fine graisse.»

Communal hunting also seemed to occur during the winter. For example, in the story *The Killing of the Children Avenged*, the men were away hunting a group of bison, and the women were transporting the camp behind them. During these activities, their children had been killed by a stranger. When the men had been informed that their children were killed, “the men started running in the snow without their moccasins” and returned to the camp extremely upset by what they found (Goddard 1916:284). (Goddard 1916:284 states that the translation of this story into English was poorly done, leading to a risk of error and misinterpretation.)

Stories told by Beaver people of Paddle River suggest that communal bison hunting sometimes occurred on an opportunistic basis. For example, the story *Atceco Kills Buffalo* tells of a band of Beaver people who were without food. Then someone tells the group that they saw buffalo. Since the buffalo were out in the open and difficult to kill, the people decided “to wait until the next day when they could make a fence and drive them into a corral” (Goddard

1916:241). The story does not specify that people were looking for bison specifically, but that someone spotted them, suggesting an opportunistic finding and subsequent hunt.

In another story, *Agait'osdünne, The Hair Scraping Man*, people were starving and trying to find animals to hunt and kill. Then someone said they saw a herd of buffalo that did not know that people were around (Goddard 1916:238). As in the previous story, people were not necessarily looking for bison specifically; rather, someone happened to come across a group of buffalo. Again, this suggests that bison hunting, at least at times, may have been done on an opportunistic basis. This also speaks to how Beaver people were highly adaptable and were ready and prepared to hunt a variety of animals with minimal preparation time.

As mentioned, communal hunting could also be a planned process (Ridington & Ridington 2013). Hunt Chiefs would dream ahead for the group and meet the animals on the trails. While these examples do not mention bison specifically, it is likely that both planned and opportunistic hunts occurred and that there were regional differences between hunting styles.

Beaver people also had to maintain good relationships with animals and with each other to ensure successful hunting (Ridington & Ridington 2013). Hunting required the cooperation and respect of humans and animals. This cooperation is exemplified through a story called *The Man who Talked to Buffalo* (Goddard 1916). This story describes how a man talked to buffalo and they would do as he asked. When his people needed food, he asked buffalo to go into the water. The buffalo obliged and went into the water backwards where his people killed them with spears (Goddard 1916:262). The man's actions were rooted in cooperation with the animals, not power and domination.

To be a successful hunter, there was an emphasis on possessing knowledge rather than owning material possessions (Ridington 1983:57). This required *knowing something*, as defined



by Beaver people. *Knowing something* came from life experience and relationships with animals (Ridington 1982 b:473). It was embodied and came from medicine power, or an individual's song, which was acquired through childhood vision quests (Ridington 1982 a; Ridington & Ridington 2013). While dreamers used their medicine power to organize and facilitate communal hunts, all individuals within Beaver society had medicine power in varying degrees.

*Knowing something*, as an embodied experience, differs from the Western concept of *knowing about something* (Ridington 1983:60). Western knowledge tends to be compartmentalized, communicated through organizations (i.e., the government, universities) and specialized through siloed disciplines (Nadasdy 1999:6; Ridington 1983:57). In contrast, *knowing something*, for Beaver people, was attained through personal experiences and relationships.

This emphasis on knowledge over material goods led many settlers to believe that Beaver people were materially impoverished, but Ridington (1983:56) argues that, on the contrary, this was a sign of "immaterially rich technology." Ridington (1982 b:471) states that whereas technology is often associated with devices and machinery in Western society, Beaver technology "should be seen as a system of knowledge rather than an inventory of objects."

### *Power in the Communal Hunt*

Although a hunter's physical power and strength were most certainly part of communal hunting, it was not necessarily the focal point. Communal hunting was underpinned by reciprocity, knowledge, respect and cooperation with animals. It reflected the rich inner lives of Beaver people, their dreams and connections to animals and each other. A story from Beaver

Elder May Dominic Apassin from Doig River First Nation highlights the foundation of power in Beaver society:

*Dahghaazhiné? Dane zhiné?*. Their songs, people's songs.

They are looking for power.

*Shin kaa dqje. Dane ejidah.* They tell them to look for power from songs.

*Ii la ge.* Just over there, they send the young kids out.

Little kids, without eat, wash their face, without even touch water, a drink of water.

Like that, they send them out. No wash face, like that.

They send them out.

*Guyághajih nazhiné? Wqleḥ nááwqtsat.*

They said to them, "You will have songs and power. Go and have songs to be strong."

They go there to get it, to find a song, to find their power.

They say that. (Ridington & Ridington 2013:55)

All individuals within Beaver society had medicine power in varying degrees. Medicine power was attained through the childhood vision quest and encounter with animals. It was an individual's unique vibration or song (Mills 1982:21-22). Medicine power was needed to carry out all daily activities, including but not limited to hunting (Mills 1982:22). The degree of one's medicine power was not determined by the power and physical strength of the animals encountered on a vision quest; for example, bear was not necessarily stronger than beaver. As Mills (1982:38) states "...it is not what medicine a person has, but where he is in the many-lifetime cycle of controlling his medicine, controlling himself, that determines how powerful he is."

Beaver people believed that they are reborn once they die. With each new rebirth, they maintained their own uniqueness and carried forward the lessons they learned in their past lives (Mills 1982:22). Different people will have completed a different number of lifetimes, some having gone through many, others only a few. Although there was no judgement placed on

someone having less lifetime experience, strengthening one's medicine power was considered a priority throughout each lifetime (Mills 1982:24). As Mills (1982:23-24, 27) states:

“As a person advances in this evolutionary cycle, however, his self control and self knowledge grow great enough for him to be in considerable control not only of himself, but... of the environment, through his extensive contact with the spirit realms. Such a person uses his power not only for the benefit of himself and his immediate family, but for the good of everyone. These were the people who...were the religious specialists, the shamans, and who later became the prophets...One's proficiency in “dreaming” determines the person's *mayine*. The ultimate is the dreaming of the shaman or prophet whose facility for dreaming or travelling to these spirit realms earns them the title “dreamer” (*naa chi*)”

Dreamers (prior to the arrival of Europeans, when they were called Prophets) could see where the paths of humans and animals would meet and were able to organize communal hunts and position everyone during the hunt (Ridington & Ridington 2013:142). Dreamers were also associated with the swan, an animal that could fly overhead and see the way for people, or "dream ahead for everyone" (Ridington 1979:75). Becoming a Dreamer was “a calling that comes upon a man (or a woman, according to Brody [1988:47-48]) rather than being sought” (Ridington & Ridington 1970:60). Few people had strong enough medicine power to become a Dreamer.

For example, the story *Fournier's Grandfather's Supernatural Power* was told by a man named Fournier, the grandson of a great medicine man from Paddle River (Goddard 1918:260). Although he is not referred to as a Dreamer, this story highlights the great power that some individuals possessed, and the power of songs. In the story, a band of Beaver people were travelling towards the Rocky Mountains from Hay River during the winter. A group had gotten separated from the main band, and due to bad luck with hunting, they ended up starving to death. “The surviving women and children came to the grandfather's camp. The old man, displeased because some of his relatives in this band had died, said he would make medicine so that none of

his relatives would have trouble in killing all the game they wanted to eat” (Goddard 1916:260). After that, the grandfather made a medicine pole<sup>6</sup> and began to sing. This brought heavy snow which immobilized the animals, and his family was able to easily hunt them with spears, especially moose. They were able to eat all the animals they wanted (Goddard 1916:260).

The medicine power of a Dreamer was public knowledge and shared with everyone, unlike the medicine power of non-Dreamers, which was private knowledge. The following story was told by Vermillion Beaver Chief, who recounts these powers:

“That is the way they used to live. The animals used to be as wild as they are now. With nothing but bow and arrow they could not live. But in each band there were one or two men like this with medicine who could kill them. The people came to them when they got hungry.” When the Chief was asked how people obtained these powers, he answered: “They do not do anything. If there was anything they could do, they would all have it. It comes suddenly on a man. Suppose some animal takes pity on him or likes him and gives him power. I do not know what used to give men like that, whether it was God or the animals themselves” (Goddard 1916:227).

Among Beaver people, power in the communal hunt was not centred on physical strength and the domination of animals, instead, it was rooted in relationships and medicine power. It also hinged on the ability of the Dreamer or Hunt Chief, through their self-knowledge and control, to dream ahead for others and locate animals on trails in their dreams (Ridington & Ridington 2013; Ridington 1983; Ridington 1979; Ridington & Ridington 1970; Mills 1982). Medicine men and women were critical for communal hunts for many cultural groups, but their powers were likely invisible to early European explorers of North America.

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<sup>6</sup> Paddle River community member named Ike described the importance of the medicine pole: “It is called enatcuggedi (leave something ready for somebody coming along there) as if one had agreed to leave something for somebody and then put it up until the person came along. The medicine pole is left for the one who helps him in his dreams” (Goddard 1916:228)

### *Communal Hunting Locations*

The following section will discuss five possible communal hunting sites in Beaver Territory. These sites have not been explored through fieldwork; all investigations have been through historical and oral records, as well as Google applications (i.e., using different features on Google maps). There is conflicting evidence of communal hunting locations, specifically buffalo jumps and pounds in Beaver Territory. For example, Western literature states that most known locations of jumps are in southern Alberta, southwestern Saskatchewan, Montana, and Wyoming (Barsh & Marlor 2003:574; Cooper 2008:215). However, Beaver Elders and community members from Treaty Eight First Nations (Doig River First Nations, Halfway River First Nations, Prophet River First Nations, West Moberly First Nations) state there are buffalo jumps in northern British Columbia (T8FNs Community Assessment Team report 2012). Historical records also indicate that there were drives in northern Alberta and the Northwest Territories (Ives 1990:308; Heming 1936). A bonebed of juvenile bison remains was recently reported to Royal Alberta Museum curator Kristine Fedyniak near Grande Prairie, in northern Alberta, and is currently under investigation.

This section will begin by describing the preservation of drive fences used by Shutagot'ine, whose traditional territory includes the Mackenzie Mountains in Northwest Territories (Figure 1) (Andrews et al. 2012:24). Shutagot'ine have been hunting caribou in the Mackenzie Mountains for millennia. They designed and built kilometres of drive fences made of wood to intercept caribou and lead them towards corrals where they were shot with either arrows or bullets (post-contact) (Van der Sluijs et al. 2020:187). The use, construction and natural degradation of these fences could inform what to look for in terms of physical structures and communal hunting sites within Beaver Territory.

Van der Sluijs et al. (2020) describes the Shutagot'ine caribou fences, which consist of four fence structures that work to guide caribou into a corral. The corral is located near the end of the main fence. Once in the corral, the caribou were killed with either snares, bullets or arrows (van der Sluijs et al. 2020:188). Past the corral, the main fence terminates at a mineral lick which would attract caribou (and likely other animals as well) and was used as an important harvesting location (van der Sluijs et al. 2020:198). The fences stretch through diverse environments (i.e., sparsely wooded plateaus and denser woodlands). Shutagot'ine fences differ in density (i.e., the number of fences in an area) depending on their location, this has been associated with the extent of maintenance or upkeep they have received, and well as their “functional requirements (e.g., there are larger pieces in heavily trafficked or impact areas)” (Van der Sluijs et al. 2020:202). One example of this is the main fence, which is thickest at the transition between sparse tree coverage and woodland areas, and around the corral (Van der Sluijs et al. 2020:198).

There are key features of the caribou fence system that can provide insight into similar structures or landscape features that might exist in Beaver Territory. Beaver Territory is situated within the boreal forest and aspen parkland. The aspen parkland is a transitional zone with grassland area to the south, and boreal forest with patches of forests or willow shrubland to the north (Alberta Parks 2015:26). This type of environment with sparsely treed and heavily wooded areas was similar to the region where the Shutagot'ine caribou fences, drive lanes and entrapments were built. Therefore, wooded transitional zones may be a key area within Beaver Territory.

Mineral licks may also play a key role in communal hunting strategies. Many ungulates require mineral licks as part of their diet, and the Shutagot'ine have incorporated mineral licks

into their fence network. Mineral licks “appear as open muddy areas, exposures of dry earth, or open rock faces” (Andrews et al. 2012:30). Andrews et al. (2012:30) notes that “mineral licks are often marked by evidence of extensive use by ungulates, such as well-worn trails radiating from the mineral exposures and high densities of shed antlers.” Evidence of mineral licks can also include “physical signs of animals (e.g., dung, tree rubs, muddy vegetation and bed sites, exposed mineral soils with clay or organic materials” (Government of Northwest Territories:2).

Prevailing wind direction is also an important variable in communal hunting. Bison have a heightened sense of smell, and with the right wind conditions they can smell other animals, including humans, from several kilometers away (Brink 2008:114-115; Verbicky-Todd 1984). Bison continuously check the wind for any signs of threats, and wind conditions are critical for the success of operating traps and impoundments (Brink 2008; Verbicky-Todd 1984). For example, the final precipice of the jump or the final kill site of a drive should be downwind of the herd, so that the smell of the hunters and their activities are not carried by the wind to the bison (Verbicky-Todd 1984:36; Brink 2008:114-115).

Past and present migration routes are also valuable information for archaeologists attempting to locate communal hunting sites. Multiple sources state that communal hunting sites were strategically positioned along migration routes (Barsh & Marlor 2003:574; Carlson & Bement 2013; Ives 1990:213-215; O’Shea et al. 2013; Van der Sluijs et al. 2020; Zeder et al. 2013). By using this strategy, humans could predict when and where large herds would be moving and use this information to intercept with the animals with traps (Carlson & Bement 2013:93). As bison no longer migrate, oral histories and historical records may be necessary to identify previous routes.

There are a few nuances to consider with regards to wood bison migrations routes for the five possible communal hunting sites explored below. Since bison were exterminated prior to any scientific study of their range, their full migration patterns are unknown (van Zyll de Jong 1986). In general, wood bison migrations are believed to be of shorter distances than plains bison (Soper 1941:384).

There are challenges and limitations associated with locating communal hunting sites in Beaver Territory. For example, many of the materials used in communal hunting impoundments (wood, twine, bone, buffalo chips) are perishable. If they were used, more resilient materials like stone used for cairns in drive lanes may be archaeologically preserved (Cooper 2008:120). There are various environmental factors that can accelerate the degradation of organic materials, such as acidic soils, high annual precipitation, agriculture and the effects of climate change, such as increased incidence of fire, storm damage and insects (Hamilton et al. 2006; Ives 1990; Cerezke 2009; Alberta Parks 2015). Bison bones were also collected by settlers to be ground up and used to make fertilizer or gunpowder (Markewicz 2017). This process could have diminished the present-day collection of bones at kill sites (Wanihadie 2022b). Surface remains were also commonly collected and cleared from areas converted to farms.

Since Beaver Territory encompasses boreal forest, aspen parkland and plains-like environments/open grasslands, soil composition is a factor that affects the preservation of material artifacts. The soil in the boreal forest tends to be acidic and can quickly destroy organic materials such as bone (Ives 1990:33). The soil in the aspen parkland region has also been used by settlers for agriculture, and about 70 percent of the area is currently cultivated with canola, wheat and barley (Alberta Parks 2015:32). “Based on agricultural development in the 1900s, little of the original native prairie exists today” (Alberta Parks 2015:32). This area is also subject



to petroleum exploration and development (Alberta Parks 2015:32). The extensive development in the aspen parkland poses a risk to communal hunting sites as they may have been damaged and/or destroyed in the development process whereas sites and artifacts in the boreal forest, may have decomposed quickly due to soil composition.

Van der Sluijs et al. (2020) describes how local climate and environmental factors such as temperature and precipitation have an impact on the preservation of Shutagot'ine caribou fences. Specifically, Van der Sluijs et al. (2020:190) state that low temperatures and low mean annual precipitation are conducive to the preservation of woody debris. In comparison, northern Alberta has on average, higher annual temperatures (Government of Canada 2021) and higher levels of precipitation than in Northwest Territories (Pétre & Rivera 2015:15) which would likely lead to a higher rate of organic decomposition. Thus, Beaver drive fences are likely to have decomposed.

Climate change and the incidence and severity of wildfires are also threats to communal hunting sites, especially those constructed out of wood. In the future, fire disturbances are predicted to be more frequent and burn over larger areas with increased severity in Alberta (Cerezke 2009:38). More frequent and severe storm damage is expected, which will result in increased damage to mature trees and a higher risk of insect infestation (Cerezke 2009:v). These environmental changes can impact the long-term preservation and ability to find communal hunting sites (if they are not already gone) in northern Alberta.

### *Locations of Beaver Communal Hunting Sites*

Five potential Beaver communal hunting sites will be explored in this section. The sites described as jumps are located at Bear Flat and Hudson's Hope in British Columbia. The sites

described as drive locations are at Point Carcajou along the Peace River in Alberta, and Grand Detour on Great Slave River in Northwest Territories, though it is unclear if these sites were used by Beaver or Cree people (Ives 1990:308; Heming 1936). There is also a recently-discovered bonebed at Bear Creek in Grande Prairie, Alberta. It has not yet been determined if this was a bison kill-site or an instance of natural death. From initial ground inspection, the site appears to be all juvenile bison bones (N. Wanihadie, personal communication to J. Metcalfe via V. Wanihadie, July 27, 2021). These could be associated with accidental death by drowning, since young animals are more susceptible to entrapment in water than are adults (W. Olson, personal communication, October 8, 2021). Fieldwork would help determine if the skeletons are complete, which might suggest death through a natural event. On the other hand, the initial report from the site's discoverers suggested that some of the bones were burned (K. Fedyniak, personal communication to J. Metcalfe, May 17, 2021). If confirmed, this might suggest cultural activities.

Direct fieldwork was not possible within the timeline of this thesis. Here, I identify key features that would help indicate the suitability of these sites for communal hunting, and evaluate the presence/absence of these features at the five sites mentioned above.

**Key features associated with jump sites:**

- Presence of a cliff not greater than 50 meters tall (typically between 10 – 20 metres) (Polk 1979)
- Nearby water source (400 – 800 meters from the jump site) (Cooper 2008; Brink 2008; Polk 1979)
- Room for processing below the cliff (e.g., flat landscape that could accommodate large groups of people) (Brink 2008)

- Associated cultural remains (i.e., projectile points; evidence of human encampment) (Hamilton 2018; Brink 2008)
- Evidence of drive lanes, fences or cairns leading up to the jump (Hamilton 2018; Brink 2008; Cooper 2008)
- A cliff edge which is hidden from view by gently rising ground leading up to the precipice (Hamilton 2018; Brink 2008)
- Prevailing wind direction, the final jump site is situated downwind of the drive area (Brink 2008; Verbicky-Todd 1984)
- Evidence of bone beds at the base of the cliff (but note that bone may have been removed or degraded, in which case oral history and/or historical records may be required) (Brink 2008; Ives 1990; Driver 1990)
- Oral history and/or historical records of the area supporting animal migration routes and /or large game populations (Brink 2008; Barsh & Marlor 2003; Van der Sluijs et al. 2020; Ives 1990)

**Key features associated with drive sites/ entrapments:**

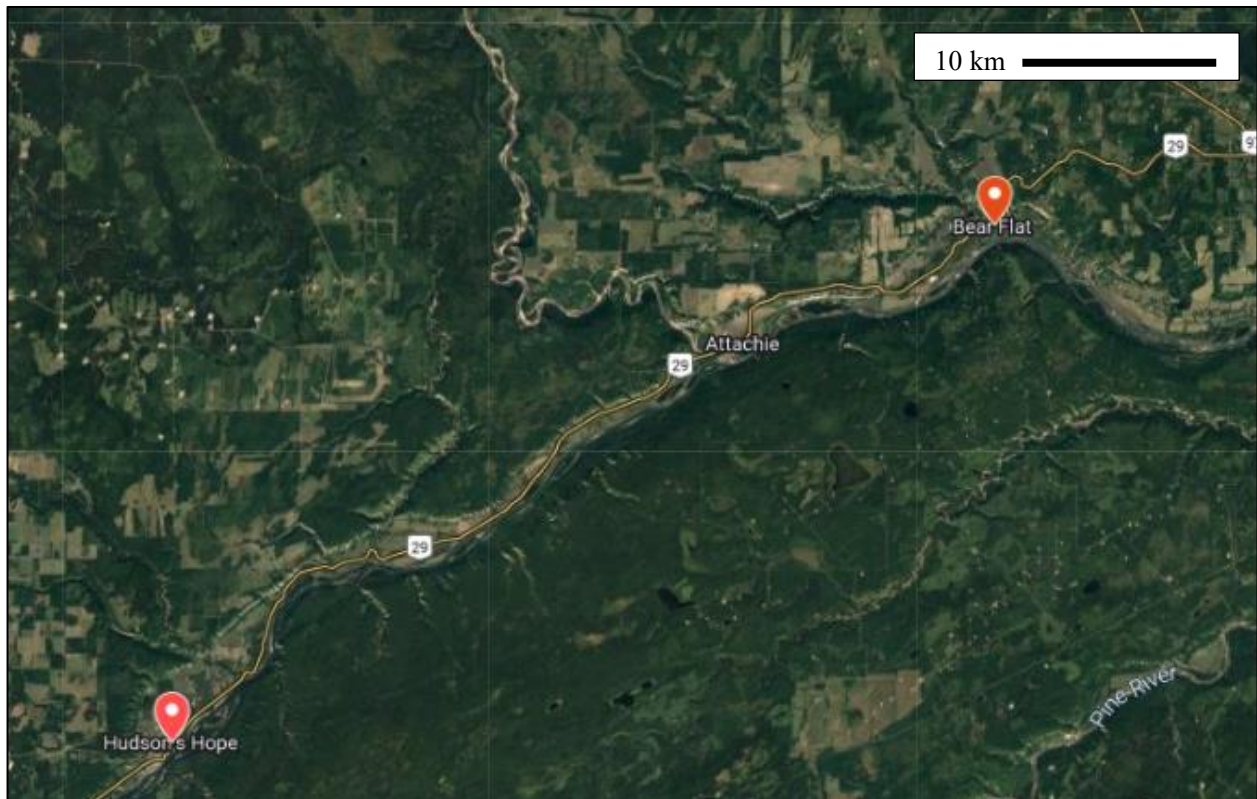
- Evidence of landscape features that could be used as an intercept point (e.g., transition from heavily to sparsely wooded areas; water crossings) (Hamilton 2018; Ives 1990; Heming 1936). Note that vegetation patterns and landscape features may have changed since the site was used.
- Evidence of drive lanes, fences, cairns or a corral (Brink 2008; Cooper 2008)
- Associated cultural remains (e.g., projectile points; evidence of human encampment) (Hamilton 2018)

- Prevailing wind direction, the final kill site is situated downwind of the drive area (Brink 2008; Verbicky-Todd 1984)
- Evidence of bonebeds (but note that bone may have been removed or degraded, in which case oral history and/or historical records may be required) (Ives 1990; Driver 1990)
- Oral history and/or historical records of the area supporting animal migration routes and /or large game populations (Brink 2008; Barsh & Marlor 2003; Van der Sluijs et al. 2020; Ives 1990)

While direct fieldwork would help answer questions about these sites, there are some key limitations that need to be considered. In my thesis, I am limited to Google applications that provide modern snapshots of the landscape. It is likely that key features of the topography that I rely on for my analysis have changed overtime due to natural and manmade events (e.g., wildfires, overgrowth, agriculture) (Hamilton et al. 2006). Subtle landscape features, such as a slightly downward slope of the land towards the hidden precipice of a cliff are very hard to recognize with current cartographic technology, as it lacks human scale landscape modelling. While it is outside the scope of my thesis, LiDAR and drone imagery is one approach that has been used to overcome these scalar issues and examine these types of subtle landscape features (Hamilton 2018).

### *Jump Sites in Beaver Territory*

Two buffalo jumps in northern British Columbia were described by the Treaty Eight First Nations Community Assessment Team (2012:ix): “...as the road climbs out of the valley at a steep pitch, one can see land to the east where Beaver Elders speak of the final buffalo jump hunt that occurred after bison numbers plummeted during the fur trade...Community Advisors also spoke of a second buffalo jump near Hudson’s Hope” (Figure 6). Although the exact location of the jumps is not specified, fur trade records indicate that the area was once abundant with bison. These locations are near Rocky Mountain Portage House, which relied heavily on bison meat brought in by Beaver hunters (T8FNs Community Assessment Team report 2012:52; Burley et al. 1996:64).



**Figure 6.** Approximate location of jump sites in British Columbia near Bear Flat and Hudson’s Hope based on image 1 in T8FNs Community Assessment Team (2012:ix) (Image source: Google Maps)



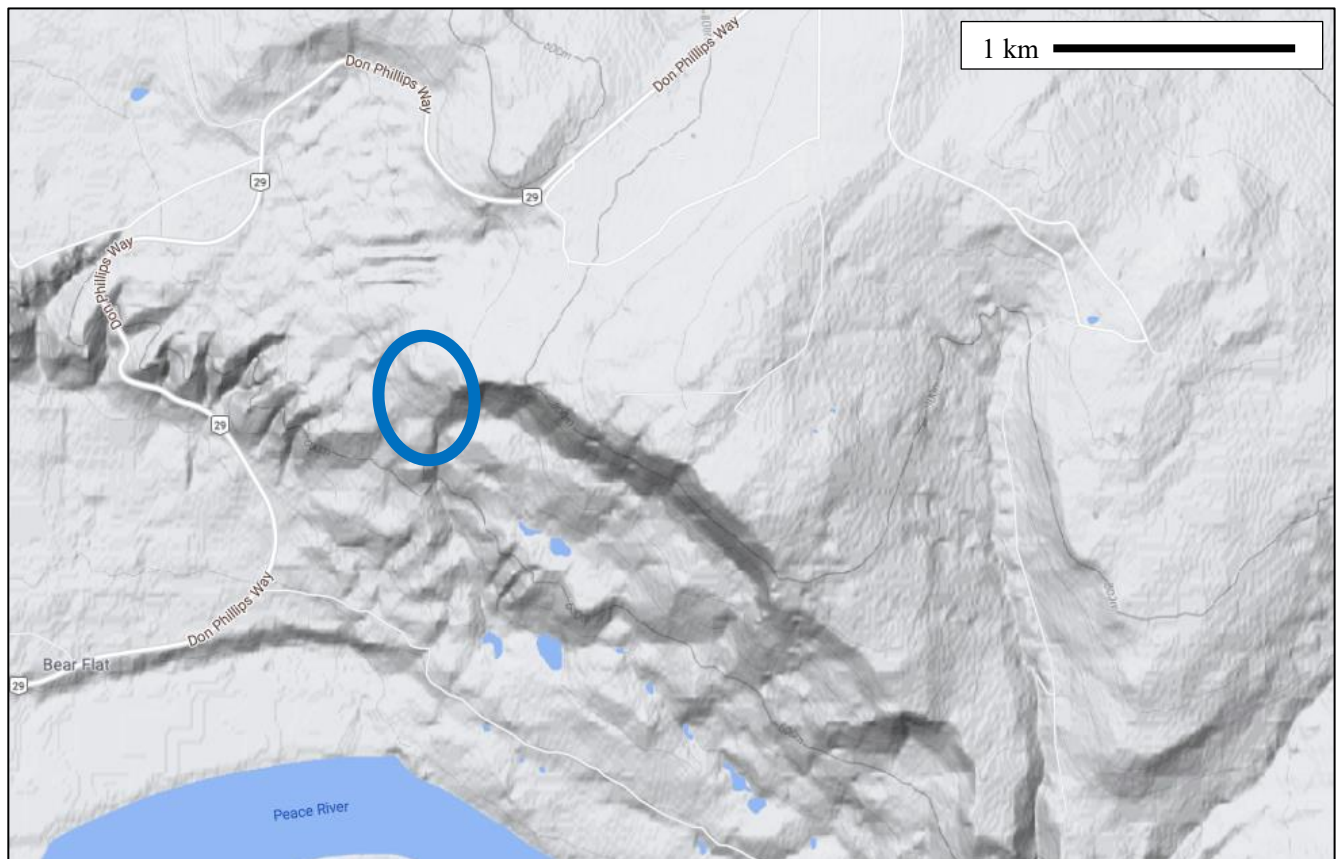
**Figure 7.** Cliffs near Bear Flat, British Columbia (Image source: Google Maps)

Figure 7 is a Google Maps ‘streetview’ image of a cliff in the general area of the buffalo jump identified by Beaver Elders and community members from Doig River First Nations, Halfway River First Nations, Prophet River First Nations, and West Moberly First Nations (T8FNs Community Assessment Team 2012). This image is not the confirmed site, it is a predicted location based on the author’s understanding of the information provided by the T8FNs Community Assessment Team report (T8FNs Community Assessment Team 2012:ix).

Figure 8 shows the elevation of the cliffs at Bear Flat. The overall elevation in many areas is quite high: greater than 50 meters, which is too high to act as a buffalo jump (Polk 1979). However, there are some sections of the cliff that have lower elevations. Depending on where the drive lanes were located, and which cliff was used, there may be sections of the cliff that could have been used for a jump site. I have circled in blue (Figures 8 - 10) a suggested location of the cliff jump based on where the height of the cliff is less than 50 meters. Figure 10 is a Google Earth image showing the topography leading up to the jump. Fieldwork would help

confirm the topography; in particular, whether the edge of the cliff was hidden from view in the drive area.

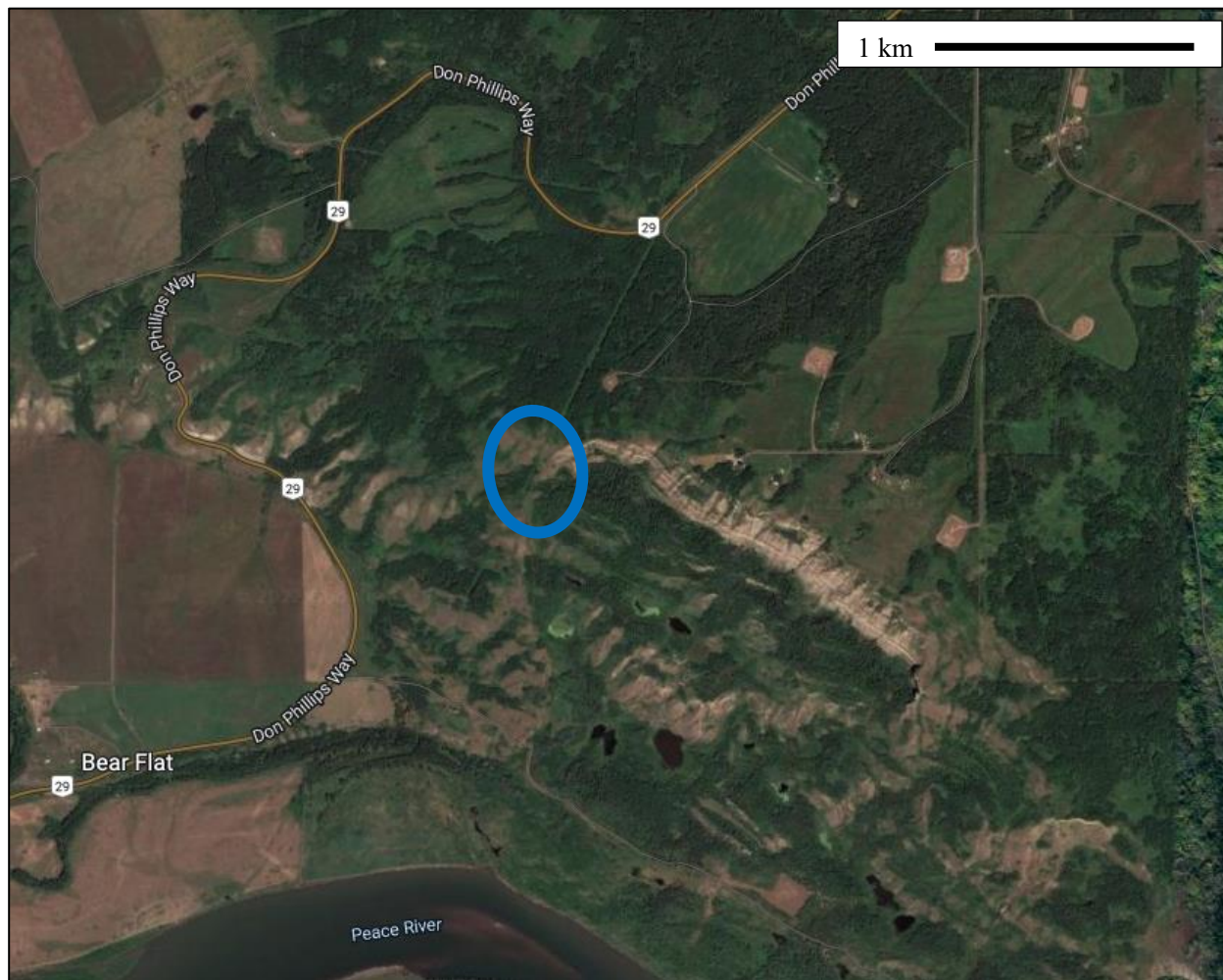
The prevailing wind direction in this area is west (i.e., originating from the west and blowing towards the east) (Weather Spark 2022 a)<sup>7</sup>, with influences from other directions. A wind originating in the north-west would provide hunters with an advantageous downwind which would have helped hide the smell of the hunters and their activities. The cliffs are also situated next to the Peace River (Figure 9). This proximity to water is an important feature for any jump site (Polk 1979:102).



**Figure 8.** Screenshot of potential jump site at Bear Flat. Suggested location of the final cliff jump (based on the height of jump being less than 50 meters) is indicated with the blue circle (Image source: Google Maps)

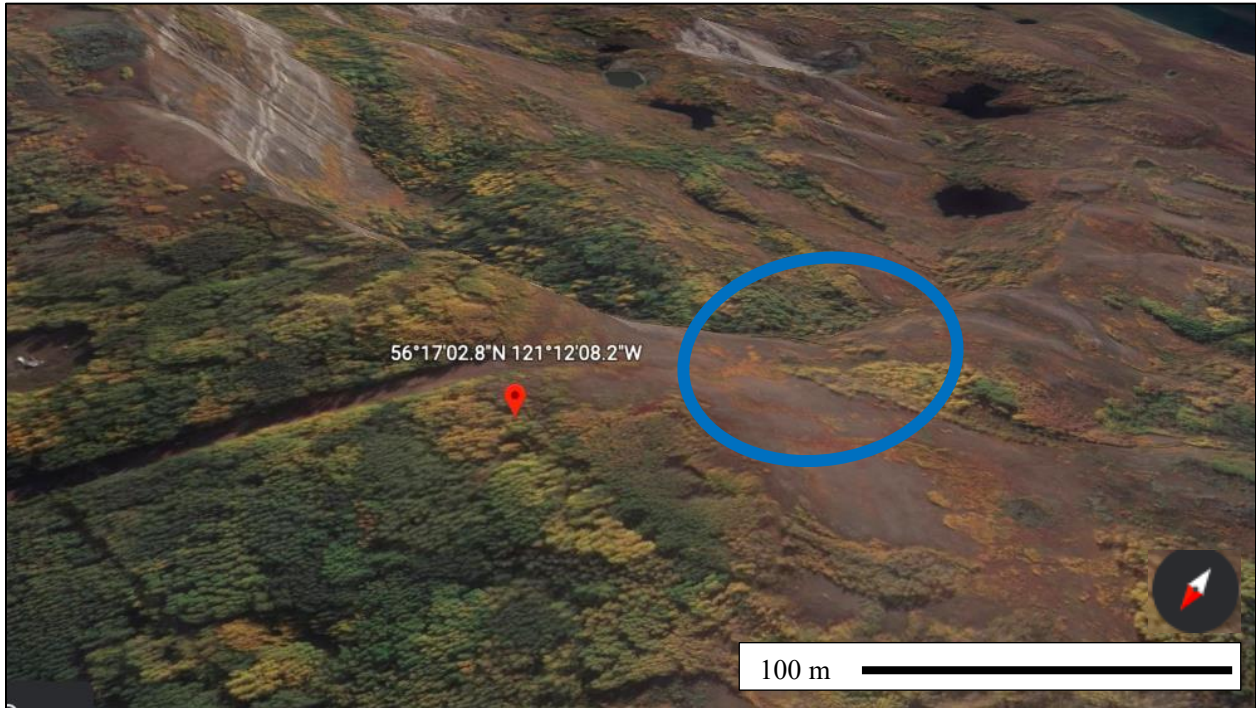
<sup>7</sup> If prevailing winds for a specific location was not available, prevailing wind direction is based on findings for the nearby area.





**Figure 9.** Screenshot of potential jump site at Bear Flat. Suggested location of the final cliff jump (based on the height of jump being less than 50 meters) is indicated with the blue circle (Image source: Google Maps)



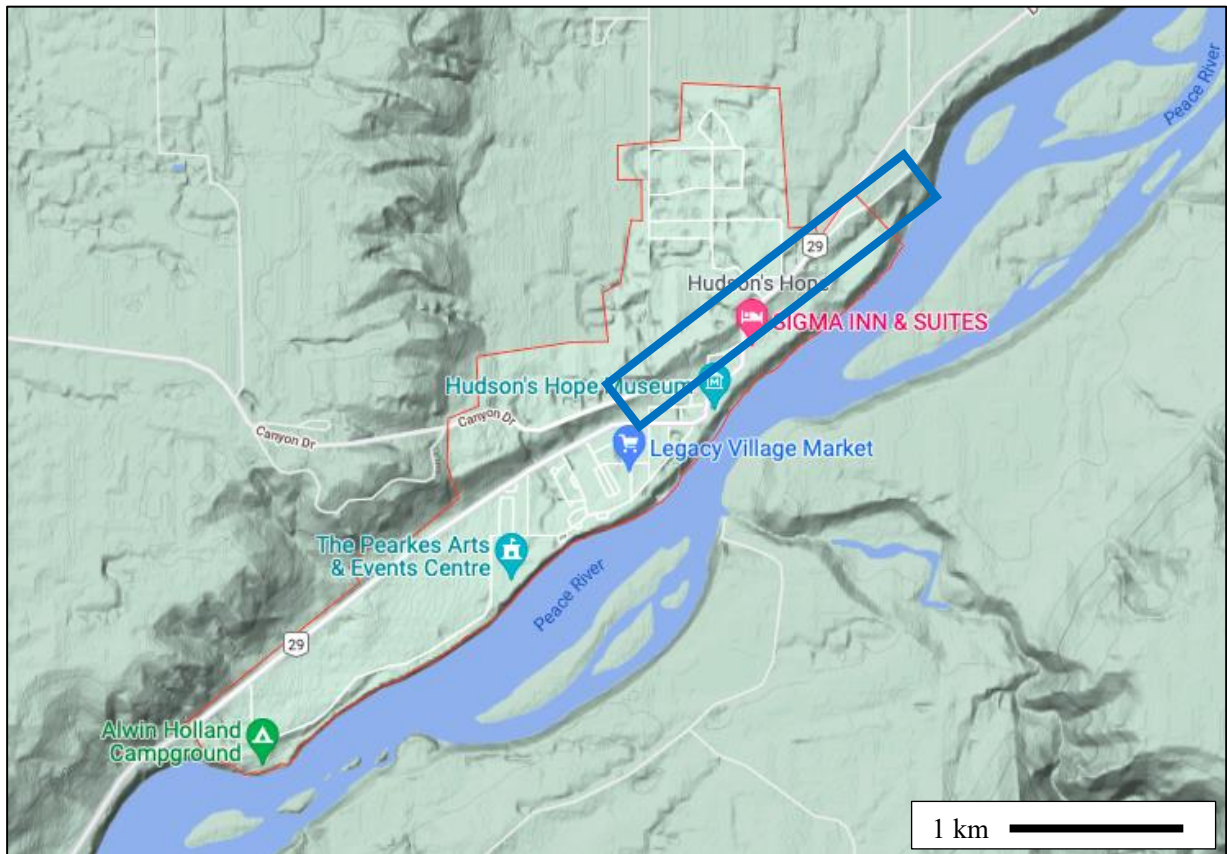


**Figure 10.** Screenshot of potential jump site at Bear Flat. Suggested location of the final cliff jump (based on the height of jump being less than 50 meters) is indicated with the blue circle (Image source: Google Earth). Image is looking toward the precipice of the jump.

The second location of a buffalo jump is near Hudson's Hope in British Columbia (Figure 11). There are varying heights of cliffs in this location, some less than 50 meters (Figure 12; terrain less than 50 meters indicated by blue box). This area is also located along the Peace River. The prevailing wind direction in this area also originates from the west (Weather Spark 2022 a). A wind originating from the north-west wind would provide hunters with an advantageous downwind which would have helped hide the smell of the hunters and their activities. Depending on the exact location, a jump could easily be within a 400–800 metre range of water.



**Figure 11.** Hudson's Hope, British Columbia (town limits outlined in red). (Image: Google Maps)



**Figure 12.** Topography of Hudson’s Hope, with cliffs less than 50 meters in height indicated by blue box (Image: Google Maps)

Table 1 provides an overview of our current knowledge of the features at each location and how well they meet criteria that could help determine if the locations were jump sites. As Table 1 shows, the evidence does not contradict Beaver Elder and community member statements that these were jump sites (T8FNs Community Assessment Team 2012).

Table 1: Description of jump sites features at Bear Flat and Hudson’s Hope (Y = Yes, L = Likely, N = No, ? = Unknown)

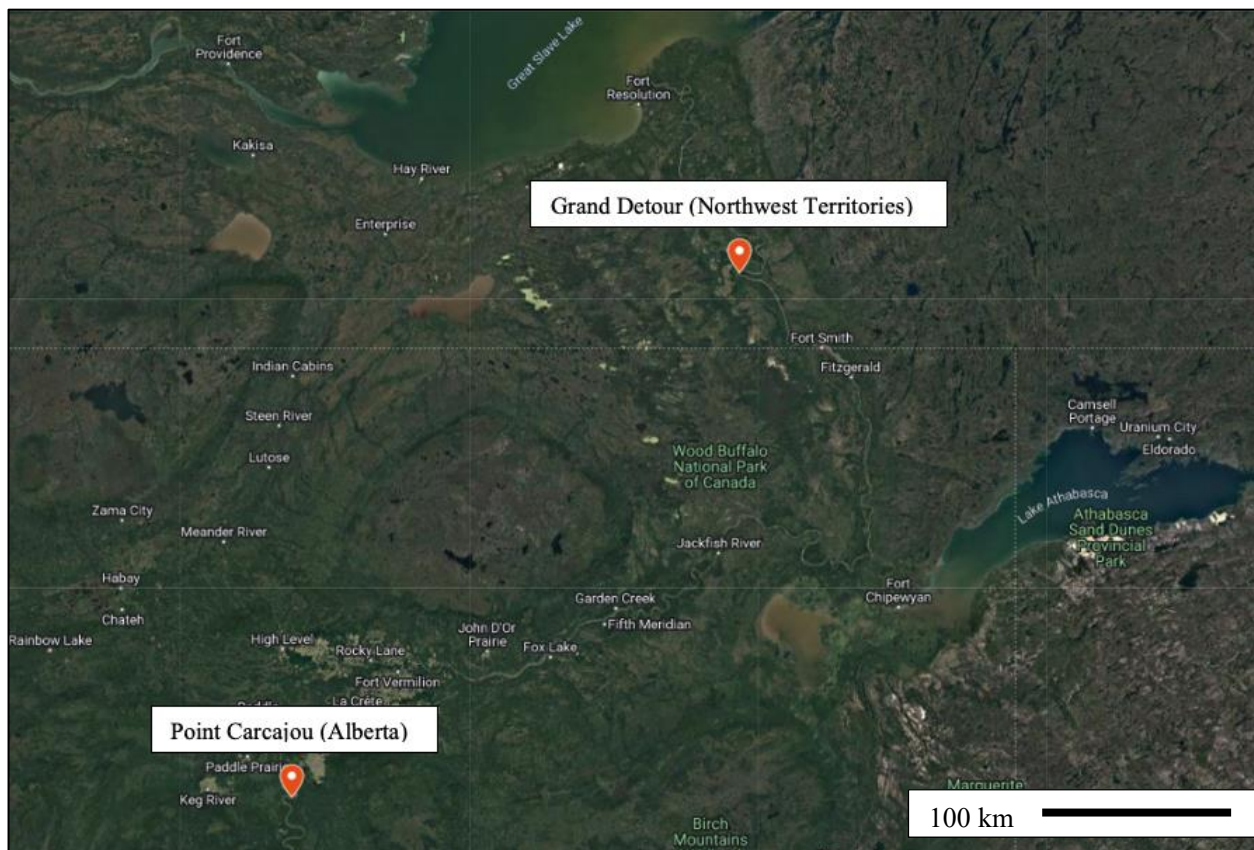
Feature	Bear Flat	Hudson’s Hope
Presence of a cliff not greater than 50 meters tall (Polk 1979)	L	Y
Nearby water source (400 – 800 meters) (Cooper 2008; Brink 2008; Polk 1979)	Y	Y
Room for processing below the cliff (e.g., flat landscape that could accommodate large groups of people) (Brink 2008)	Y	Y
Associated cultural remains (e.g., projectile points; evidence of human encampment) (Hamilton 2018; Brink 2008)	?	?
Evidence of drives lanes, fences or cairns leading up to the jump (Hamilton 2018; Brink 2008; Cooper 2008)	?	?



A cliff edge which is hidden from view by gently rising ground leading up to the precipice (Hamilton 2018; Brink 2008)	?	?
The final jump site is situated downwind of the drive area (Brink 2008; Verbicky-Todd 1984)	Y	Y
Evidence of bone beds at the base of the cliff (bone may have been found in the past, and oral history and/or historical records may be required) (Brink 2008; Ives 1990; Driver 1990)	?	?
Oral history and/or historical records of the area supporting animal migration routes and /or large game populations (Brink 2008; Barsh & Marlor 2003; Van der Sluijs et al. 2020; Ives 1990)	Y	Y

### *Drive-Trap Sites*

Two other specific communal hunting sites (drive sites) have been previously described within Beaver Territory: Point Carcajou on the Peace River (Alberta) and the Grand Detour on Great Slave River (Northwest Territories) (Figure 13).



**Figure 13.** Locations of Point Carcajou, (Alberta) and Grand Detour (Northwest Territories) (Image: Google Maps)

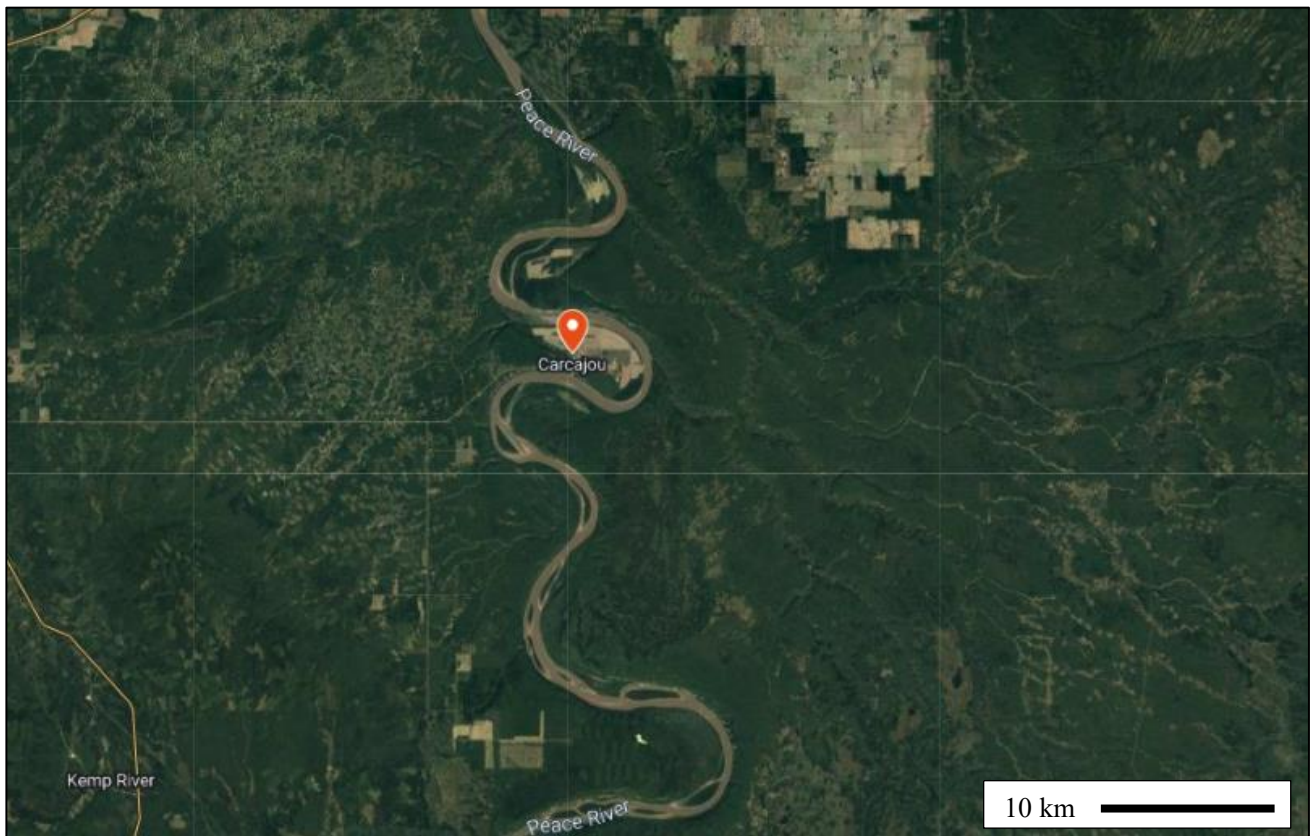
It is unclear if these sites were used by Beaver or Cree people (Ives 1990:308). While Heming (1936) highlights these sites, he only provides a description of the use of one of the sites, Point Carcajou. At this location, he describes how game animals were driven out of the forest, towards waiting hunters. Heming (1936:233) describes the drive technique as follows:

“One of the most ancient methods of hunting...is the “drive.” Two famous places for drive hunting in olden days were Point Carcajou on Peace River and the Grand Detour on Great Slave River. The former driving ground was about thirty miles long by about three miles across, while the latter was about fifteen miles long by about three miles across. The mode of hunting was for [hunters to]...spread out through the woods, and all, at an appointed time to move forward toward a certain point, and thus drive the game before them, until the animals, on coming out into the open at the other end, were attacked by men in ambush...At those driving grounds in the right season...[hunters] could count on securing two or three bears, three or four moose, and twelve to fifteen caribou.”

The type of drive described by Heming (1936) uses “beaters”, or people to drive the animals towards waiting hunters (Forbis 1978:3). Since people, instead of fences or impoundments were used to drive the animals towards a final kill site, material evidence (fences, corrals, stone cairns) are likely non-existent. However, transitions from heavily to sparsely wooded areas could again be an indicator of where these drives may have occurred.

Point Carcajou is situated in the boreal forest within dry mixed-wood ecozone subregion (Figure 14). This region might facilitate a drive site, as the area is a mix of aspen forests mixed with open landscapes (Alberta Parks 2015:5; Downing & Pettapiece 2006). Heming (1936:233) states that the driving ground was thirty miles long by three miles across, which is quite extensive and would extend the drive site beyond the bend in the Peace River (Figure 14). This would facilitate the necessary transition from wooded to open areas. Fur trade records from the Northwest Company state that bison were once abundant near Boyer River, approximately 150 kilometers from Point Carcajou (Ferguson 1993:69). The site also has river oxbows (where the river curves away from a straight path). Bison or other animals could have been driven into the

inner oxbow which would trap them against the riverbank; however, this technique would likely require many hunters (S. Hamilton, personal communication, March 11, 2022). The prevailing wind direction in both these areas originates from the west (Weather Spark 2022 b,d,e), with influences from other directions. This western wind is prevalent through most months of the year, and would provide hunters with an advantageous downwind while they waited for the animals to be driven towards them within the oxbow of the river (Weather Spark d,e).



**Figure 14.** Point Carcajou, Alberta and surrounding area (Image: Google Maps)



The second drive site mentioned by Heming (1936) is at Grand Detour in Northwest Territories. Again, Heming (1936) is not clear on whether this site was used by Beaver or Cree people, or both. There is local knowledge and historical records of this area being abundant with bison prior to the 1800s. For example, European explorer Samuel Hearne (1911, as quoted from Soper 1941:358) states that in the general area of Grand Detour, bison were numerous up to “a point near the longitude of the eastern end of the Great Slave Lake.” Near Salt River, European explorer John Franklin recorded that his group saw bison herds on the lower Athabasca and killed a bison at Salt River (approximately 40 kilometres south of Grand Detour) (Franklin 1823:192-97, as quoted from Soper 1941:358).



**Figure 15.** The area around Grand Detour, Northwest Territories (Image: Google Maps)

In terms of landscape, the region around Grand Detour is currently comprised of patches of trees and poor drainage, which make it a suitable grazing location (EcoDynamics Consulting Inc. 2008:30,118). Similar to Point Carcajou, the river at Grand Detour has an oxbow where the

river curves away from a straight line. In the surrounding area, the interspersed trees and open areas would facilitate a communal drive. Heming (1936:233) states that the driving ground for Grand Detour was fifteen miles long by three miles across, which is again quite extensive and may extend the drive site beyond the bend in Slave River (Figure 15). Local knowledge also states that Grand Detour was a crossing point for bison along the Slave River (Gates et al. 2001, as quoted from Gates et al. 2003:13). This river crossing could have been used as a drive intercept point, making it easier to kill bison as they were crossing the water. The prevailing wind in this region is from the west. This would not be advantageous for hunters, as a wind originating in the west would carry the scent of the hunters along the inner oxbow of the river towards the bison being driven to this area. However, a prevailing wind originating from the east is more prevalent in this region in the spring, particularly from March to June, and would produce the advantageous downwind (Weather Spark 2022 b). The time of year the drive was used may have been seasonal.

Table 2 provides an overview of the findings at each potential drive location and how they relate to known features of drive sites. As with the jump sites in British Columbia, the evidence does not contradict historical accounts that these were drive locations.

Table 2: Description of drive sites features at Point Carcajou and Grand Detour (Y = Yes, L = Likely, N = No, ? = Unknown).

Feature	Point Carcajou	Grand Detour
Evidence of landscape features that could be used as an intercept point (e.g., transition from heavily to sparsely wooded areas; water crossings) (Hamilton 2018; Ives 1990; Heming 1936)	Y	Y
Evidence of drives lanes, fences, cairns or a corral (Brink 2008; Cooper 2008)	?	?
Associated cultural remains (e.g., projectile points; evidence of human encampment) (Hamilton 2018)	?	?
The final kill site is situated downwind of the drive area (Brink 2008; Verbicky-Todd 1984)	Y	Y
Evidence of bonebeds (bone may have been found in the past, and oral history and/or historical records may be required) (Ives 1990; Driver 1990)	?	?



Oral history and/or historical records of the area supporting animal migration routes and /or large game populations (Brink 2008; Barsh & Marlor 2003; Van der Sluijs et al. 2020; Ives 1990)	Y	Y
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*Bonebed Site*

Another possible communal hunting location is alongside Bear Creek in Grande Prairie, Alberta. A citizen noticed bones eroding out of the banks along the edge of the creek and reported it to Kristine Fedyniak, Assistant Curator of archaeology at the Royal Alberta Museum (Figures 16 & 17). Beaver Elders Norman Wanihadie, Dorothy Wanihadie, and Beaver Knowledge Keeper Victoria Wanihadie made a preliminary site visit and documented the site with photographs. Norman Wanihadie identified most of the faunal remains as juvenile bison bone, horn, and hoof (Wanihadie et al. 2021). A precise location for the site is not provided here since a research permit application is still pending, and none of the material has been removed from the site.

It is important to note that the presence of exclusively juvenile bones at a site is not representative of the usual bison herd structure, which would typically include animals of various ages (Olson 2006; Brink 2008). The presence of exclusively juvenile bones could be associated with accidental death by drowning, rather than a mass kill event (W. Olson, personal communication, October 8, 2021). A kill site of solely juvenile animals would be highly unusual.

Historical evidence and oral accounts state that bison inhabited the Grande Prairie region prior to the 1800s, before the intensification of European settlement. Dawson (1881:54) states that during his travels throughout Grande Prairie in 1879, he was informed by people in the area (whether Beaver or Cree is unclear) that bison once lived there but had since been exterminated. Dawson (1881:54) also noted that buffalo trails and wallows were still visible on the landscape when he was passing through, even though bison had already been extirpated by that time.



**Figure 16.** Bison bonebed near Bear Creek, Grande Prairie (Photo credit: Victoria Wanihadie)



**Figure 17.** Landscape leading towards the bonebed site near Bear Creek, Grande Prairie (Photo credit: Victoria Wanihadie)

In-person field work could help determine if any woody debris or other impoundment features (i.e., rocks used as cairns) are visible on the landscape. While the site is close (within 400 meters) of a water source, an important feature for a jump site, there is limited space for processing, as the site is about 15 feet from the water (V. Wanihadie, personal communication to J. Metcalfe, March 14, 2022). There is also no cliff at the site suggesting that if it was a

communal hunting site, it was more likely a drive site. The bonebed site is located along the eastern bank of the river, and the prevailing wind direction throughout most of the year originates from the west (Weather Spark 2022 c). A downwind site would require the bison to be driven from the west, forcing them into the river. If the drive was to occur from the other direction, from the east, a prevailing wind originating from the east would be needed to hide the scent of the hunters waiting at the kill site. A prevailing wind originating from the east is more common in the Spring, particularly March through June (Weather Spark 2022 c). The use of the site, if it is a communal hunting location, may have been seasonal. If there was a sizable herd, trees which were more abundant closer to the rivers (Dawson 1881:51) could have been used to slow down the animals. However, these inferences are speculative until the use of the site can be confirmed.

In terms of representing a drive site, the site is located within parkland territory. While this area has undergone extensive agricultural development, prior to European settlement it may have offered transition areas from heavily wooded areas to sparsely wooded areas. The close proximity to water could have also acted as an intercept point. While very little is known about this site, plans for field work are underway. More information will need to be gathered before any conclusions can be made.

Table 3: Description of bonebed site features (Y = Yes, L = Likely, N = No, ? = Unknown)

Features	Bear Creek
<b>Jump Sites</b>	
Presence of a cliff not greater than 50 meters tall (Polk 1979)	N
Nearby water source (400 – 800 meters) (Cooper 2008; Brink 2008; Polk 1979)	Y
Room for processing below the cliff (e.g., flat landscape that could accommodate large groups of people) (Brink 2008)	N
Associated cultural remains (e.g., projectile points; evidence of human encampment) (Hamilton 2018; Brink 2008)	?
Evidence of drives lanes, fences or cairns leading up to the jump (Hamilton 2018; Brink 2008; Cooper 2008)	?
A cliff edge which is hidden from view by gently rising ground leading up to the precipice (Hamilton 2018; Brink 2008)	?
The final jump site is situated downwind of the drive area (Brink 2008; Verbicky-Todd 1984)	Y
Evidence of bone beds at the base of the cliff (bone may have been found in the past, and oral history and/or historical records may be required) (Brink 2008; Ives 1990; Driver 1990)	N
Oral history and/or historical records of the area supporting animal migration routes and /or large game populations (Brink 2008; Barsh & Marlor 2003; Van der Sluijs et al. 2020; Ives 1990)	Y
<b>Drive Sites</b>	
Evidence of landscape features that could be used as intercept an point (e.g., transition from heavily to sparsely wooded areas; water crossings) (Hamilton 2018; Ives 1990; Heming 1936)	L
Evidence of drives lanes, fences, cairns or a corral (Brink 2008; Cooper 2008; Hamilton 2018)	?
Associated cultural remains (e.g., projectile points; evidence of human encampment) (Hamilton 2018)	?
The final kill site is situated in relation to downwind of an approaching herd (Brink 2008; Verbicky-Todd 1984)	Y
Evidence of bonebeds (bone may have been found in the past, and oral history and/or historical records may be required) (Ives 1990; Driver 1990)	Y
Oral history and/or historical records of the area supporting animal migration routes and /or large game populations (Brink 2008; Barsh & Marlor 2003; Van der Sluijs et al. 2020; Ives 1990)	Y

Based on the information provided by Van der Sluijs et al. (2020), the composition of boreal forest soil, and the extent of development in the aspen parkland, finding communal sites may be challenging, but local knowledge tells of their existence.

## Conclusion

Communal hunting was, and continues to be, an important practice for Indigenous groups across North America. It not only facilitated the procurement of resources, but provided the

opportunity for social gatherings, ceremonies, rituals, political alliances, and other activities. For many North American Indigenous groups, communal hunting was underpinned by reciprocity, knowledge, respect, and cooperation with animals. The role of the shaman and the connections and relationships with animals were often central and critical aspects of a communal hunt.

Communal hunting is an umbrella term that can have specific and nuanced features within each community. A standard definition of communal hunting (i.e., the number of hunters, specific motivations, temporality, and seasonality) may not be achievable or necessary. The concept of ‘communal’ is variable and likely differs between Western and Indigenous groups, as the latter often considered animals an active part of the hunt.

In Beaver Territory, Dreamers or Hunt Chiefs played a leading role in communal hunting. Through their ability to dream ahead for everyone, they were able to meet with animals and determine where the hunt would take place. The maintenance of proper relationships between people within Beaver society, and between people and animals was a critical factor for the success of both communal and individual hunts.

Beaver society was knowledge-based, and included an extensive understanding of their territory, plant and animal life, and effective hunting tools and traps. Since Beaver people were highly mobile, excess material goods was a liability. European settlers did not recognize Beaver people’s rich knowledge-based society and wrongly identified minimal materiality as a sign of impoverishment. Instead, knowledge was of greater value than possessions, as knowledge could be taken anywhere and applied in a variety of environments. An implication of this focus on knowledge may be that non-perishable features such as impoundments are rare in Beaver territory. Nevertheless, ethnohistoric and ethnographic records show that social gatherings

occurred during summer and fall, and these gatherings may have provided opportunities for large communal hunts to occur.

The archaeological literature and oral histories related to buffalo jumps in Beaver Territory are contradictory. Beaver Elders and community members from Treaty Eight First Nations (Doig River First Nations, Halfway River First Nations, Prophet River First Nations, West Moberly First Nations) state there are two buffalo jumps in northwestern British Columbia, whereas Cooper (2008) states that buffalo jumps do not occur that far north. Historical records (Heming 1936:233) describe drives that may have been operated by Beaver people in northern Alberta and southern Northwest Territories.

Five possible communal hunting locations in Beaver territory were described, and while the exact locations of the sites are unknown, the areas did have historical records of supporting bison populations. The potential jump sites were all situated near water sources, with room for processing animals obtained in the hunt. The locations of the potential jump sites were situated in areas that likely had access to cliff heights that were less than 50 meters in height. In terms of the possible drive sites, both have historical records of supporting bison populations and one of the sites was associated with a known water crossing, which could have been used as an intercept point. The bonebed site also had key features associated with communal hunting sites. If a field survey is conducted in these areas, non-perishable materials used for impoundments may still be visible, although the preservation of organic materials is probably unlikely due ongoing development of aspen parkland, the boreal forest environment, the passage of time and effects of climate change. More information would be required to empirically evaluate whether these locations were communal hunt sites, but there is no documented evidence to contradict the oral histories and ethnohistoric accounts of communal hunting at these locations.

## **Chapter Three: Exploring the Limits of American Bison's Precolonial Territory through Buffalo Art and Skeletal Remains**

### **Introduction**

As North America's largest land mammal, bison (*Bison bison*) have had a significant impact on the landscape, ecology, and cultures of North America (Guthrie 1990; Knapp et al. 1999; Markewicz 2017). Bison are a keystone species as their movement and activities alter and shape the landscape, create and maintain habitats, and provide resources for plant and animal species, including humans (Knapp et al. 1999; Polley & Collins 1984; Coppedge 2009). Bison have been an influential and central animal to many cultures across North America, including Beaver people. Prior to European contact, bison population numbered in the tens of millions; by the late 1800s, European settlement had resulted in their near eradication (Gates 2010).

Ferguson (1993) states that bison population numbers began to decline in Beaver Territory (Peace Region) by around 1820. During this time there was significant "competitive stress" between the fur trading Hudson's Bay Company and the Northwest Company which led to the overhunting of many animals, including bison (Ferguson 1993:69-70). By 1821, the fur trade companies had amalgamated under the Hudson's Bay Company name. Following the merger, reports from Peace River Chief Traders stressed that there was extensive game depletion and that it was a regional issue occurring throughout the Peace River system (Ferguson 1993:71; Burley et al. 1996). In the 1820s, fish became a staple in some fur trade posts in the upper Peace River valley (Burley et al. 1996). This subsistence shift from big-game hunting to fishing was a sign of overhunting and decreased game populations in the region (Burley et al 1996). Around 1830, a series of harsh winters with deep snow may have been the final blow for Upper Peace buffalo populations that were already severely depleted by overhunting (Dawson 1881:54;

Ferguson 1993:66,73-74). By the 1840s, the archaeological record at Fort St. Johns in northeastern British Columbia shows extensive hunting of snowshoe hares which were considered a 'starvation resource' due to their low amount of fat and meat, and unmarketable fur (Ferguson 1993; Burley et al. 1996). This indicates that the region was under incredible food stress. The shift from large game to fish and hare was widespread across North America and was known as the 'fish and hare period' (Rogers & Black 1976).

By the late 1800s, bison populations across North America, including in the Peace Region, were nearly extinct, with an estimated remaining population of only 23 plains bison and 250 wood bison across the whole continent (Olson 2022). While there are approximately 430,000 bison in North America today, over 93% are kept as livestock (Gates et al. 2010). Free-roaming bison live in small herds throughout North America (62 plains bison herds and 11 wood bison herds) occupying less than 1% of their former range (Gates et al. 2010:58,61). Near Beaver Territory, free-roaming herds were reintroduced in Banff National Park in 2018 (Banff National Park 2020), as well as the Innoko River area of Alaska in 2015 and the Nisling River Valley of Yukon in 1986 (Auld 2021; Yukon Fish and Wildlife Management Board & Yukon Environment 2012). Bison have continuously occupied the area now referred to as Wood Buffalo National Park in northeastern Alberta and southern Northwest Territories since pre-colonial times (Chow-Fraser, G. n.d.).

Recently, the province of Alberta designated wood bison in multiple northern Alberta Wildlife Management Units (WMU) as 'wildlife' and 'threatened species'. This provides wood bison in these WMUs additional protection under the Wildlife Act (Prentice 2021). Certain herds (e.g., the Wabasca herd adjacent to Wood Buffalo National Park) will have additional protections such as prohibitions against hunting (Prentice 2021). There are also organizations working to



increase the territories available to free-ranging bison. For example, ‘Yellowstone to Yukon’ is working to establish a 3,200-kilometer open corridor from Yellowstone National Park (Wyoming) through Alberta and into the Yukon Territory, to allow for the natural movements/migrations of bison and other animals (Yellowstone to Yukon 2022). There are also ongoing Indigenous initiatives to restore free-ranging bison to their traditional lands, such as the Buffalo Treaty as discussed in Chapter 1, and the Ininii Initiative which works to return bison to traditional Blackfeet territory (Blackfeet Nation 2022). Despite ongoing initiatives and reintroductions, plains bison continue to be designated as a ‘threatened’ species, while wood bison throughout most of Canada are designated as a species of ‘special concern’ (COSEWIC 2013).

A systematic approach to studying bison and their geographic range from a scientific perspective never occurred until after the species was nearly exterminated (van Zyll de Jong 1986). As a result, it can be difficult, if not impossible, to identify bison’s full Late-Holocene distribution throughout North America (van Zyll de Jong 1995; van Zyll de Jong 1986; Soper 1941). Colonial-era maps must rely on historical records, archaeological and palaeontological data as well as oral histories to determine the extent of bison’s Late-Holocene range (List et al. 2006; Stephenson et al. 2001).

The purpose of this chapter is to explore material evidence of bison living outside of the Late-Holocene range indicated by colonial-era maps (COSEWIC 2013; Gates et al. 2010), in order to better understand where bison could have been hunted, and which subspecies was likely present in these areas. Bison are a highly adaptable species and may have moved outside of known habitats depending on resource availability. Bison range maps are a work in progress, so there may be outlying areas where bison lived that are not currently documented. Finding

evidence of outlying areas is important not only to understand the limits of modern bison range estimates, but to potentially help inform and expand bison conservation options. A key challenge in bison conservation is finding land within bison's Late-Holocene range for establishing viable free-roaming herds, because much of their range has been overtaken by industry and agriculture (Gates et al. 2010). Identifying territories utilized by bison outside of their known Late-Holocene range could help inform and expand future land-use for bison conservation. This work could also help support and inform revitalization initiatives such as the Buffalo Treaty, which works on the rematriation of bison to their ancestral lands. Some ancestral land may be outside of bison's generally known Late-Holocene territory.

To explore the evidence of bison outside of their known Late-Holocene territory, I searched for and examined bison art (effigies, rock paintings and petroglyphs)<sup>8</sup> and skeletal remains in regions that are peripheral to or outside of known bison habitats.

There are two main research questions this chapter seeks to answer: What examples of bison art and skeletal remains exist on the periphery (and outside) of bison's generally accepted range in central Alberta, northern Saskatchewan, Manitoba, and Ontario? Can morphometric measurements be used to determine the subspecies of bison (i.e., wood versus plains bison) depicted in art? Subspecies differentiation could help determine whether art depicts bison local to the area in which the art was found. For example, boreally-situated artistic depictions of wood bison would be consistent with bison observed locally, whereas depictions of plains bison in boreal environments might suggest observations made in areas further south.

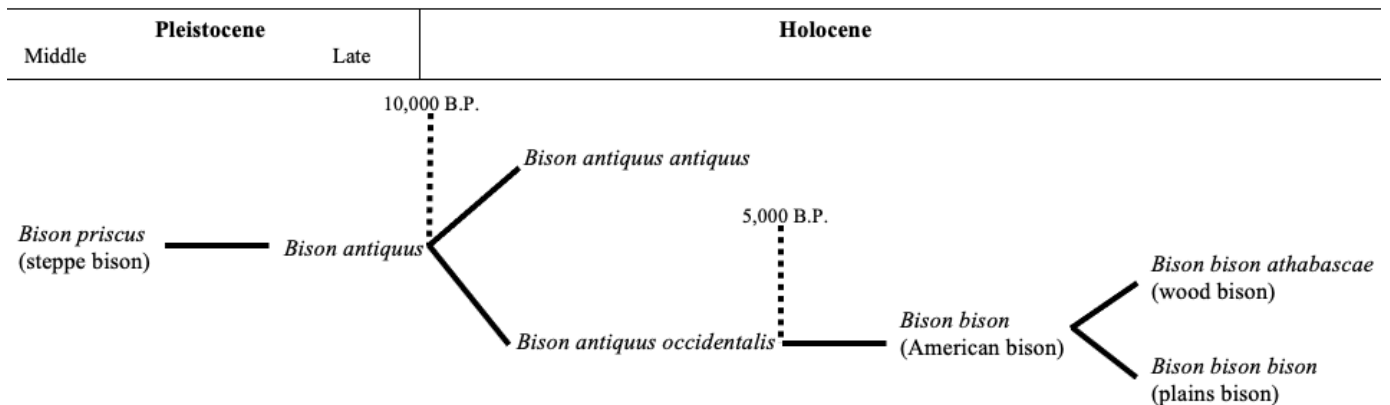
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<sup>8</sup> Effigies are images or portable representations (i.e., stone or wood carvings) of people or animals. Rock paintings, particularly on the Canadian Shield, are typically done using red ochre on vertical rock faces on the edge of rivers and lakes (Steinbring & Zawadzka 2019). Petroglyphs are images that are pecked, incised, or carved into rock or other materials, either on vertical or horizontal surfaces (Steinbring & Zawadzka 2019; Jones 1981:1-2).

It is important to acknowledge that this research examines art created by numerous Indigenous groups across Canada. As a settler scholar, I appreciate the opportunity to study the art and skeletal remains, which come from the traditional territories and meeting places of many different Indigenous peoples, including (but not limited to) Dene, Cree, Haudenosaunee, Anishinaabe, and Métis. Based on the preference of Little Grand Rapids First Nation for rock art not to be photographed (drawings/reproductions permitted) (J. Taylor-Hollings, personal communication, July 21, 2021), no actual photographs of rock art images have been included in the thesis. All images are drawn reproductions.

*Bison Ancestry*

Bison have lived in North America for many millennia. The ancestor of modern American bison was the Beringian Steppe Bison [*Bison priscus*], which originated in Eurasia and entered eastern Beringia around 300,000 – 130,000 before present (B.P.) (Shapiro 2004). From Beringia, bison moved southward and dispersed throughout North America by 130,000 – 75,000 B.P. (Shapiro 2004). Modern bison are thought to have evolved around 5,000 years B.P. (see Figure 18) (Wilson 1979).

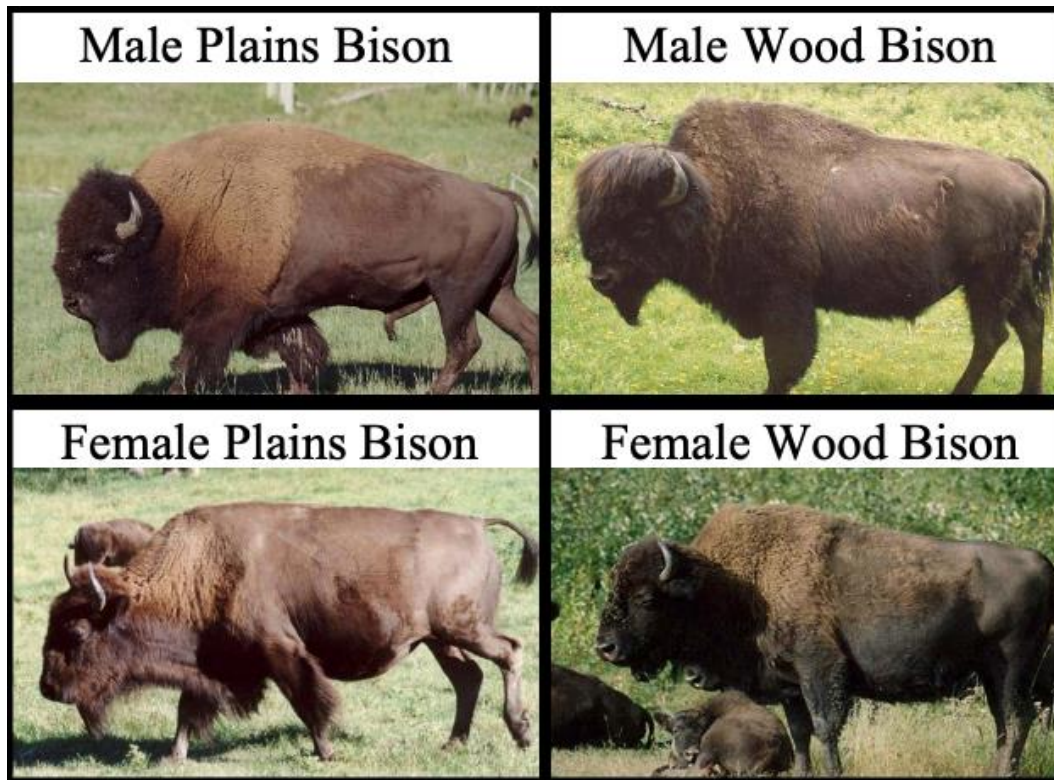


**Figure 18.** Simplified phylogeny of genus *Bison* relevant to this thesis, focusing on lineages of American bison (adapted from McDonald 1981; Prusak et al. 2004; Hardy 2012; Wilson 1979)

The surviving modern American bison are two distinct subspecies (Rhoads 1897; van Zyll de Jong 1986). This designation has historically been challenged. For example, Geist (1991) stated that the two subspecies were in instead ecotypes. He argued that the classification of two subspecies of bison was unjustified, as the main criteria used for differentiation were body size and morphometrics (Rhoads 1897; van Zyll de Jong 1986; Geist 1991). He argued that environmental influences had been overlooked when bison were taxonomically classified, and their morphological differences were influenced by diet and habitat. However, recent research has firmly countered Geist (1991)'s argument. For example, van Zyll de Jong (1995:402) has shown that even when wood bison are translocated into plains bison territory or vice versa, their physical features remain distinctive to their subspecies, even over a period of 60 years. Van Zyll de Jong (1986:54) also states that plains bison relocated to zoos retained the physical characteristics of their subspecies. These examples demonstrate that phenotypic differences are genetically and not environmentally based (van Zyll de Jong 1995; van Zyll de Jong 1986).

#### *Key Morphological Differences Between American Bison Subspecies*

Several key physical differences between plains and wood bison exist and are subdivided here into pelage characteristics and anatomical characteristics (Figure 19).



**Figure 19.** Comparison of male and female wood and plain bison (Image credits: Wes Olson)

The bison's pelage refers to their coat or hair. Since hair was generally not depicted on art, I could not use this feature in my research. Nevertheless, I explain the differences briefly here. The first pelage characteristic is their 'cape.' Plains bison have a light-coloured cape on their back which is well demarcated from the rest of their body. In contrast, wood bison tend to have a more monotone coat. The second pelage characteristic is their 'bonnet,' or the hair on their head. Plains bison have shorter and curlier hair, whereas wood bison have longer hair that may fall in front of their face. The third feature refers to their chaps (the fur on the back of their front legs). Plains bison have more full or well-developed chaps, while wood bison have reduced chaps (Gates et al. 2010:16). The final pelage feature refers to the 'beard' or throat mane. Plains bison have a fuller beard which is reduced in wood bison.

A striking aspect of both bison subspecies is their large hump, which is comprised of connective tissues and the dorsal spinous process of the thoracic vertebrae (Guthrie 1990). Of all

extant animals, bison have the largest thoracic spinous processes of any other animal relative to size, which helps to support their very large head (Guthrie 1990:133). There are key anatomical differences in the position, shape, and size of the humps of the two subspecies. The highest point of the plains bison hump is typically over their front legs. Functionally, a large hump centred over the front legs helps with locomotion, particularly with sustaining long bouts of galloping or cantering (Guthrie 1990:133-137). It is believed that plains bison underwent longer migrations than wood bison, and their hump allowed for more cost-effective biomechanical energy expenditures when travelling long distances (Guthrie 1990; Soper et al. 1947). In contrast, the highest point of the wood bison's hump is forward of their front legs (Gates et al. 2010; Guthrie 1990). Wood bison likely migrated over shorter distances, and a hump centered over their front legs for biomechanical efficiency was not crucial as with plains bison (Soper 1941; Bergman 2000, as quoted from Cooper 2008). Wood bison are also up to 20% larger than plains bison (Markewicz 2017:3). Additional musculature to support their head may result in a larger and more forwardly placed hump (Olson n.d. a). Wood bison's larger size also aligns with Bergmann's rule, which states that individuals of the same species who live in northern latitudes (above 66 degrees in latitude) and colder climates will have a larger body size than their counterparts who live in more southern and warmer climates (Olson 2022; Clauss et al. 2013). A larger body size in northern latitudes and colder climates is a critical factor for conserving heat (Clauss et al. 2013).

The size of the horns also differs between the two subspecies. In plains bison, the horns do not extend above the hair or bonnet, while wood bison's horns are taller and extend above their bonnet (Gates et al. 2010:16). It is also important to note that there is considerable physical variation between the sexes and among individuals. The aforementioned general characteristics

are more prominent in some individuals than others. In particular, males can have more exaggerated features, which can make it easier to distinguish subspecies.

### *Cattle Hybridization and Domestication*

When wild bison were nearly eradicated in the late 1800s, a small number of individuals were already kept by private ranchers (Ranglack 2015). Along with propagating the species, ranchers crossbred bison and cattle in an attempt to create a more docile animal with high-quality meat that could survive severe winters (Hornaday 1988; Ward 1999). Hornaday (1988:452) states that cattle would die in the thousands when unexpectedly brutal winters hit. Cattle were not able to navigate deep snow, whereas bison could survive in such conditions. Cattle also do not have the same physiological cold tolerance as bison (Christopherson et al. 1978). Experimental studies show that in extreme cold (-30°C) cattle's metabolic rate increases, which indicates cold stress, whereas bison's do not (Christopherson et al. 1978).

Crossbreeding cattle and bison was challenging as the two species were reluctant to interbreed. There were also high levels of offspring sterility and high mortality rates for mothers and offspring (Dary 1974; Ranglack 2015; Gates et al 2010). For all of these reasons, crossbreeding was ultimately abandoned (Dary 1974; Ranglack 2015). However, the small cross-bred herds were used as founder populations for bison restoration throughout much of North America (Ranglack 2015). Thus, cattle DNA was spread throughout North America and is still present in most extant free-ranging herds (i.e., herds that are free to roam in conservation areas) (Gates et al. 2010; Ranglack 2015). While the amount of cattle DNA in bison is typically only 1% or less, there remains a risk that it impacts their anatomical features (i.e., hump shape and size) (Hedrick 2009). However, there are eight free-ranging herds in North America with

bison that are completely free of cattle DNA introgression. Studying the physical characteristics of these herds is most beneficial for comparison with prehistoric art (Table 4).

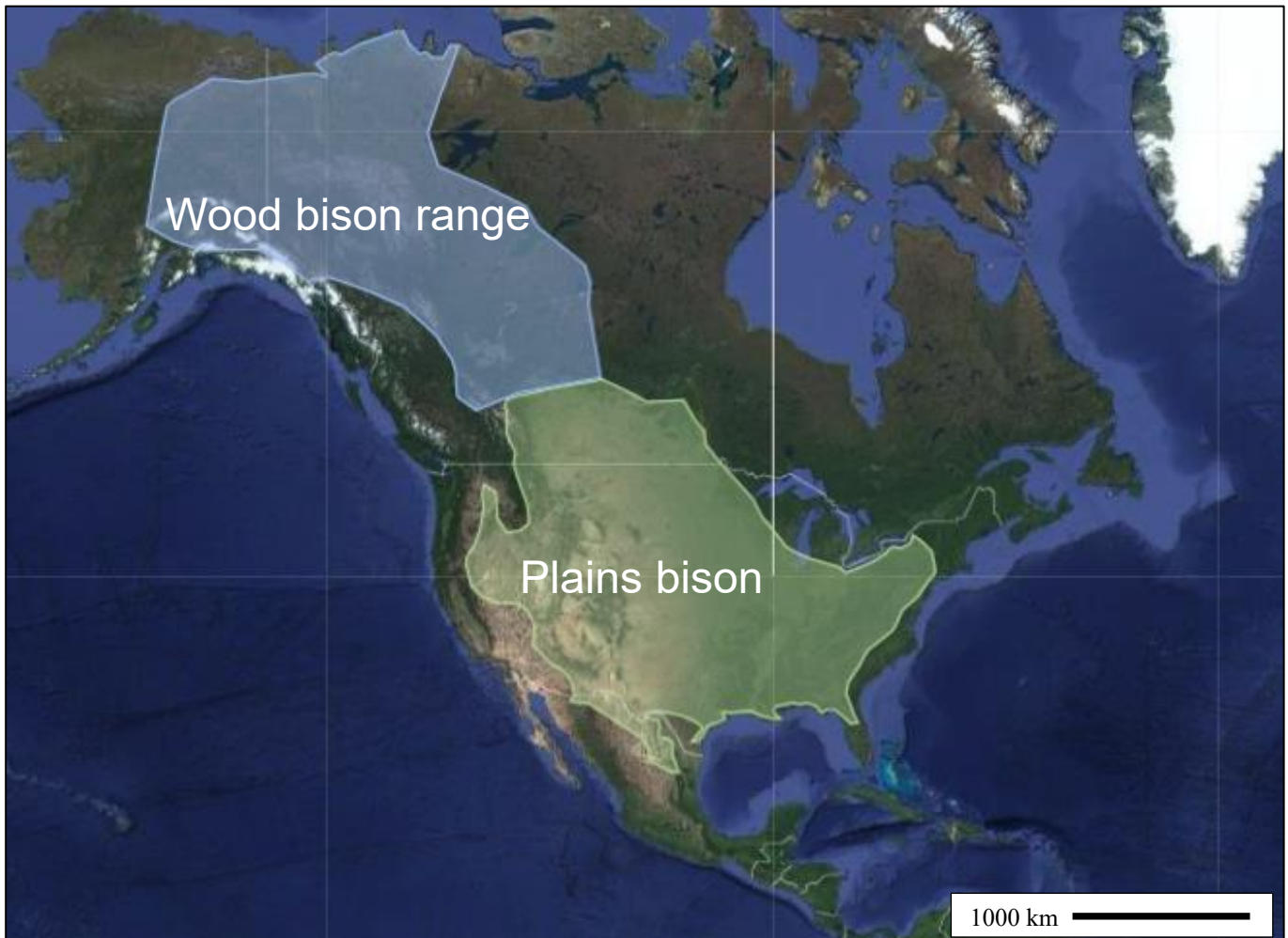
Table 4: List of free-ranging bison herds without cattle DNA (Ranglack 2015; Halbert et al. 2005; Halbert et al. 2007; Ward et al. 2009).

Name	Location	Subspecies
Elk Island National Park	Alberta	Wood & Plains
Grand Teton National Park	Wyoming	Plains
Henry Mountains State Park	Utah	Plains
Mackenzie Bison Sanctuary	Northwest Territories	Wood
Sully's Hill National Game Preserve	North Dakota	Plains
Wind Cave National Park	South Dakota	Plains
Wood Buffalo National Park	Alberta and Northwest Territories	Wood
Yellowstone National Park	Idaho, Montana and Wyoming	Plains

#### *Dispersion and Subspecies Hybridization*

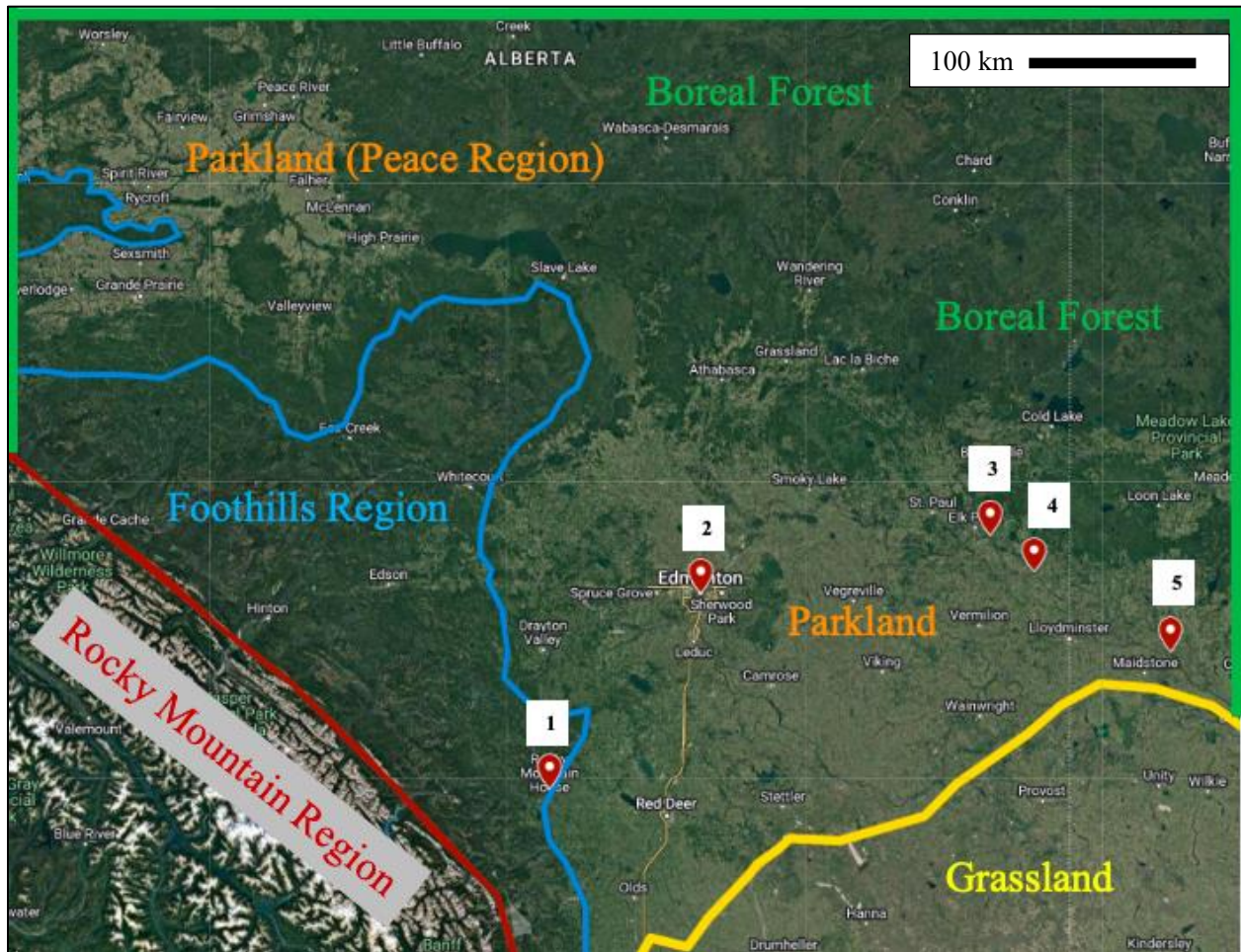
Before European contact, the two bison subspecies are believed to have occupied mostly distinct ranges. The boundaries of these ranges likely shifted depending on available resources, as bison are a highly adaptable animal that could survive in various landscapes (Stephenson et al. 2001). When colonial-era maps outline Late-Holocene bison territories, they do not show how bison moved in and out of these areas over time; rather, they are static representations of the fullest known extent of each bison subspecies' range (Gates et al. 2010; COSEWIC 2013). For this thesis, the known Late-Holocene range of bison in North America was approximated based on a map produced by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC 2013:12) (Figure 20).





**Figure 20.** Approximate Late-Holocene range of wood and plains bison (adapted from COSEWIC [2013:12] using Google My Maps).

The Late-Holocene ranges of wood and plains bison met in a transition zone that stretched across central Alberta and into western Saskatchewan (COSEWIC 2013:12). This broadly corresponds to the modern parkland ecological zone, which is a mosaic of forest and grassland situated between plains to boreal forest environments (Hamilton et al. 2006; Dawson 1881:51). The area in which plains and wood bison territories met would have shifted on a seasonal basis, and more extensively over time (COSEWIC 2013:iv; Hamilton et al. 2006) (see Figure 21).



**Figure 21.** Modern ecological zones (zones have changed over time) in central Alberta and western Saskatchewan (adapted from Downing & Pettapiece 2006:vi). Fur trade posts are identified by red pins. Site 1: Rocky Mountain House; Site 2: Edmonton House; Site 3: Fort George; Site 4: Fort Vermilion; Site 5: Manchester House (Malainey & Sherriff 1996).

The timing of wood and plains bison occupation of this transition area and the extent of interbreeding that occurred between the two subspecies remains unclear. Van Zyll de Jong (1986) argues that although some hybridization between the two subspecies likely occurred, ecological factors and migration patterns helped keep the two subspecies distinct throughout most of their range. The boreal forest and foothills region may have acted as an environmental barrier to minimize contact between wood bison in the north and plains bison in the south (van Zyll de Jong 1986; Soper 1941).

Through historical records (mainly mid-nineteenth century Hudson's Bay records and accounts from missionaries) Moodie and Arthur (1972) postulate that plains bison may have moved into the parklands transition zone in the winter, and back to the prairies for the spring and the summer rut, which would help limit interbreeding. In contrast, Malainey & Sherriff (1996) argue that according to earlier historical records from the Hudson's Bay Company and European explorers, many plains bison spent the winters on the plains, and did not move *en masse* into the parkland. "Observations of wintering bison reaching forts located in the parkland are rare; vast herds of bison were instead found out on the open plains" (see Figure 21 for fort locations numbers 2-5) (Malainey & Sherriff 1996:352). Although the plains offered less shelter and more exposure to the elements, the open environment and the wind helped decrease overall snow accumulation, enabling bison to access frozen grass (Malainey & Sherriff 1996). In contrast, the parkland had higher levels of precipitation and was more sheltered, allowing greater snow depth to accumulate, and causing greater difficulty for bison foraging (Malainey & Sherriff 1996). The boreal forest region also has greater levels of precipitation than grasslands which could pose similar issues of deep snow (Downing & Pettapiece 2006). Deep snow requires more effort from bison to muzzle or dig through the snow and puts bison in danger of overexertion and starvation (Malainey & Sherriff 1996). Overall, evidence about when each subspecies of bison occupied the transitional zone is lacking and contradictory. This may be due in part to the irregularity and rapidly changing of winter weather conditions on the plains that required ongoing adaptation (Hamilton et al 2006; Malainey & Sherriff 1996).

It is also difficult to confirm the historical sizes of wood bison herds. While some historical documents state that wood bison formed smaller herds than plains bison, these reports were written after bison populations had started to decline (Richardson 1829:282). Some of the

earliest written European records comment on the abundance of wood bison in certain regions, suggesting that large, aggregated herds would be possible. For example, the English explorer Samuel Hearne (1911:324) described wood bison in the area of the lower Slave River as “very plentiful”. Near Grande Prairie, Alexander Mackenzie also remarked on the abundance of animals, including bison, in the Peace region, which he likened to “a stall yard” (Mackenzie 1927). In the late 1700s and early 1800s, fur trade posts along the central and upper Peace River area were considered “buffalo posts” suggesting there were many bison in the area (Carbyn et al. 1993:15; Burley et al. 1996) (see Figure 3).

Stephenson et al. (2001) recorded oral histories about bison from Athapaskan Elders from the upper Yukon and interior Alaska. In Yukon and Alaska, wood bison were historically abundant and considered an important resource. In 1998, Elder Mrs. Annie James of Fort Yukon stated she was told there were once “lots” of bison in the area that had been hunted with bows and arrows (Stephenson et al. 2001:129). Mr. Moses Cruikshank from Beaver, Alaska, recounted how historically there were “big herds” of bison on the Yukon Flats, and large numbers of bison would be killed to provide resources throughout the winter (Stephenson et al. 2001:131). Mr. Cruikshank referred to a mountain in the Sheenjek River area (in Alaska) that was called “Buffalo Shirt Mountain” (Stephenson et al. 2001:131). Mr. Cruikshank stated that the mountain was given this name when “a large herd of bison came through and covered it like a shirt” (Stephenson et al. 2001:131). Similarly, Mary Sam, born in 1914 and growing up in the Black River (Alaska), recounted how her great-grandfather told stories about the abundance of bison in the area (Stephenson et al. 2001:131). While exact numbers of wood bison herds are unknown, historical records and oral histories indicate an abundance of wood bison that congregated in large herds.

## Methods

### *Locating Bison Art and Skeletal Remains*

To locate bison art and skeletal remains, I searched the literature and consulted with archaeologists and museum curators, including Jessica Metcalfe, Jill Taylor-Hollings and Scott Hamilton (Lakehead University), Bob Dawe (Royal Alberta Museum) and Kevin Brownlee (Manitoba Museum). Jack Ives (University of Alberta), Bob Dawe and Kristine Fedyniak provided pictures and contextual information for the central Alberta bison effigies. Tim Jones (Archaeologist & Heritage Resource Consultant) provided pictures and references for bison art along Churchill River.

The majority of art and skeletal remains discussed in this thesis were identified via these contacts and by researching contextual information and primary source documents. In many cases, one finding would lead to another through footnotes or references in the research papers and archaeological reports.

I also systematically searched for bison art and skeletal remains using Google, Google Scholar, Google Books and the Lakehead University library, employing the following search terms:

- bison OR buffalo AND skeletal remains OR remains OR bones AND [province];
- bison OR buffalo AND art OR effigy OR rock painting OR petroglyph AND [province].

This database search was less effective than the ‘word of mouth’ method, as many references to bison skeletal remains and art were in footnotes or only briefly referenced in reports and studies, and therefore would not show up in database searches that rely on keywords

and abstracts. All bison art or skeletal remains found in ‘outlying’ territories were mapped using Google MyMaps.

### *Subspecies Identification Methods Based on Images*

Qualitative and quantitative approaches to differentiating plains and wood bison both followed methods developed by Wes Olson and utilized a reference database of modern plains and wood bison reference photographs (Olson 2013; Olson & Merkle n.d.; Olson n.d. a; Olson n.d. b; Olson n.d. c; Olson n.d. d). The qualitative analysis was accomplished by answering a series of questions describing the shape and position of the hump and the position of the tail. The quantitative analysis involved measuring bison hump angles, hump areas and length ratios, then using a Principal Component Analysis (PCA) to plot the results from bison art relative to those of the photographic reference dataset. A detailed overview of both the qualitative and quantitative approaches is provided below.

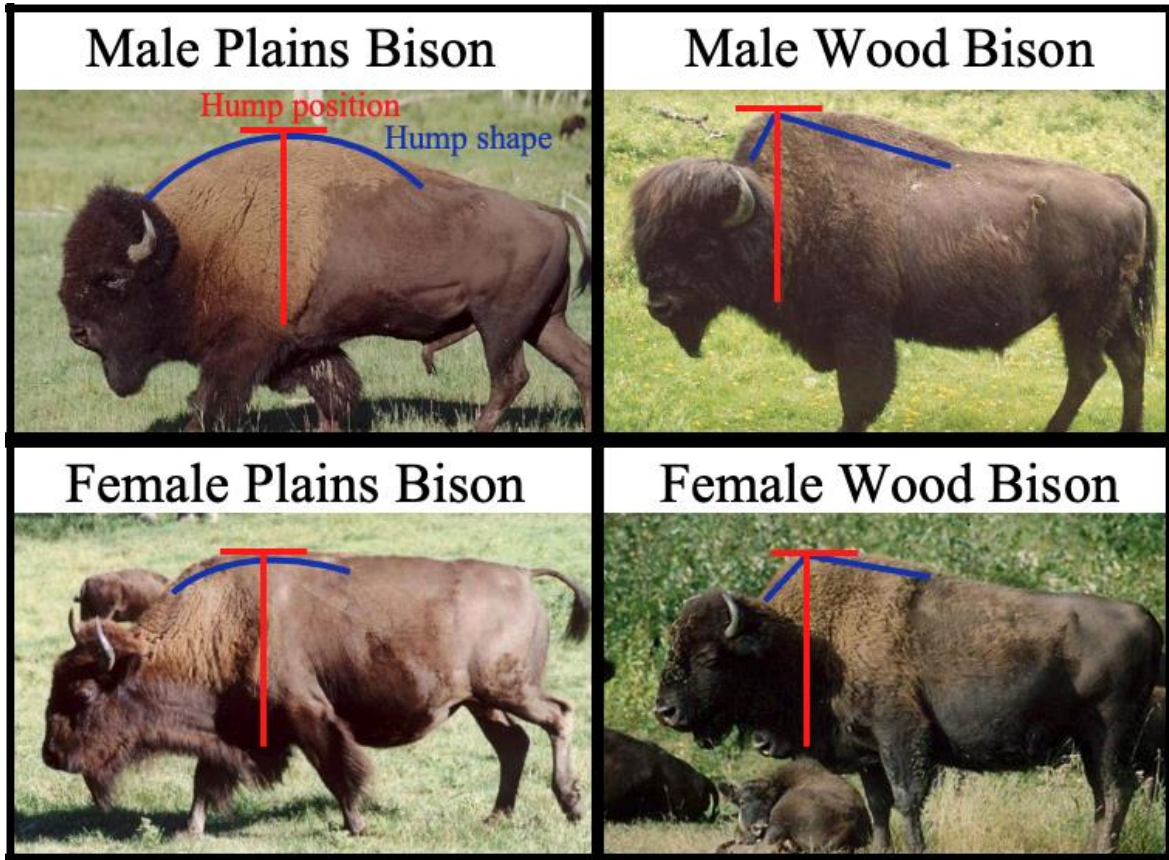
#### *Qualitative subspecies identification methods:*

In the qualitative stage of analysis, bison art was analyzed by selecting the appropriate answer to the following questions about the position and shape of the hump (Figure 22):

1. Where is the highest point of the hump located in relation to the shoulders?
  - Behind the front legs [typical of plains bison]
  - Centred over the front legs [typical of plains bison]
  - In front of the front legs [typical of wood bison]
2. What is the shape of the hump?
  - Rounded and convex [typical of plains bison]



- Squarish, with a steep drop at the front [typical of wood bison]



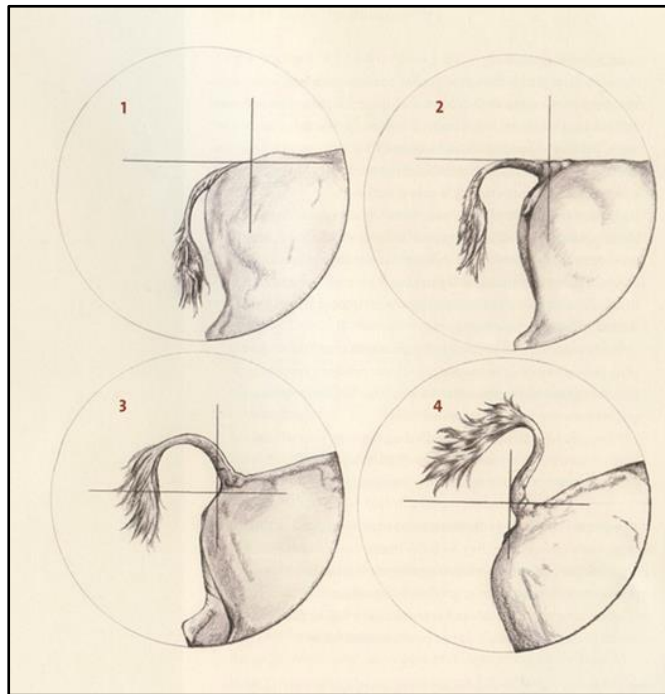
**Figure 22.** Anatomical comparison of male and female wood and plain bison (Image credits: Wes Olson)

A qualitative analysis of the tail was also completed on art with sufficient anatomy to provide additional context about the art. The examination was completed based on Olson’s description of four main tail positions (Olson 2005:30; Figure 23). The bison’s tail was analyzed by selecting the appropriate answer to the following question:

3. What is the position of the tail?:

- Position 1: Lowered and held against the body, the tip of the tail is pointed towards the ground [indicates the bison is relaxed]
- Position 2: Raised so that the top of tail is in line with the bison’s back [indicates the bison interested or engaged with surroundings]

- Position 3: Raised above the bison's back [indicates the bison is experiencing tension]
- Position 4: Raised at 90 degrees [indicates the bison is experiencing high amounts of tension; or is excreting]



**Figure 23.** Four tail positions of bison (Olson 2005:30)

The tail position analysis was included because a bison's tail can help identify how the animal is interacting with their environment. In extant bison, tails are an important social communication device. Bison fur and anatomical features can make it difficult to see their social cues (e.g., position of the ears, straightening of the back), and different tail positions work to convey different messages, including dominance, aggression, submission, or fear (Komers et al. 1992). The tail position analysis provided additional information about how the bison was being portrayed by the artists; for example, were the bison passive or were they assuming an active and/or interactive role in the artwork.



## Quantitative Subspecies Identification Methods

### Overview of Reference Dataset

The quantitative analysis followed Wes Olson’s unpublished methodology (Olson 2013; Olson & Merkle n.d.; Olson n.d. a; Olson n.d. b) involving a reference dataset of morphometric measurements obtained by Olson using photographs of modern plains and wood bison.

Measurements were made by using landmark points and lines on the photographs to measure hump angles, hump areas and length ratios. For this thesis, I employed the same methods using bison art and compared the results to Olson’s reference dataset.

The reference dataset included morphometric measurements from both male and female plains bison, and from male wood bison. Unfortunately, measurements from female wood bison were not available. The images were obtained from bison living in several American and Canadian parks. To mitigate any potential influence on the bison anatomy from cattle gene introgression, only data from bison herds free from cattle DNA introgression were used in this thesis (Table 5).

Table 5: Modern bison morphometric data used in this thesis, organized by location, number of individuals, and age groups (Olson, unpublished data).

Location	Plains Bison				Wood Bison		
	Males (age 4-7)	Males (age 8-15)	Males (age 16 +)	Females (age 3-15)	Males (age 4-7)	Males (age 8-15)	Males (age 16 +)
Elk Island National Park, Alberta	13	60	14	65	11	41	6
Fort Niobrara Wildlife Refuge, Nebraska		9					
Grand Teton National Park, Wyoming	14						
Mackenzie Bison Sanctuary (Northwest Territories)					9	16	5
Wind Cave National Park, South Dakota	8	16	3				
Wood Buffalo National Park: Central (Alberta/Northwest Territories)					16	12	
Wood Buffalo National Park: Lake Claire (Alberta)					20	10	
Yellowstone National Park, Wyoming	39	27	5	78			
Subtotal	199			143	147		
Total	489						

To obtain the reference dataset, Olson and his team collected photographs of modern bison throughout these regions in the early and mid-1990s. When a herd was encountered, pictures of all individuals of the herd were taken and subsequently sorted by herd of origin, sex and age class. To minimize seasonal coat variation, photographs of bison were taken during July and August. Juveniles were not included in the modern reference dataset, since juvenile anatomy is not fully developed and differs from adult morphology in both anatomical structures and pelage features (Olson & Merkle n.d.). To be included in the modern reference sample, the minimum age for males was 4 years old, and the minimum age for females was 3 years old. Photographs were limited to bison in relaxed states who were either walking or standing with their head forward, not grazing (Olson & Merkle n.d.). The entire image of the bison had to be in profile (i.e., not having body parts hidden from view).

Olson completed all the morphometric measurements from the photographs of modern bison for the reference dataset. This ensures consistency in the placement of points and lines. The methodology states that images can be measured using printed copies of the photographs, and line and point placement can be done with a fine-tipped marker. Alternatively, measurements could be made using image software programs. Olson completed all measurements by hand using printed copies, whereas I used image software. I made this choice because some of the images I worked with were quite small in size, and the software allowed me to zoom in on the image and obtain more accurate landmark placement. While having these two different approaches to complete measurements may lead to slight inconsistencies, I completed some images by hand and compared the results to using the image software, the differences were negligible.

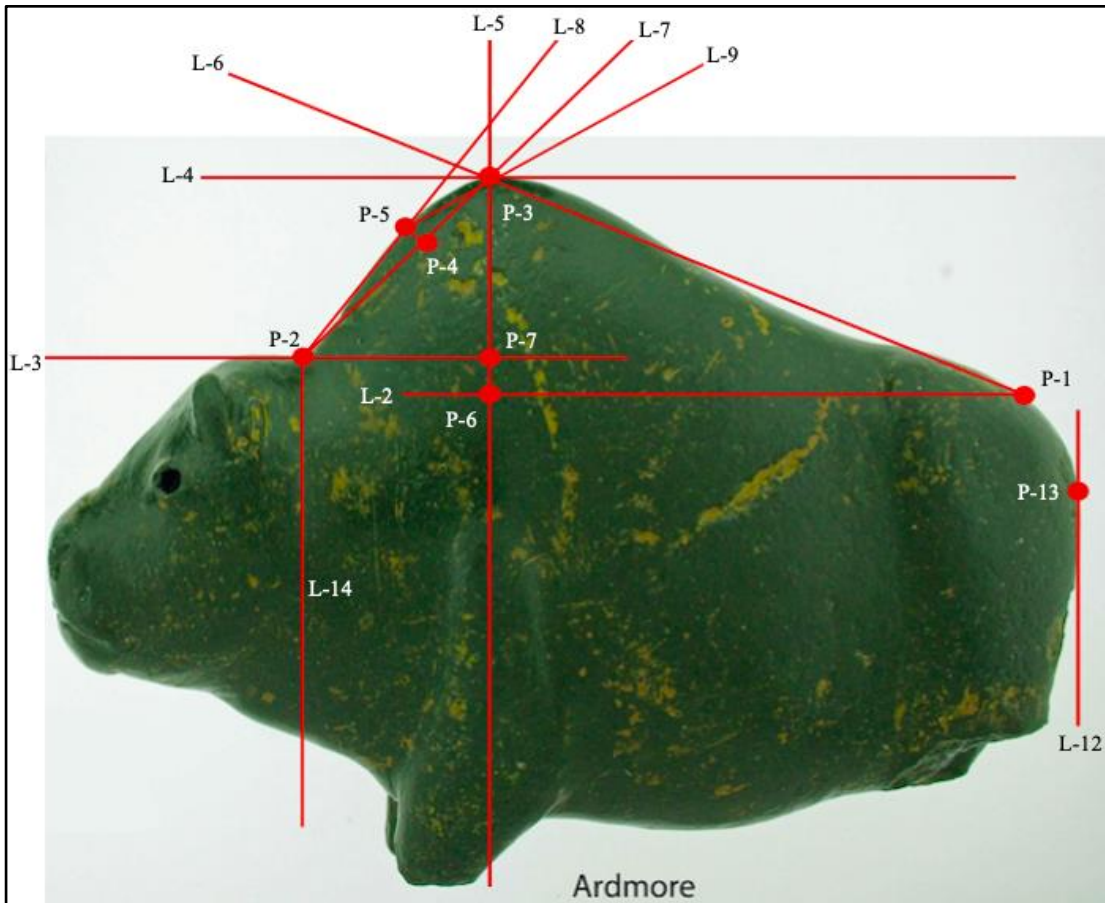
### *Limitations of Morphometric Measurements on Bison Art*

Conducting these morphometric measurements on art images has additional limitations. In comparison to the dataset, not all the art images had bison in the relaxed, profile position. Some of the art was on an angle, or slightly rotated. Some bison also appeared to be in excited states. There is no way to be certain of the age of the bison in the art, so I had to make the assumption that all art depicted mature individuals.

It is also important to consider that the art may have been completed in a stylised manner, accentuating certain aspects of the animal and not aiming to be morphometrically accurate. In this case, differentiation between plains and wood bison might not be possible, or erroneous designations might be made. In some artistic representations, some landmarks were not as apparent as they are on modern bison (e.g., the notch at the head of the tail). The condition of the art is also important: older art is more likely to be damaged or faded, which could cause key physical landmarks to be altered or destroyed. Without the landmarks readily visible, I had to use my best judgement about the location of some landmarks, which increased the risk of error.

### *Subspecies Identification Methodology, Step-by-Step Process*

The first step in determining the subspecies depicted in the art was to input anatomical landmarks and associated lines on the art images (Figure 24, Table 6), as described in Olson's unpublished works for his reference dataset of modern bison photographs (Olson 2013; Olson n.d. b). To complete the process, landmarks and lines were digitally annotated using the image software program, Inkscape (see Appendix A for a full description of how the positions of landmarks and lines were determined).



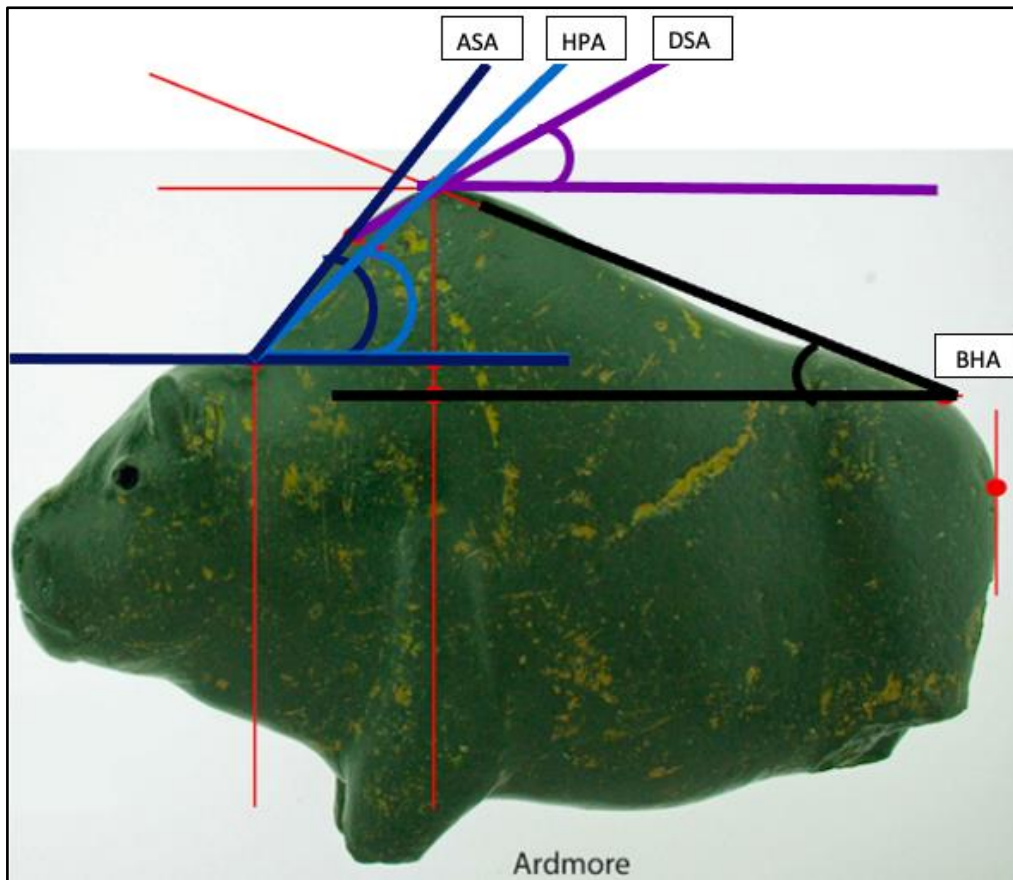
**Figure 24.** Morphometric lines (indicated with L and their number) and points (indicated with P and their number) on the bison art that were made following Wes Olson’s methodology (Olson 2013; Olson n.d. b). Descriptions of the lines and points are given in Table 6.

Table 6: Description of anatomical landmarks and associated lines and points, as indicated in Figure 24.

Points	
P-1	Junction of the back and sacrum. Identified by a slight notch just ahead of the tail, approximately equal to the vertical centre of the hip
P-2	Junction of the head and anterior line of the hump
P-3	Highest point of the hump
P-4	Junction of a line drawn from P-5, perpendicular to L-7
P-5	The divergent point of the hump, location at the greatest distance from L-7
P-6	Intersection of L-5 and L-2
P-7	Intersection of L-5 and L-3
P-13	Posterior edge of the hip
Lines	
L-2	Line connecting P-1 and P-6
L-3	Line connecting P-2 and P-7
L-4	Line drawn through P-3 and parallel to L-1. Must be perpendicular to L-5
L-5	Line passing through P-3, should extend beyond the point.
L-6	Line begins at P-1 and passes through P-3

L-7	Line begins at P-2 and passes through P-3
L-8	Line begins at P-2 and passes through P-5. Line should extend beyond P-5
L-9	Line begins at P-5 and passes through P-3. Line should extend beyond P-3
L-12	Line drawn vertically through P-13
L-14	Line drawn perpendicular to P-2

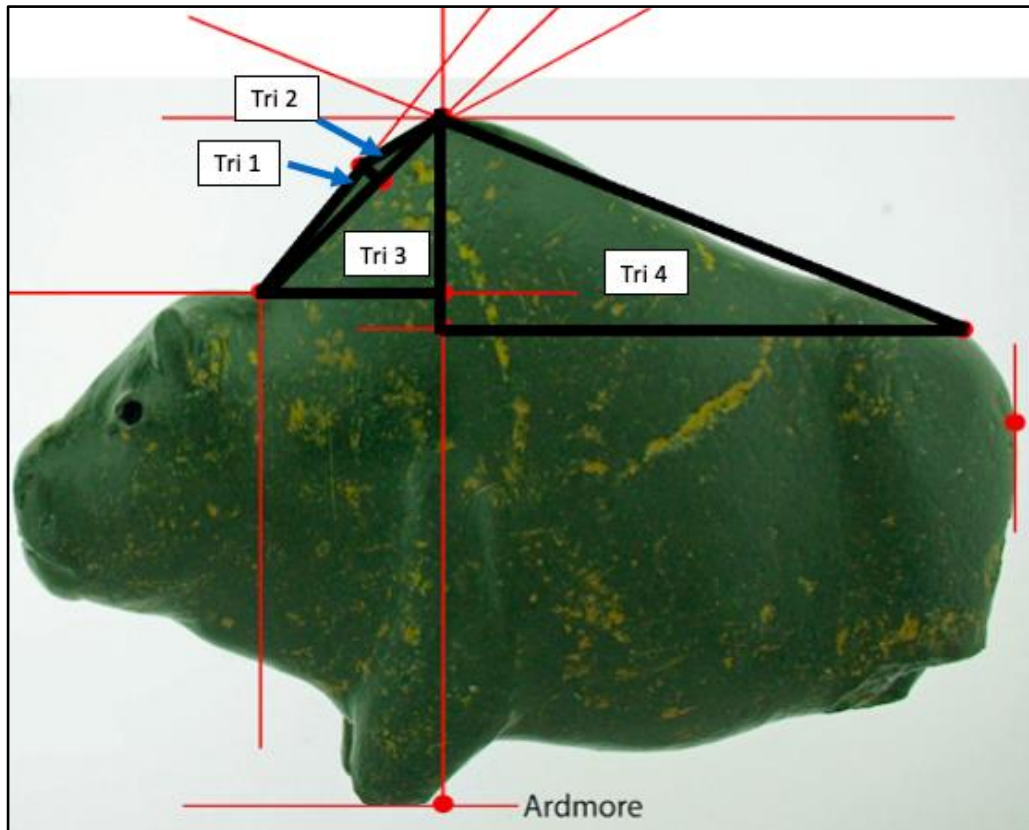
Once landmarks and lines were added to the images, hump angles were measured (Figure 25). Hump angles were measured for all artistic depictions of bison, with the exception of a rock art painting (site 10) and the petroglyph (site 18) for which anatomical landmarks were lacking.



**Figure 25.** Hump angle measurements used in comparison of bison art to reference photographs: ASA: anterior shoulder angle, HPA: highest point angle, DSA: dorsal shoulder angle, and BHA: back hump angle. See Table 7 for details regarding each angle measurement.

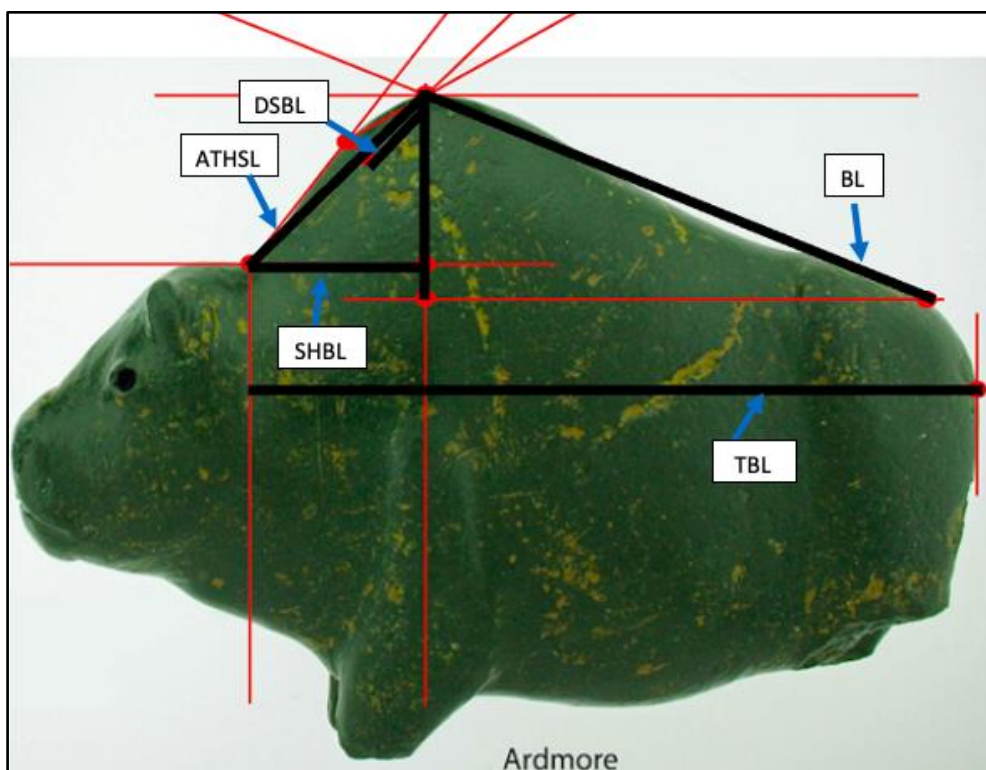
Four hump areas were also measured and calculated (Figure 26). These calculations were done by determining the area of each of the four triangles and dividing these areas by the total

area (i.e., all four areas combined) to produce a decimal value for each triangle (with the sum of all triangles being 1).



**Figure 26.** Hump area measurements used in comparison of bison art to reference photographs: Tri 1: anterior shoulder hump area, Tri 2: dorsal shoulder hump area, Tri 3: ventral shoulder hump area, Tri 4: back hump area. See Table 7 for details regarding each area measurement.

Four length ratios were also determined (Figure 27). There were additional length ratios in Olson's methodology that was developed for use with photographs of live bison. However, 19 of these measurements required anatomical features that were not available on all the art pieces (e.g., not all art pieces had legs, none had pelage characteristics).



**Figure 27.** Lines that were used to determine the length ratios described in Table 7.

Table 7: Measurement descriptions for hump angles, hump areas and length ratios.

Category	Measurement	Description
Hump Angles	Anterior Shoulder Angle (ASA)	Angle taken from the junction of the head and neck and the divergent point of the hump (the transition from cervical to thoracic vertebrae)
	Highest Point Angle (HPA)	Angle taken from the junction of the head and neck to the highest point of the hump
	Dorsal Shoulder Angle (DSA)	Angle formed by a line beginning at the divergence point to the highest point of the hump
	Back Hump Angle (BHA)	Angle from the root of the tail to the highest point of the hump
Hump Areas	Triangle (Tri) 1	Anterior shoulder hump: P-2 to P-4 to P-5
	Triangle (Tri) 2	Dorsal shoulder hump: P-3 to P-4 to P-5
	Triangle (Tri) 3	Ventral shoulder hump: P-2 to P-3 to P-7
	Triangle (Tri) 4	Back hump: P-1 to P-6 to P-3
Length Ratios	Back length (BL)/Total body length (TBL)	BL (P1 to P-3) divided by TBL (L-14 to L-12)
	Shoulder hump base length (SHBL)/ Total body length (TBL)	SHBL (P2 to P7) divided by TBL (L-14 to L-12)
	Anterior total hump slope length (ATHSL)/ Back length (BL)	ATHSL (P2 to P3) divided by B (P1 to P-3)
	Dorsal should base length (DSBL) / Total body length (TBL)	DSBL (P4 to P3) divided by TBL (L-14 to L-12)



### *Principal Component Analyses*

To help determine whether the morphometric measurements of the art images were more representative of wood or plains bison, seven PCAs were completed. PCAs allow for multiple variables and large data sets to be summarized so that the data can be easily visualized and analyzed (Peres-Neto et al. 2003; Dunteman 1989). A standard use of PCA is to reduce a large dataset to only few variables, and ideally the first two variables should account for the greatest variance (Dunteman 1989; Hammer 2022). In my study, the first two variables in all PCAs accounted for the greatest variance, therefore, I followed standard procedure and used these variables in my analysis. A PCA will cluster individuals who have similar features, and is an effective way to test if the anatomical morphometrics of the art pieces were more similar to wood or plains bison. I completed all PCAs using Paleontological Statistics (PAST) software. The PCAs included twelve measurements: four hump angles (in degrees), four hump areas (calculated as decimal values whose total sum to 1), and four ratios based on length measurements taken from the art images. Since each of these measurements had different units (angles, proportions, ratios) I used a correlation matrix instead of covariance matrix in PAST to standardize the values. This allowed the different units to be compared against each other, without one variable overriding the others. Grouping (i.e., between groups or within groups) was disregarded. I also used convex hulls to help visualize the perimeters of the subspecies groups from the reference data. This was helpful to easily see the degree of overlap between subspecies, and where the bison art clustered in comparison.

Prior to analyzing the art, I completed three PCAs of the reference dataset of photographs of modern bison to investigate the overlap between subspecies. The first PCA compares the reference dataset of photographs of modern female plains bison with modern male plains bison.



The purpose of this analysis is to evaluate the degree of overlap between different sexes of the same subspecies. Since female wood bison data was not available, this graph provided an idea of how much female wood bison data might overlap with male wood bison data. If the overlap between female and male plains bison is significant, it is reasonable to assume that male and female wood bison data would have a similar degree of overlap.

The second PCA I completed compares the reference dataset of photographs of modern male and female plains bison with male wood bison to determine the degree of overlap between the two subspecies.

The third PCA depicts data from male wood bison and male plains bison only (i.e., female plains bison data was removed). The purpose of this analysis was to determine the influence of the female plains bison data. If the female data had a significant influence, I would have decided not to include it in the PCA analyses with the art, because its counterpart (female wood bison data) was not available. However, by comparing female bison data against a PCA with male bison data, it was apparent that the female plains data did not significantly alter the PCA analysis. Therefore, to provide a larger sample size, I decided to include female plains data in all art analyses.

I also completed a PCA analysis of Colorado Plateau bison art (n=9). The purpose of this analysis was to test if these rock paintings of what are presumably plains bison would group with the photographs of modern plains bison in the PCA (i.e., a test of the efficacy of the method). The Colorado Plateau is over 1,800 kilometres southwest of wood bison range and interbreeding with wood bison during the prehistoric period is unlikely. However, the 'mountain bison', believed to be an ecotype of plains bison with wood bison features, may have inhabited the rocky mountain range, and into Utah (van Zyll de Jong 1986:50; Cannon 2001; W. Olson, personal

communication, February 24, 2022). While the full range of mountain bison is not well-understood, if mountain bison did inhabit this area, local encounters with bison may have resulted in some wood bison features exhibited in the art.

Within the Colorado Plateau area in Utah, artistic depictions of bison may go back as far as the Pleistocene epoch, before bison had differentiated into modern subspecies. To help determine if the art pieces used were modern versus extinct bison species, images were used from two locations (Nine Mile Canyon and Newspaper Rock) that are associated with cultural groups who occupied the area within the last 5,000 years (i.e., approximately when modern bison emerged as a distinct species) (Wilson 1979).

The Nine Mile Canyon art is associated with Fremont groups who lived in the Nine Mile Canyon region of the Colorado Plateau from approximately 500 to 2,100 years ago (Madsen & Simms 1998; Matheny & Matheny 2008; McCool & Yaworsky 2008). The Newspaper Rock art is associated with Puebloan people who lived in the area approximately 650 to 2,000 years ago (Petriified Forest National Park n.d.). Some of the images at this site, such as a person on a horse with a bow must postdate this timeline (Rohn & Ferguson 2006).

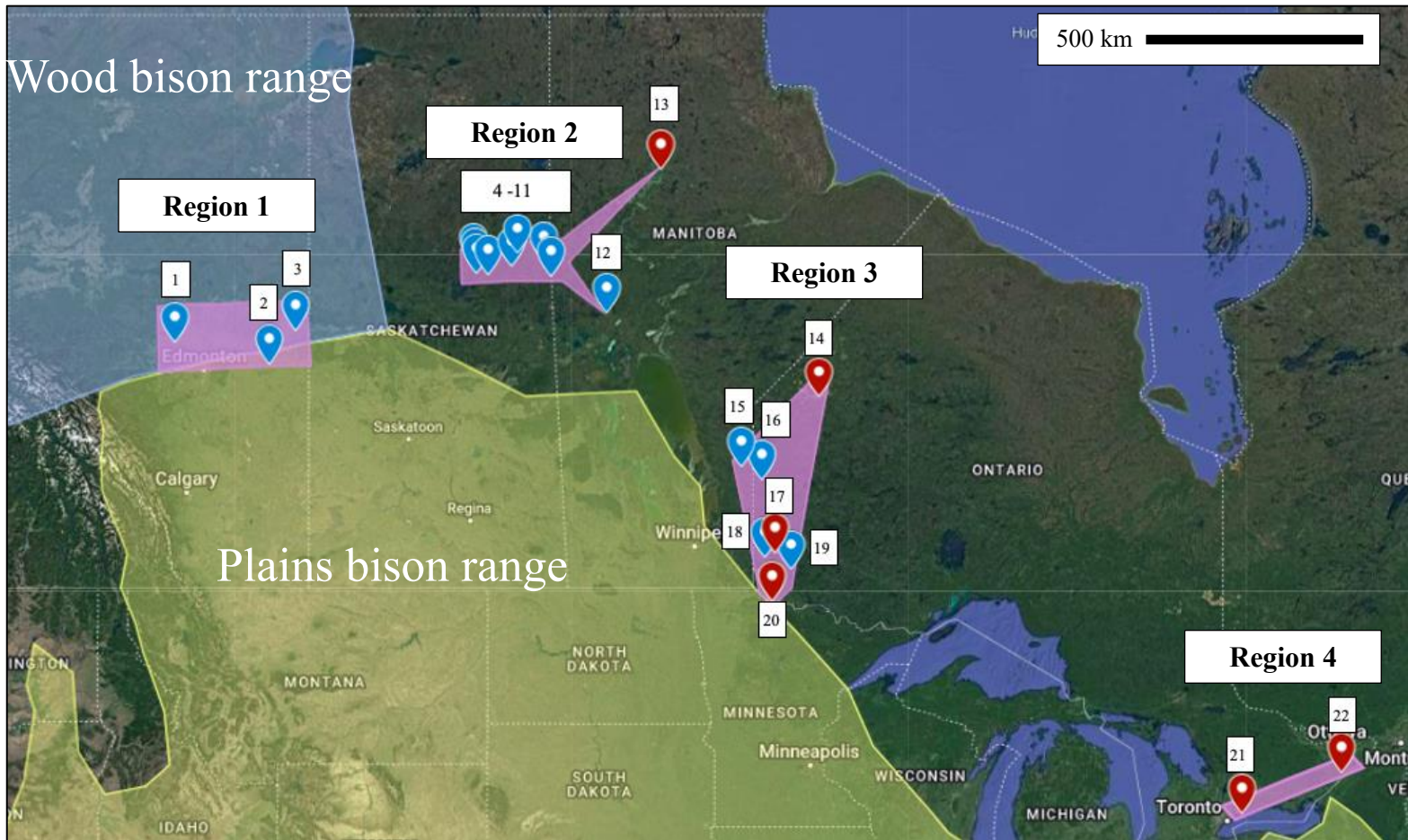
The Colorado Plateau images were measured using the same procedures described above and plotted against the reference dataset of modern bison in a PCA analysis. In alignment with my approach to include only reproductions of rock art in my thesis, I created reproductions of these images by tracing over the original image using Microsoft Word (with the exception of images C and I, which were pulled from Agenbroad & Hesse 2004:194).

After completing the PCAs with reference bison data and the Colorado Plateau art, I completed three PCAs comparing the northern Canadian art with the reference dataset of photographs of modern bison. The purpose of these PCAs was to help determine the subspecies

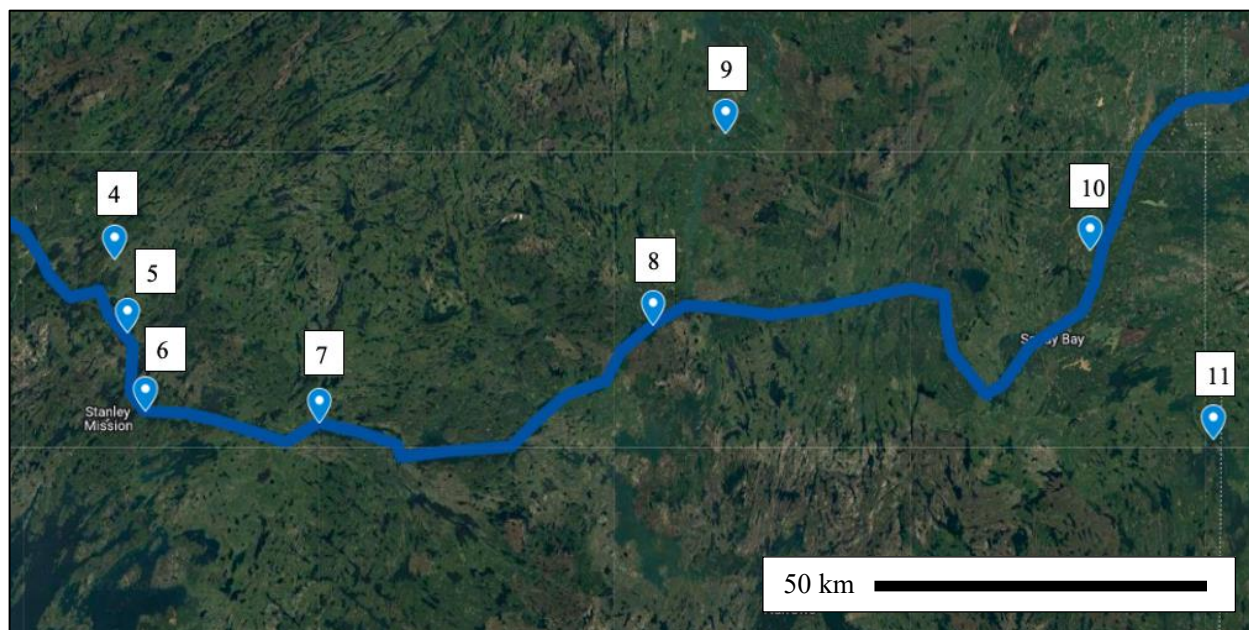
of the northern art. The Colorado Plateau art was not used in these analyses as it did not alter the results, and its omission allowed greater visual clarity on the graphs.

## **Results**

Twenty-two sites with bison art and skeletal remains were identified in central Alberta, Saskatchewan, Manitoba and Ontario (Figures 28 & 29). These locations have been grouped into four regions: central Alberta (Region 1), northern Saskatchewan / Manitoba (Region 2), southeastern Manitoba / northwestern Ontario (Region 3), and southeastern Ontario (Region 4). Apart from the central Alberta findings, all findings were located outside of the known pre-Holocene range of wood bison as depicted in the conservation literature (COSEWIC 2013; Gates et al. 2010).



**Figure 28.** Locations of bison art (blue markers) and bison skeletal remains (red markers) described in this chapter. Sites are indicated by number and listed in Table 8. (Image: Google Maps)



**Figure 29.** Bison art locations in northern Saskatchewan along the Churchill River (sites 4-11 listed in Table 8) (Image: Google Maps, Churchill River location approximated from Jones 1981)

Table 8: Summary of northern bison art and skeletal remains discussed in this thesis.

Region	Site	Sample Name	Material Evidence of Bison	Reference or Contact
<b>Region 1:</b> Central Alberta	1	Barrhead A	Effigy (coal)	Bob Dawe (RAM catalogue number H71.30)
	1	Barrhead B	Effigy (coal)	Bob Dawe (RAM catalogue number H10.032)
	2	Beauvallon	Effigy (coal)	Bob Dawe (RAM catalogue number H11.113);
	3	Ardmore	Effigy (soapstone)	Bob Dawe (Glenbow museum catalogue number AX.70)
<b>Region 2:</b> Churchill River Area (northern Saskatchewan & Manitoba)	4	Rattler Creek	Rock Painting	Jones 1981; Jones 1974
	5	Cow Narrows	Rock Painting	Jones 1981
	6	Stanley Rapids	Rock Painting	Jones 1981
	6	Stanley Rapids	Rock Painting	Jones 1981
	7	Island Portage	Rock Painting	Jones 1981; Jones 1974
	8	Conjuring River Mouth	Rock Painting	Jones 1981; Jones 1974
	9	Reindeer Lake	Rock Painting	Downes, P.G. 1936
	10	Maple Leaf Rapids	Rock Painting	Jones 1981
	11	Kipahigan Lake	Rock Painting	Pohorecky & Jones 1967
	12	Tramping Lake A	Rock Painting	Steinbring 1998
12	Tramping Lake B	Rock Painting	Steinbring 1998	
13	Southern Indian Lake	Teeth and extremity shaft fragments	Dickson 1975; Dickson 1980	
<b>Region 3:</b> Southeastern Manitoba &	14	Ghost Point Site	Foot bones (left 4 <sup>th</sup> hind lateral sesamoid, a third left front proximal phalanx)	Dawson 1976

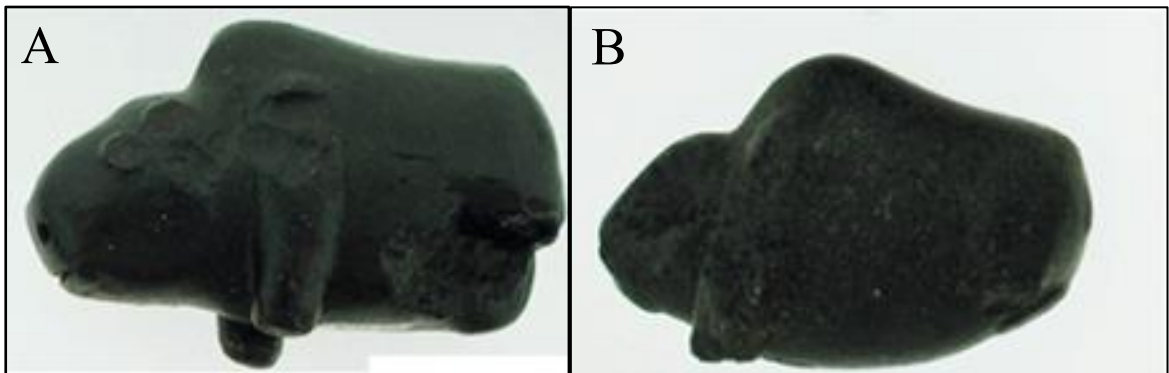
Northwestern Ontario	15	Sasaginnigak Lake A	Rock Painting	Steinbring 1998
	15	Sasaginnigak Lake B	Rock Painting	Steinbring 1998
	16	Bloodvein River	Rock Painting	Dewdney & Kidd 1962
	17	Kenora	Skull, scapula, two rib fragments, radius and phalanx	McDonald & Lammers 2002; McAndrews 1982; Rajnovich 1980; Boyle 2018; Kevin Brownlee (Manitoba Museum catalogue number V-7800)
	18	Mud Portage	Petroglyph	Steinbring & Zawadzka 2019
	19	Whitefish Bay	Rock Painting	Dewdney & Kidd 1962
	20	Rainy River	Foot bones (six middle phalanges and two distal phalanges)	Dawson 1976; Moore 1975
<b>Region 4:</b> Southwestern Ontario	21	Lake Iroquois Beach	Skull	Jackson 1983:35; McAndrews 1982; Coleman 1899:36
	22	Roebuck	Distal phalanx, broken scapula head	Wintemberg 1972

*Region 1: Central Alberta*

*Art*

Four bison effigies (Barrhead A, Barrhead B, Beauvallon and Ardmore) were found in central Alberta in the transition zone between the known Late-Holocene territories of wood and plains bison (roughly corresponding with the transition from parkland to boreal forest). Two bison effigies (Barrhead A and B; Figure 30, site 1) were found on the surface of ploughed fields, their ages are unknown. They were both found in the same farmer's field, but Barrhead effigy B was found 60 years later. Both Barrhead effigies and the Beauvallon effigy (Figure 31, site 2) are made from coal, whereas the Ardmore effigy (Figure 32, site 3) is made from steatite (soapstone). The Barrhead B and Beauvallon effigies appear to be representatives of pregnant females due to their distended stomachs (B. Dawe, personal communication, August 30, 2021).





**Figure 30.** Bison effigies, Barrhead A and B, central Alberta (site 1, bison image A and B) (Images: Bob Dawe, Royal Alberta Museum)



**Figure 31.** Bison effigy, Beauvallon, central Alberta (site 2) (Image: Alberta Culture and Tourism 2021)



**Figure 32.** Bison effigy, Ardmore, central Alberta (site 3) (Image: Bob Dawe, Royal Alberta Museum)

*Region 2: Churchill River Area (Northern Saskatchewan & Manitoba)*

*Art*

There are numerous rock paintings of potential bison in the Churchill River area in northeastern Saskatchewan that were created by Cree people (sites 4-12) (Jones 1981). The paintings are found on flat, nearly vertical rock surfaces next to the water's edge, or a short distance from the water (Jones 1981:47). Along the river, there are seven potential images of bison (Jones 1981:50). In Saskatchewan, these rock paintings are located approximately 300 kilometres east of the known wood bison Late-Holocene range, and approximately 300 kilometres north of the known plains bison Late-Holocene range. The paintings in western Manitoba along the Churchill basin are located approximately 500 kilometres east of the known wood bison Late-Holocene range, and approximately 200 kilometres north of the known plains bison Late-Holocene range.

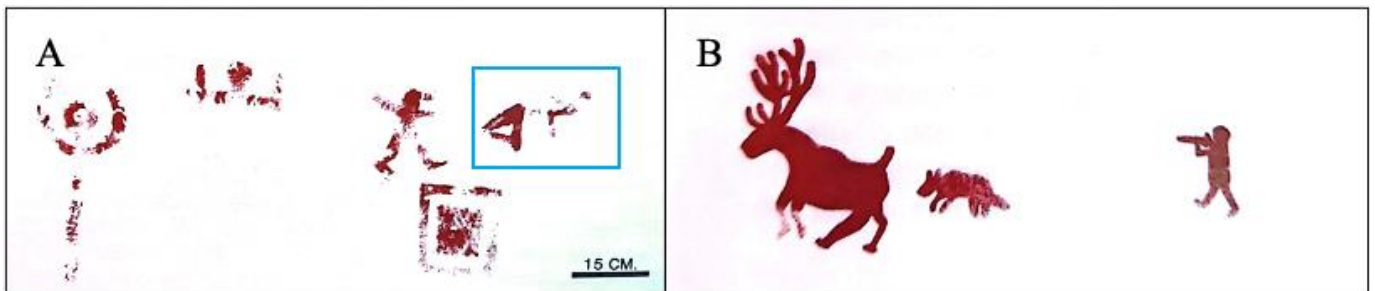
The Churchill River is approximately 1,600 long and was a busy travel route prior to, and during the fur trade. While it is unknown exactly who painted the images, it is likely there were multiple artists that created them over the last several centuries, or perhaps millennia (Jones 1981). Certain families from Pelican Narrows (located south of the Churchill River) were known for creating rock paintings and traveled extensively along the Churchill River, and they may have been the artists responsible for some of the Churchill River images (Jones 1981:70). A local Cree person told Jones (1981:70) that the paintings were completed by only a few Cree individuals who travelled throughout the area.

By studying Cree oral histories, archaeological and historical records, and by comparing the Churchill River art to other art along the Canadian shield, Jones (1981:74) suggested five non-mutually exclusive ways in which the types Churchill River art may have been created: (1)



images of spirits and guardians seen in visions; (2) paintings created by shamans; (3) paintings created by *Memekwesiwak*<sup>9</sup>; (4) paintings created by people who had visions of the future; and (5) painting created as markers for travelers.

The age of the Churchill River paintings is unknown. Jones (1981:78) states that these paintings have likely existed for several centuries. Remembered history in the area indicates that the rock paintings were made a long time ago, "...that the really old-timers dreamed of these things we see on the rocks" (Jones 1981:70). There are two images with European influences. The first image (Figure 33A) contains syllabic writing, which was introduced to the area in 1841 by Methodist missionary James Evans (Jones 1981:17). Another image with European influence is of a man shooting a rifle, associated with the late 1700s (Figure 33B) (Jones 1981:65).



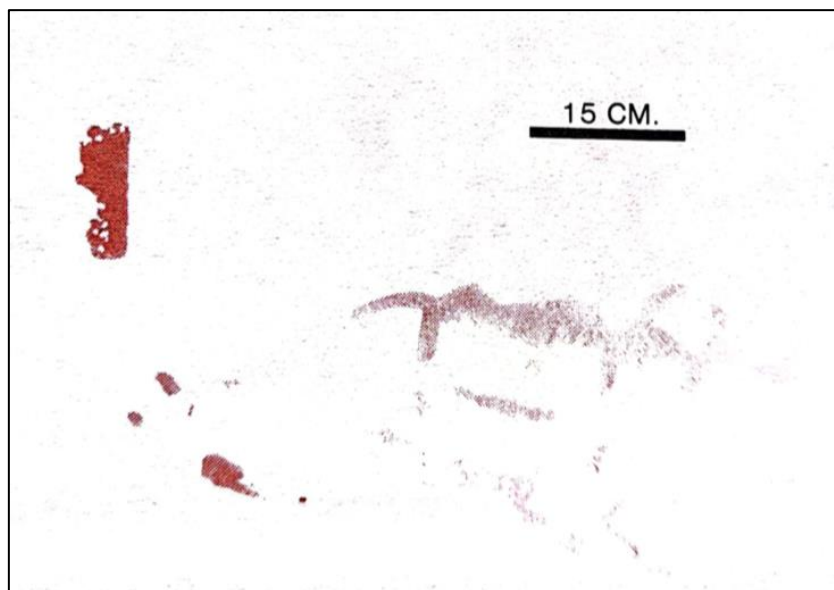
**Figure 33.** A. Art from Wamninuta Island, Saskatchewan, with syllabics (indicated by images within square blue box), which were introduced to the area in 1841. B. Hunter carrying a rifle, late 1700s (Adapted from Jones 1981:31,17).

Since only two of the paintings along Churchill River have European influence, it is possible the majority of the paintings were completed precontact (Jones 1981:78). In the late 1700s, European explorer Alexander Mackenzie remarked on paintings along the Churchill River at Black Bear Island Lake and Sandfly Lake, although it is unclear about which paintings he is referring to (Lamb 1970:122-123; Jones 1981:66). This situates some of the paintings as older

<sup>9</sup> The *Memekwesiwak* are humans who lived long before the Cree. They possessed powerful medicine and knowledge and lived in water and rocks, among other places. Remembered history states that the *Memekwesiwak* would teach the Cree about medicine long ago (Jones 1981:77).

than 200 years. As part of an impact analysis for a hydro-electric dam, the Churchill Archaeology Study completed a two-year study of the Churchill River area from 1973-1974 (Meyer & Smailes 1974). While the study focused on cultural artifacts and faunal remains rather than the rock paintings, it did state that the paintings generally coincided with the Clearwater Lake phase, which ranged from 800-1700 A.D. (Meyer & Smailes 1974:230; Jones 1981:68). While the exact ages of the rock paintings are unknown, European influences are minimal, and at least some of the images were created precontact.

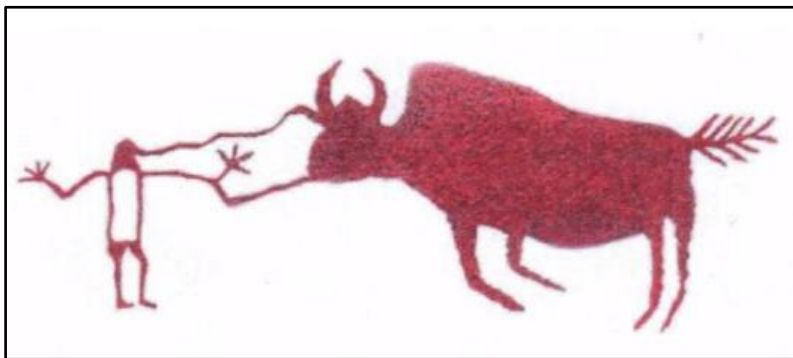
Rattler Creek is the most western image of bison located in the Churchill River area. Due to the condition of the artwork at Rattler Creek (Figure 34), an image of what appears to be a large animal, possibly a bison, is obscure. The full height and shape of the hump are difficult to distinguish. When describing the image, Jones (1981:25) suggests uncertainty about its identity as a bison; “The bison (?) is very faded.”



**Figure 34.** Faded rock painting of a potential bison, Rattler Creek, Saskatchewan (site 4) (Jones 1981:25)

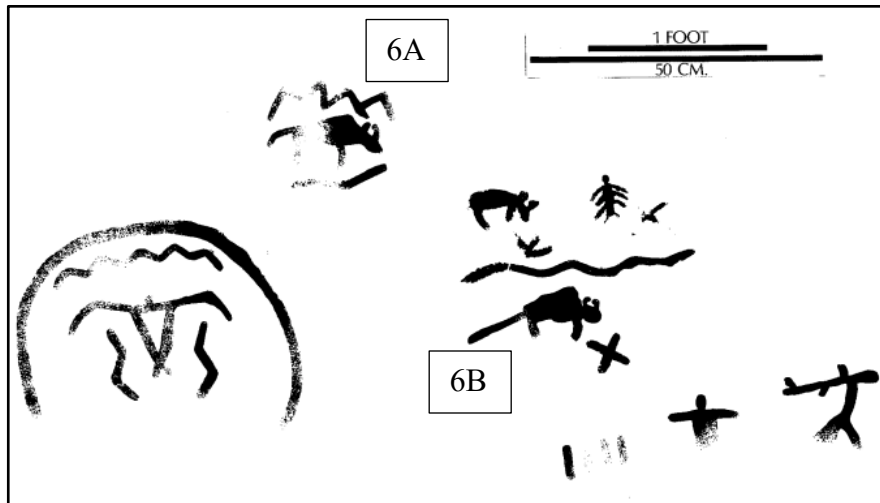
At Cow Narrows, (Figure 35) a rock painting depicts a bison with jagged lines extending to a human figure. Jones (1981:59) states that these lines are not found anywhere else along the

Churchill River but are often seen with Ojibwe birch bark pictography (Jones 1981:51). The lines likely depict communication and powerful medicine emanating from the bison (which is likely a spiritual entity or *manitou*) to the person, or healer (Rajnovich 1994:100, 140). Remembered history in the area states that this image was created a long time ago to commemorate the event of a cow (while a bison cow instead of cattle cow is assumed, Jones [1981] does not specify) seen swimming through the water with moss on its back (Jones 1981:71, from D. Whitfield, personal communication July 31, 1968). The stance of the bison implies that it is very engaged in its environment. The front legs are bent, suggesting they are non-weight bearing while the back legs are straight with a slight bend as if the bison has reared up. The fur on the bison's tail is standing up at a 45-degree angle as if electricity or energy were running through its body.



**Figure 35.** Rock painting of a bison interacting with a human figure. Cow Narrows, Saskatchewan (site 5) (Image: Pettipas n.d.)

Figure 36 depicts two potential bison at Stanley Rapids (site 6). The bison share the frame with other animals, including a human-like figure (Jones 1981:30). While image 6B is in full profile, image 6A is partially faded.



**Figure 36.** Rock painting of two potential bison at Stanley Rapids, Saskatchewan (site 6, bison image A and B) (Image: Jones 1974:88)

At Island Portage, three animals along with a bison are indicated on the rock panel: a moose, a snake figure and bird tracks (Figure 37) (Jones 1981:32-33). There is also an unidentifiable head and a human with a bow (Jones 1981:32-33). These images may be connected with a hunting scene or hunting practices. Another animal, which has been suggested to be a beaver nursing from the bison can be seen below the bison (Jones 1981:33). Based off other rock art images in Ontario, the beaver could also be representative of a medicine bag (Figure 38). The medicine bag was made from the whole skin of the animal, with tail and extremities attached (Rajnovich 1994:123). Medicine bags were highly respected, could carry important items such as stones from *manitous*, and were not shared with others (Rajnovich 1994:123-125). There are remembered histories among the Algonquin in Quebec and Menominis of Michigan of medicine bags being used by powerful medicine men and women (Rajnovich 1994:123-125).



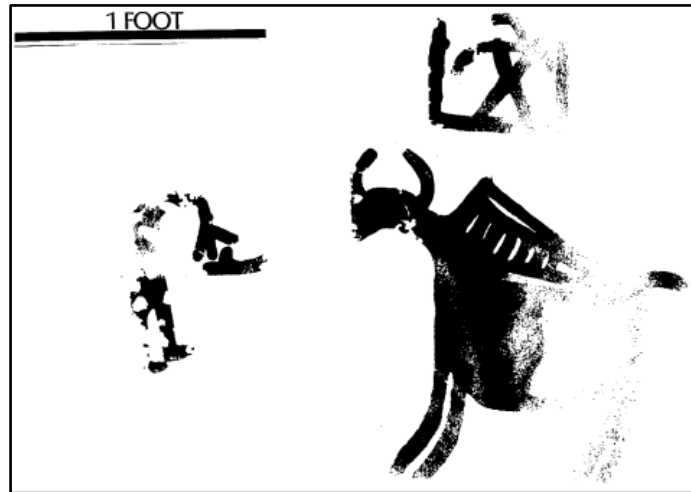
**Figure 37.** Rock painting of a bison with a potential medicine bag seen underneath the animal at Island Portage, Saskatchewan (site 7) (Image: Jones 1974:95)



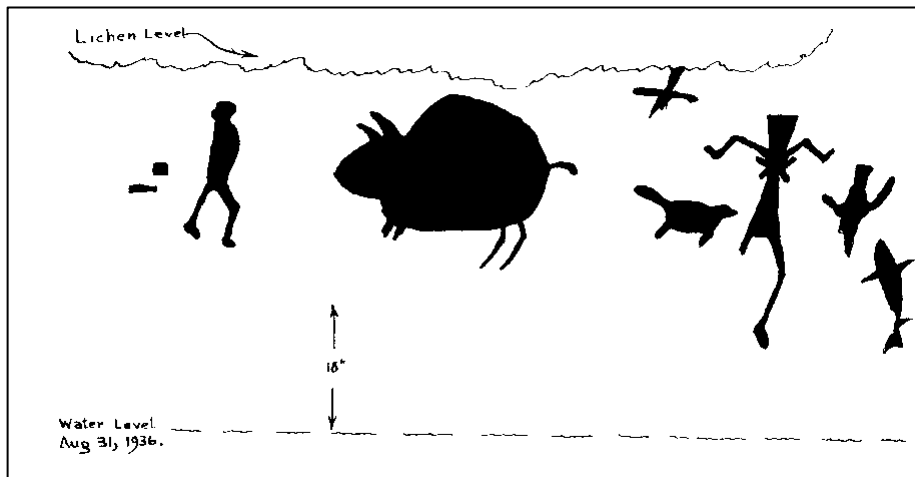
**Figure 38.** Birchbark song record of a Mides (a member of the “Society of Good Hearted Ones”, a medicine woman/man in Algonkian society) holding an otter medicine bag (Rajnovich 1994:28)

At Conjuring River Mouth the image (Figure 39) includes a large bison head and torso with exposed ribs (Jones 1981:36) or thoracic spines. The image at Reindeer Lake is the most northern bison art I found during my thesis work (Figure 40). The image has a mix of both plains and wood bison features, with the highest point of hump behind the front legs, similar to plains bison, but the front of the hump has a steep drop. At Maple Leaf Rapids, Jones (1981:41,57) refers to the image on the rock face as a “bull-like animal”, and potentially a bison (Figure 41). The image at Kipahigan Lake (Figure 42) has the tail of the bison is similar to the image found at Cow Narrows, where the fur is sticking out at a 45-degree angle, potentially suggesting energy

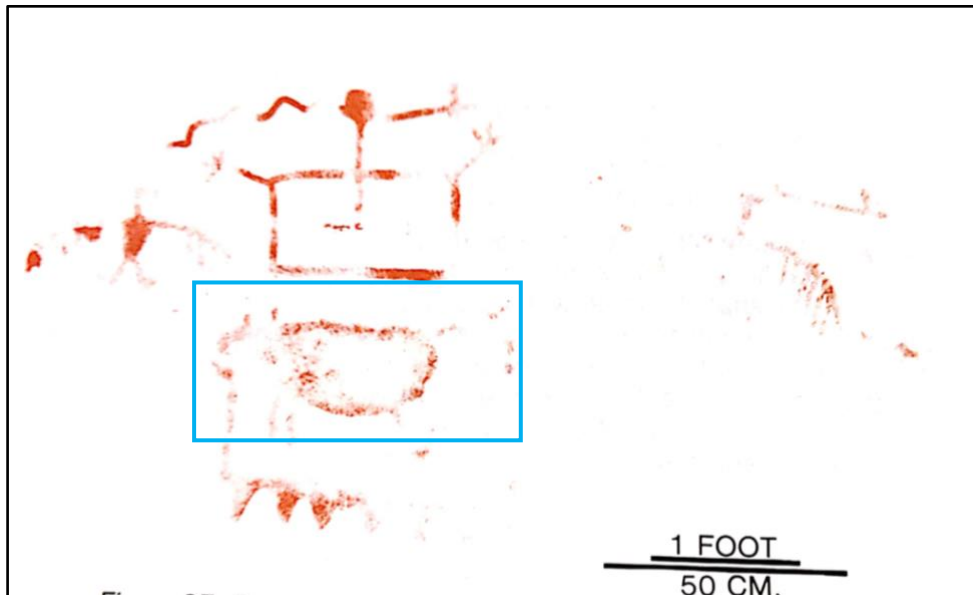
going through the animal, or simply depicting a thick tuft of hair at the end of the tail. The Tramping Lake images (Figure 43) are found on nearly vertical rock faces dipping into the water (Stanton 1947:147; Steinbring 1998). The age of the site and paintings are unknown. This site is the most eastern site in Region 2.



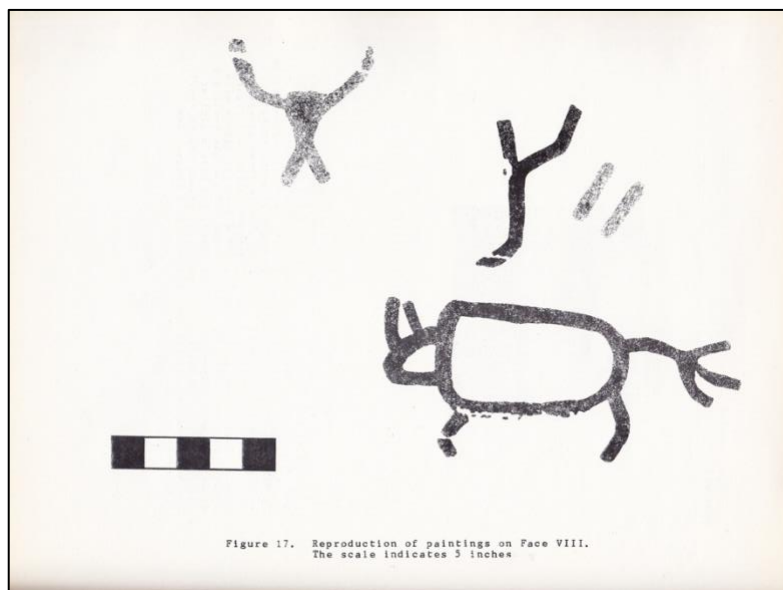
**Figure 39.** Rock painting of a bison at Conjuring River Mouth, Saskatchewan (site 8) (Jones 1974:102)



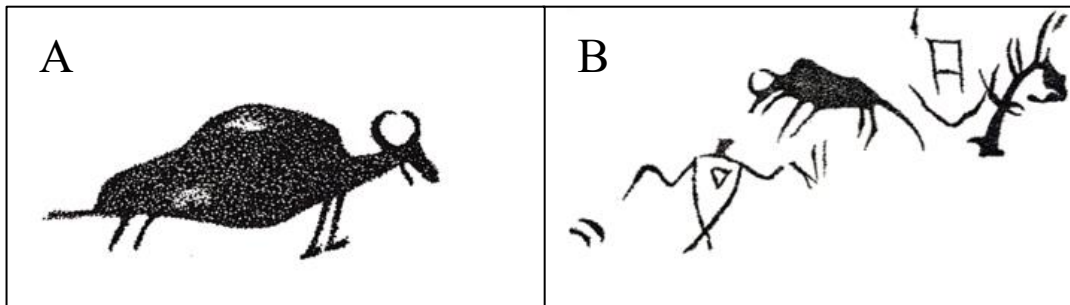
**Figure 40.** Rock painting of a bison at Reindeer Lake, Saskatchewan (site 9) (Downes, P.G. 1936 - courtesy of Tim Jones)



**Figure 41.** Rock painting of a potential bison (within blue box) at Maple Leaf Rapids, Saskatchewan (site 10) (Jones 1981:42)



**Figure 42.** Rock painting of a bison at Kipahigan Lake, Saskatchewan (site 11) (Pohorecky & Jones 1967 - courtesy of Tim Jones)



**Figure 43.** Rock paintings of two potential bison at Tramping Lake, Manitoba (site 12, bison image A and B)

### *Skeletal Remains*

All species/subspecies designations of skeletal remains included within my thesis are based on archaeological reports. In general, it can be difficult to determine the age and species associated with skeletal remains, particularly if no associated cultural findings, additional specimens, or evidence of a surrounding bison populations are available (Wilson 1979). It is also difficult to determine species/subspecies of bison skeletal remains because of the range of morphological variation between and within extant and extinct bison populations (Wilson 1979), and because of the fragmentary remains that are recovered. These designations may shift as more information becomes available.

Bison skeletal remains were recovered at Kame Hills (site 13) on the northwest shore of Southern Indian Lake in northern Manitoba during excavations that took place between 1971 and 1974. The site is part of the Churchill River complex and is the northernmost instance of bison skeletal remains I discuss in my thesis. This site helps to support the argument that bison are found outside of their known geographical range, east of Alberta. The Kame Hills site is believed have been occupied by Cree ancestors (Canadian Museum of History n.d.) The site contains extensive material culture including ceramics, projectile points, lithic tools, faunal remains, and hearths (Dickson 1980; Canadian Museum of History n.d.).



The Kame Hills bison skeletal remains were from a single individual and were the oldest directly-dated materials at the site, at  $3505 \pm 90$  B.P (Dickson 1980:13,34,158). The bison remains included five teeth and extremity shaft fragments (Dickson 1975:63; Dickson 1980). The remains were classified as *Bison bison*, (American bison, subspecies unknown) between three and four years of age (Roberts 1976:25, as quoted from Dickson 1980:34). Of all the faunal remains found at this site (n=29,000), the only animal outside its known geographical range was bison (Dickson 1980). Dickson (1980:147) states that the bison skeletal remains:

“...were not associated with any cultural materials and the animal is believed to have wandered into the region at a time when the climate was warmer and drier than at the present. At 1500 B.C., the climate began to cool and the treeline, which had extended up to 200 kilometres north of its present location, receded. The date indicates that the bison appeared about the time that the climate was beginning to change.”

Dickson (1980:13) states the bison remains were not associated with any cultural remains because no other findings were made in the same test pit and butchering marks could not be identified on the extremity fragments due to erosion of the sample. However, cultural remains with roughly contemporaneous dates (samples collected from a hearth associated with charcoal were dated to  $3340 \pm 65$  B.P., or 1390 B.C.) were recovered from nearby test pits (Dickson 1980:13,34,147). Given the standard deviations of these dates, the cultural deposits could be contemporaneous with the bison remains. Bison could have lived in the area or the remains could have been carried from elsewhere by local Cree people.

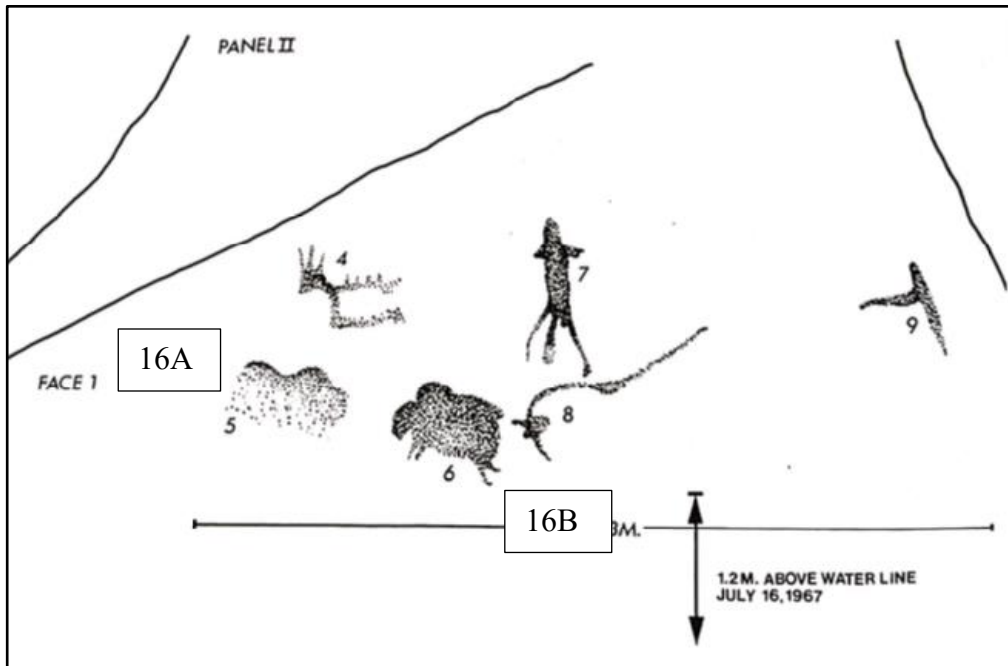
### *Region 3: Southeastern Manitoba and Northwestern Ontario*

#### *Art*

Three rock paintings, one petroglyph and two sites with bison skeletal remains were found in Region 3. While most of these are located around 900 kilometers from known Late-

Holocene wood bison territory, the distance to known Late-Holocene plains bison range varied from 20 to 500 kilometers. All art and skeletal remains were located in Northwestern Ontario, with the exception of Sasaginnigak Lake rock painting (Figure 44), which is located in southeastern Manitoba.

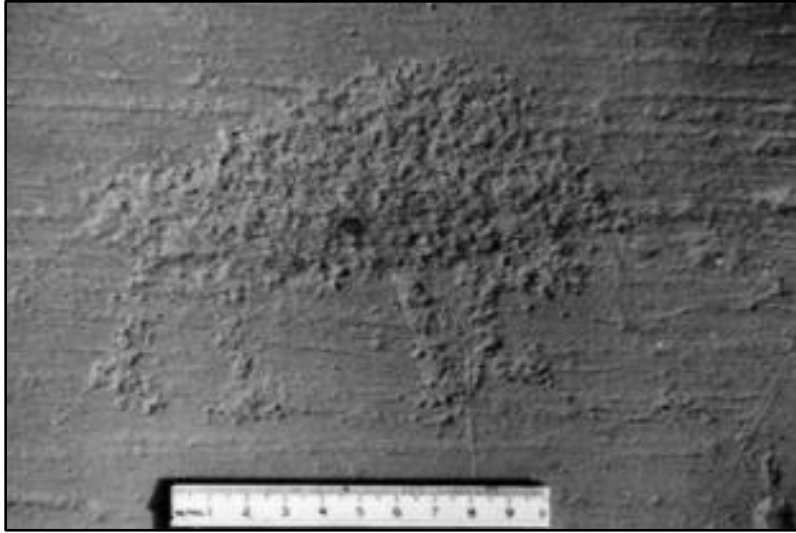
The Sasaginnigak Lake rock paintings include two potential bison facing each other on the same rock panel. The most northern art in Ontario that I discuss in my thesis is the rock painting at Bloodvein River (Figure 45). This image may represent a female bison because the horns curve inwards (W. Olson, personal communication, October 8, 2021). There is also a heart shape on the bison's chest, which is potentially a "lifeline to the heart" of the animal, used to help the hunter gain control of the bison or enhance the hunter's luck when hunting (Rajnovich 1994:23,115). Figure 46 is a petroglyph of a bison at Mud Portage near Lake-of-the Woods, Ontario. Based on the style of the production of the petroglyph pecked into the rockface, it was very tentatively dated to between 3,000 and 5,000 B.C.E. (Steinbring & Zawadzka 2019:74). The image is challenging to resolve; however, a rounded hump appears broadly similar to plains bison. The bison image at Whitefish Lake (Figure 47) is round with its stomach lower than its hooves, which might suggest it is a pregnant female. The legs of the bison may also depict motion. The back leg is straight and perpendicular to the ground, suggesting it is weight-bearing. The right front leg is slightly curved or bent, while the other is raised at 45 degrees. The age of the painting is unknown.



**Figure 44.** Rock paintings of potential bison at Sasaginnigak Lake, Manitoba (site 16 bison image A and B) (Steinbring 1998:28)



**Figure 45.** Rock painting of a bison along the Bloodvein River, Ontario (Dewdney & Kidd 1962:59)



**Figure 46.** Petroglyph of a bison at Wakimika Lake, Ontario (site 18) (Steinbring & Zawadzka 2019:79)



**Figure 47.** Rock painting of a bison at Whitefish Bay, Ontario (site 19) (Dewdney & Kidd 1962:53)

### *Skeletal Remains*

Ghost Point (site 14) is located on Sandy Lake which is connected to the Severn River in northwestern Ontario. Ghost Point is the most northern location in Ontario I discuss of bison skeletal remains. Two specimens were found: a left 4<sup>th</sup> hind lateral sesamoid, and a third left front proximal phalanx (Dawson 1976:85). The remains were classified as *Bison bison* (American bison, subspecies unknown). (It is important to note that sesamoids are relatively small bones and difficult to identify to species.) Dawson (1976:76,85) states that the site was a residential village, not a hunting site, so it is certainly possible that the remains were transported from a far-away location. Small foot bones were commonly used as children's toys, and therefore may have been transported long distances as people moved across the landscape (W. Olson, personal communication, October 8, 2021).

The near-complete remains of a single bison individual were found in Kenora, Ontario (site 17). Kenora is relatively close to the known Late-Holocene plains bison territory, (approximately 100 km north), but is at least 1,000 km southeast of Late-Holocene wood bison territory. The Kenora bison remains include a skull, mandible, teeth (n=14), and 58 complete or incomplete postcranial fragments including cervical vertebrae, thoracic vertebrae, lumbar vertebrae, sacrum, ribs, manubrium, sternbrae, scapulae, radius, pelvic bones, tibia, femur, calcaneum, foot bones (McDonald & Lammers 2002:86). McAndrews (1982) radiocarbon dated sediment found within the skull to the mid-Holocene period ( $4,850 \pm 60$  B.P.). and is likely *Bison antiquus occidentalis* (extinct subspecies) (McAndrews 1982). The bison's ribs were directly radiocarbon dated to the mid-Holocene ( $4,270 \pm 65$  B.P) (McDonald & Lammers 2002). No artifacts were found associated with the animal (McAndrews 1982).

Bison skeletal remains were also found at the Hungry Hall site on Rainy River, Ontario (site 20). The Hungry Hall Site is within ~20 km of known Late-Holocene plains bison territory. Due to the migrations/movement of bison, and the imprecision of colonial-era maps of bison ranges, this could be considered within plains bison territory. The site is over 1,100 km southeast of Late-Holocene wood bison territory. Eight bison specimens were found: six middle phalanges and two distal phalanges. The remains were found in earth that was part of a burial mound. The specimen was identified as *Bison bison bison* (plains bison) (Moore 1975, as quoted from Dawson 1976:84). As mentioned, small foot bones were often used as children's toys, and could have been imported from a distant location (W. Olson, personal communication, October 8, 2021).

#### *Region 4: Southeastern Ontario*

##### *Skeletal Remains*

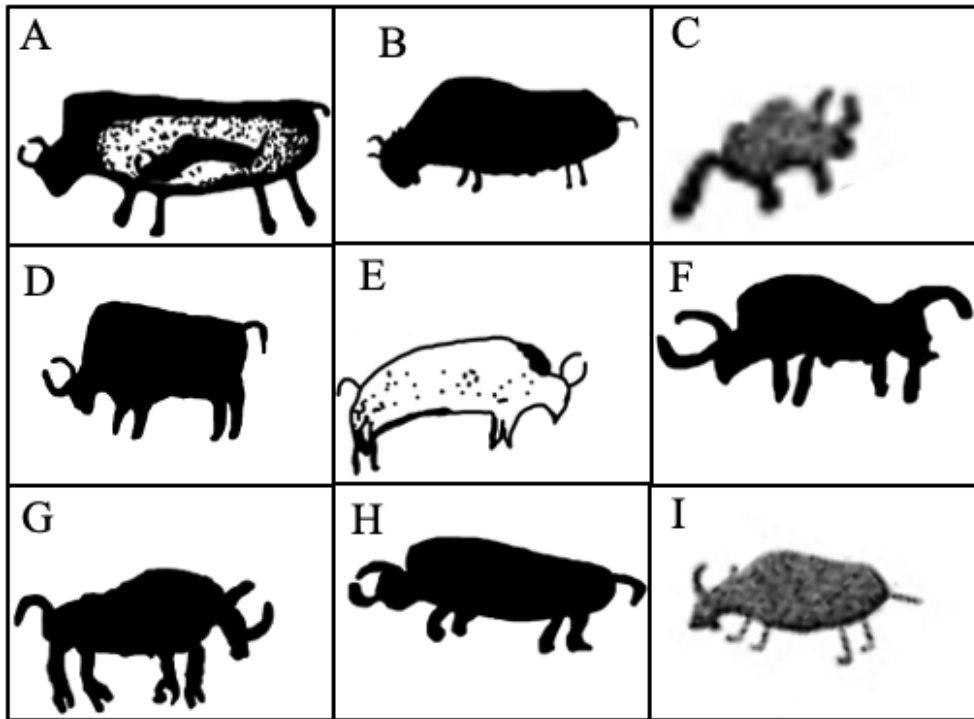
Two sites with bison skeletal remains were found in southeastern Ontario. These locations are approximately 100-200 kilometers north of known plains bison territory. Bison skeletal remains were found at Lake Iroquois Beach, near Toronto Ontario (site 21). A skull was found by workmen in Toronto who were working to dig a waterline in the early 1900s (Jackson 1983:34). There is some discrepancy about the age and species of the specimen. In an anonymous report published by the *Edmonton Journal*, that the findings were described as *Bison bison* (American bison – subspecies unknown) without providing a basis for that species-level designation (Jackson, 1983). McAndrews (1981, as quoted from McAndrews 1982) states that the skull is from the Late Pleistocene/ Early Holocene era (12,400 to 11,300 B.P.), though it is not clear how this date was assigned (likely through horn core breadth). Since modern bison did

not emerge until approximately 5,000 years B.P., the sample could be an earlier species, such as *Bison antiquus* (extinct species) (Wilson 1979). In addition to the skull, there were reports of a civilian carrying off bison remains in the same area (Coleman 1899:36). Therefore, there may have been multiple skeletal specimens of bison in the area.

The Roebuck Site in southeastern Ontario south of Ottawa (site 22) is the most eastern location with bison remains discussed in this thesis. Wintemberg (1972:14) mentions that southwest of the site, in Jefferson County New York, early records of settlers describe sightings of herds of bison at local salt licks. Skeletal remains of (presumably modern) bison in the area have also been found (Wintemberg 1972:14). The Roebuck bison remains included a distal phalanx and the broken head of a scapula (Wintemberg 1972:14). These were the only bison bones recovered from the site, and the least numerous of all the faunal remains (Wintemberg 1972). Bayesian modeling of radiocarbon dates on carbonized maize and collagen extracted from a bone needle case suggest that the initial occupation of the Roebuck site began around A.D. 1474-1568 and ended around A.D. 1524-1587 (Birch et al. 2016). Thus, the Roebuck skeletal remains are undoubtedly modern bison.

*Comparative Plains Bison Art – Colorado Plateau*

Figure 48 shows the nine rock paintings of (presumably plains) bison from the Colorado Plateau that were plotted against the reference dataset to test the efficacy of the methodology. One of the images (Colorado Plateau A) is interpreted as female because a smaller bison (fetus) is depicted inside the larger animal (Dalton & Dalton 2014:107). The proportion of black in the image generally represents the extent of rock that was removed to create the image.



**Figure 48.** Bison rock paintings from the Colorado Plateau, Utah, Nine Mile Canyon A – C (Agenbroad & Hesse 2004:194; Atlas Obscura 2022; Climb Utah 2022; Spangler 2013). Bison images from Colorado Plateau, Utah, Newspaper Rock D – I (Agenbroad & Hesse 2004:194; The American Southwest (n.d.))

*Qualitative Subspecies Identification*

Table 9 summarizes the results of the qualitative analysis of bison morphology. Along with descriptions of the shape and position of the hump and the tail position, additional notes describe any missing anatomical landmarks, the quality of the image and the potential sex of the bison.



Table 9: Qualitative analysis results of bison art subspecies identification.

Region	Site	Sample Name	Highest point of hump		Shape of hump		Tail Position (#)	Additional Notes	Subspecies Designation (qual. analysis)
			In front of legs (Wood)	Behind/ over front legs (Plains)	Square (Wood)	Convex (Plains)			
Central Alberta	1	Barrhead A	X		X		-	No tail	Wood
	1	Barrhead B		X		X	-	No tail; Possibly female	Plains
	2	Beauvallon	X		X		-	No tail; Possibly female	Wood
	3	Ardmore		X		X	-	No tail	Plains
Churchill River	4	Rattler Creek		X		X	2	Potentially cattle	Plains
	5	Cow Narrows	X		X		2		Wood
	6	Stanley Rapids A	X		X		2		Wood
	6	Stanley Rapids B	X		X		2		Wood
	7	Island Portage	X		X		1		Wood
	8	Conjuring River Mouth	X		X		2		Wood
	9	Reindeer Lake		X	X		2	Hump both plains and wood features (i.e., highest point of hump is behind the front legs [similar to plains], the front of the hump has a steep drop [similar to wood])	Plains/Wood
	10	Maple Leaf Rapids		X		X	3	Image is quite faded, potentially cattle (not included in the quantitative analysis)	Plains
	11	Kipahigan Lake	X		X		2		Wood
	12	Tramping Lake A		X		X	2		Plains
12	Tramping Lake B	X		X		2		Wood	
SE Manitoba / NW Ontario	15	Sasaginnigak Lake A		X	X		-	Hump has both plains and wood features (i.e., highest point of hump is over front legs [similar to plains], front of hump has a steep drop [similar to wood]. No horns or tail are visible, image is quite faded	Plains/Wood
	15	Sasaginnigak Lake B		X		X	2	No horns, tail is short and extends only slightly from the body	Plains
	16	Bloodvein		X		X	1	Possibly female	Plains
	18	Mud Portage		X		X	2	Petroglyph is challenging to decipher as the outline of the image is unclear due to fading and photo quality (not included in the quantitative analysis)	Plains
	19	Whitefish Bay		X		X	2	Possibly female	Plains
Colorado Plateau	-	Colorado Plateau A	X		X		2	Female bison with fetus	Wood
	-	Colorado Plateau B		X		X	2		Plains
	-	Colorado Plateau C		X		X	1		Plains
	-	Colorado Plateau D	X		X		2		Wood
	-	Colorado Plateau E		X		X	3		Plains
	-	Colorado Plateau F		X		X	3		Plains
	-	Colorado Plateau G		X		X	3		Plains
	-	Colorado Plateau H		X		X	2		Plains
	-	Colorado Plateau I		X		X	2		Plains

Tail positions: 1= lowered, at rest; 2= Raised in line with bison's back, engaged; 3= Raised above back, experiencing tension; 4= Raised at 90 degrees, heightened tension or excretion.

The qualitative analysis found that with two exceptions (sites 9 and 15), hump shape and position implied the same subspecies designation. This suggests that the shape and position of the hump in bison art are strongly correlated. In terms of subspecies findings, in central Alberta there was an even mix of plains (n=2) and wood bison (n=2) art. In the Churchill River area, most of the art was designated as wood bison (n=8), one had a mix of both plains and wood bison features, and two were designated as plains bison. In southeastern Manitoba/ northwestern Ontario, most art was designated as plains bison (n=4) and one painting had a mix of both plains and wood bison features.

For the tail positions, position 2 was the most common (n=6), which represented an animal who was interested or engaged in their environment. All position 2 tails were found in rock art along the Churchill River area. Tail position 1, suggesting the bison was in a relaxed state, was the second most common tail position in the Churchill River area and the Bloodvein River (n=2). Only one instance of tail position 3 was found in northern Saskatchewan along the Churchill River area. No instances of tail position 4, which indicates that the bison is experiencing heightened tension and ready to charge (or discharge) was found in the samples. None of the effigies from central Alberta had tails, and had to be excluded from the analysis.

For the qualitative analysis of Colorado Plateau art, the majority were designated as plains bison (n=7), and two were designated as wood bison. The majority of Colorado Plateau images had tail position 2 indicating interest or engagement (n=6). Three had tail position 3 indicating heightened excitement. Only one image had the tail in a resting position (tail position 1).

*Quantitative Subspecies Identification*

All bison art hump angles, hump areas and length ratio measurements, including the Colorado Plateau art data, are listed in Table 10.

Table 10: Morphometric measurements of all art images used in PCA analyses.

Site	Sample Name	Hump angles (degrees)				Hump areas (proportions)				Body ratios			
		BHA	HPA	ASA	DSA	Tri1	Tri2	Tri3	Tri4	BL/ TBL	SHBL/ TBL	ATHSL/ BL	DSBL/ TBL
1	Barrhead A	23	46	60	16	0.05	0.04	0.25	0.65	0.83	0.20	0.38	0.14
1	Barrhead B	20	38	50	25	0.04	0.04	0.33	0.60	0.61	0.29	0.60	0.18
2	Beauvallon	20	54	67	29	0.06	0.04	0.25	0.66	0.75	0.23	0.51	0.15
3	Ardmore	21	44	52	28	0.03	0.01	0.22	0.74	0.75	0.25	0.45	0.12
4	Rattler Creek	16	29	40	19	0.02	0.02	0.12	0.84	0.97	0.27	0.31	0.13
5	Cow Narrows	17	58	72	29	0.04	0.02	0.13	0.81	0.88	0.14	0.32	0.10
6	Stanley Rapids A	12	44	47	32	0.05	0.01	0.44	0.50	0.68	0.29	0.58	0.08
6	Stanley Rapids B	23	62	71	45	0.01	0.02	0.16	0.81	1.04	0.21	0.40	0.29
7	Island Portage	8	63	77	40	0.05	0.08	0.22	0.65	0.82	0.12	0.30	0.15
8	Conjuring River Mouth	35	40	41	40	0.01	0.00	0.10	0.90	1.32	0.30	0.29	0.12
9	Reindeer lake	24	41	51	27	0.03	0.03	0.37	0.57	0.67	0.33	0.67	0.22
11	Kipahigan Lake	10	55	70	36	0.04	0.05	0.10	0.81	0.87	0.09	0.19	0.08
12	Tramping Lake A	26	29	62	16	0.03	0.07	0.27	0.62	0.64	0.36	0.64	0.29
12	Tramping Lake B	26	48	61	33	0.01	0.01	0.06	0.92	0.94	0.15	0.22	0.12
15	Sasaginnigak Lake A	12	32	45	16	0.02	0.02	0.14	0.82	0.75	0.25	0.33	0.13
15	Sasaginnigak Lake B	7	64	96	36	0.13	0.10	0.28	0.49	0.86	0.14	0.40	0.14
16	Bloodvein	13	42	52	22	0.05	0.02	0.26	0.68	0.75	0.24	0.42	0.10
19	Whitefish Bay	7	35	55	12	0.10	0.06	0.36	0.47	0.93	0.34	0.44	0.15
-	Colorado Plateau A	2	67	83	38	0.11	0.07	0.29	0.53	0.87	0.06	0.07	0.20
-	Colorado Plateau B	12	40	54	25	0.04	0.04	0.36	0.56	0.70	0.27	0.17	0.50
-	Colorado Plateau C	25	38	48	25	0.04	0.04	0.34	0.59	0.47	0.37	0.18	1.02
-	Colorado Plateau D	12	64	81	33	0.12	0.07	0.31	0.51	0.76	0.17	0.15	0.55
-	Colorado Plateau E	17	35	58	19	0.05	0.1	0.21	0.64	0.76	0.29	0.19	0.44
-	Colorado Plateau F	22	39	65	25	0.06	0.13	0.44	0.38	0.61	0.39	0.33	0.82
-	Colorado Plateau G	21	22	50	11	0.04	0.09	0.31	0.56	0.59	0.37	0.27	0.69
-	Colorado Plateau H	8	39	77	22	0.08	0.12	0.31	0.50	0.73	0.23	0.18	0.40
-	Colorado Plateau I	11	32	41	22	0.05	0.04	0.35	0.57	0.72	0.30	0.18	0.53

BHA=Back Hump Angle, HPA = Highest Point Angle, ASA = Anterior Shoulder Angle, DSA = Dorsal Shoulder Angle, Tri1= Triangle 1 (anterior shoulder hump), Tri2= Triangle 2 (dorsal shoulder hump), Tri3 = Triangle 3 (ventral shoulder hump), Tri4=Triangle 4 (back hump), BL=Back Length, TBL = Total Back Length, SHBL = Shoulder Hump Base Length, ATHSL = Anterior Total Hump Slope Length; DSBL = Dorsal Shoulder Back Length. See Table 7 for measurement descriptions.

*PCA Results for Reference Dataset and Colorado Plateau Art*

Table 11 includes the percent variance of each principal component (PC) for the four PCA comparisons. I chose to compare PC1 and 2, because they accounted for the majority of the overall variance (66-81%). I used PC1 and 2 in all four PCAs, and for the analyses and discussions that follow.

Table 11: Percent variance of PCAs for the reference dataset of photographs of modern bison, and the Colorado Plateau art.

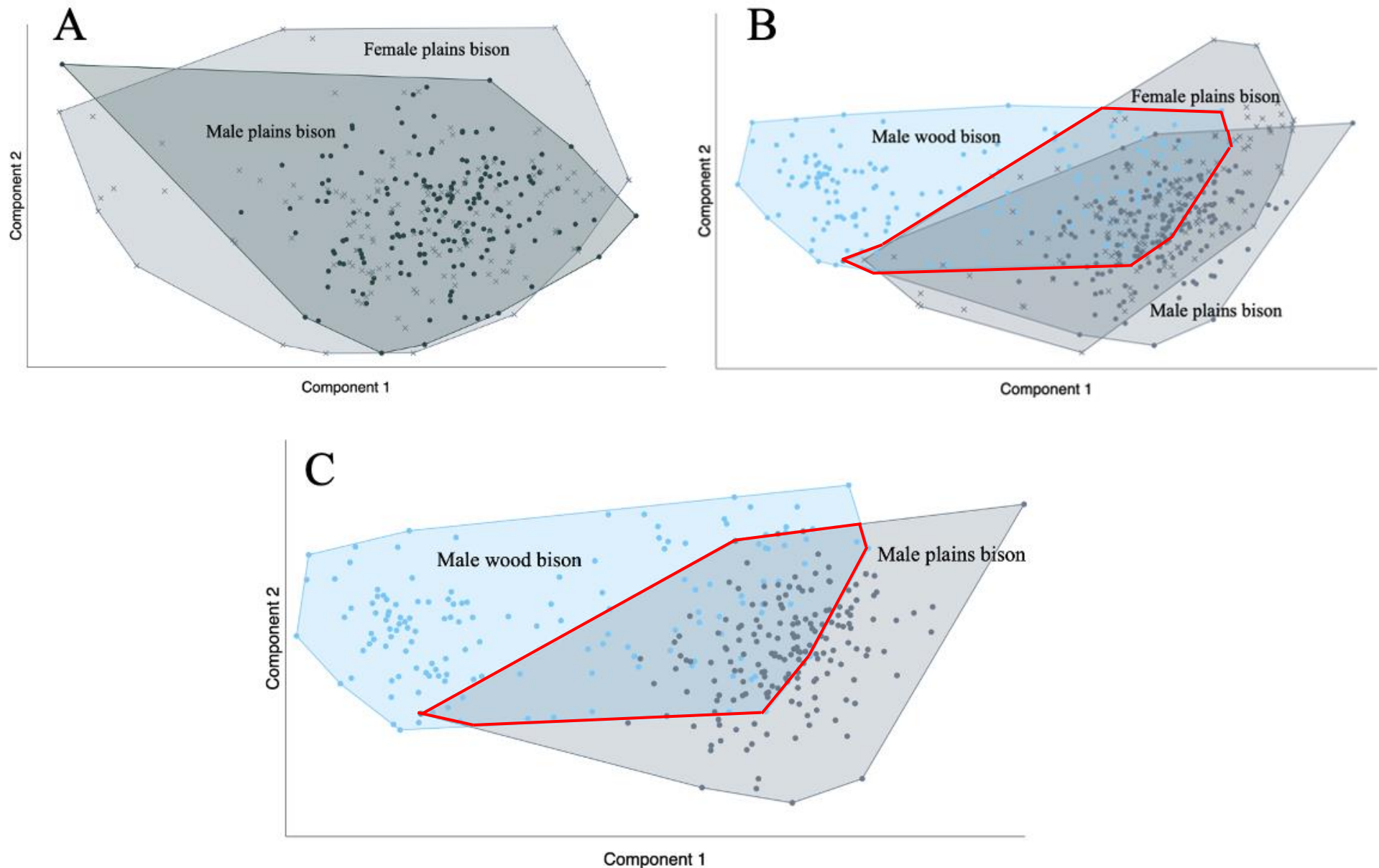
Principal Component	% Variance			
	Plains-M/F (Figure 49a)	Plains-M/F & Wood-M (Figure 49b)	Plains-M & Wood-M (Figure 49c)	Plains-M/F & Wood-M + Colorado Plateau Art (Figure 50)
<b>1</b>	<b>47.3%</b>	<b>66.7%</b>	<b>70%</b>	<b>65.5%</b>
<b>2</b>	<b>18.3%</b>	<b>12.5%</b>	<b>11%</b>	<b>13.4%</b>
3	15.8%	9.9%	7.1%	10.0%
4	7.5%	4.4%	5.0%	4.3%
5	5.8%	3.5%	3.5%	3.6%
6	1.5%	0.8%	0.8%	0.9%
7	1.5%	0.8%	0.6%	0.8%
8	1.0%	0.5%	0.5%	0.5%
9	0.5%	0.2%	0.2%	0.2%
10	0.3%	0.1	0.1%	0.1%
11	0.1%	0.0%	0.0%	0.0%
12	0.0%	0.0%	0.0%	0.0%

Figure 49a depicts the PCA results for reference data obtained from modern female and male plains bison photographs, to evaluate the degree of overlap between different sexes of the same species. Figure 49a shows that there is near-complete overlap between the two sexes of plains bison on PC1 and 2. It is reasonable to assume that male and female wood bison data would have a similarly high degree of overlap.

Figure 49b depicts the PCA results for modern male and female plains bison, and male wood bison comparison, to determine the degree of overlap between the two species (regardless of sex). While there is a clear distinction between many wood and plains bison individuals, there is also a significant area of overlap. This is not unexpected given the high degrees of individual variation within subspecies.

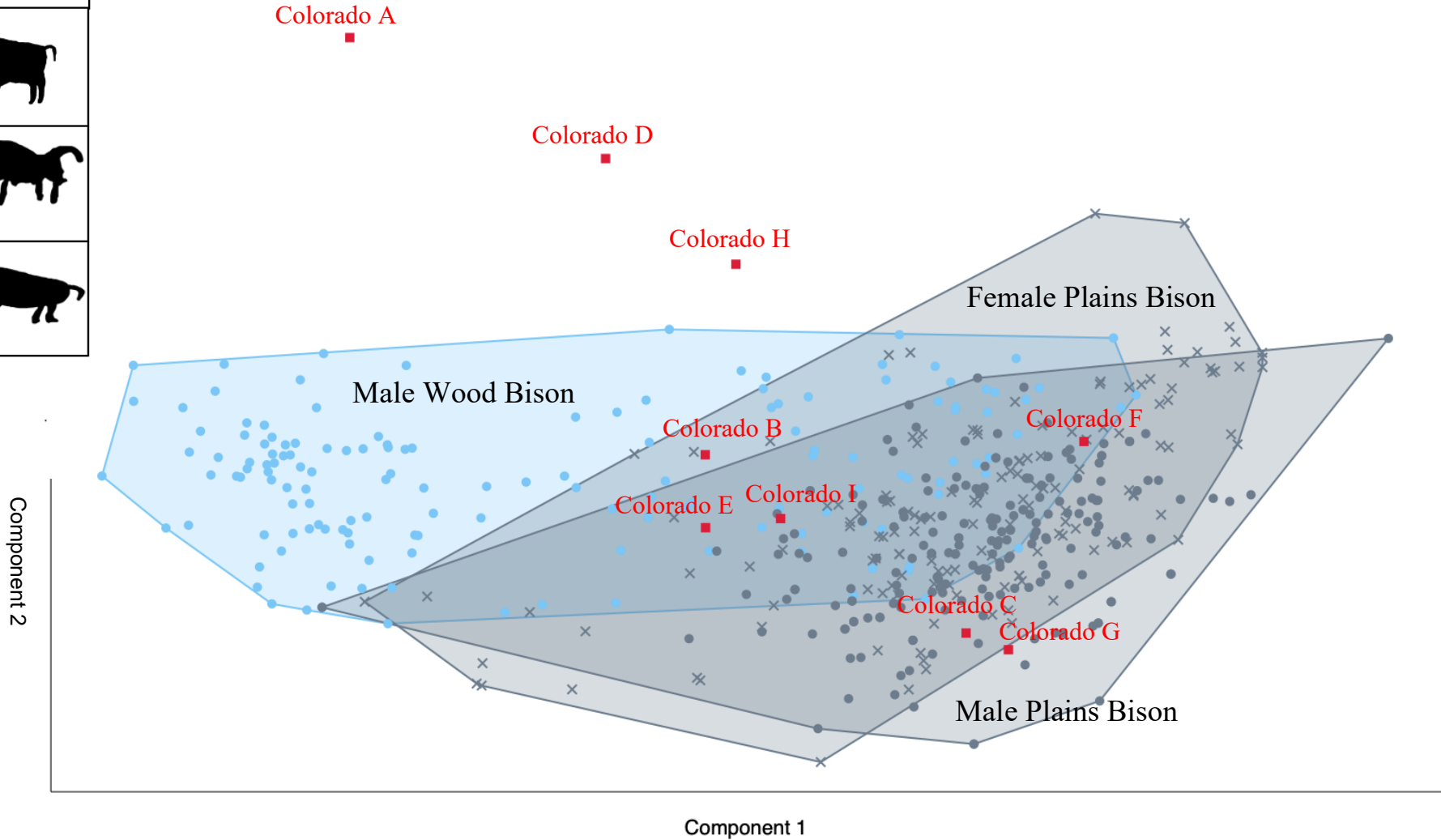
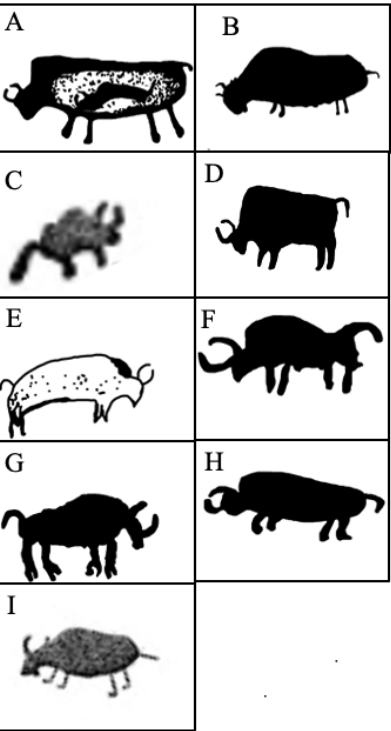
Figure 49c depicts the PCA results for the modern male wood and male plains bison comparison (female plains bison data were removed) to determine the influence of the female plains bison data. Figure 49c shows that the female plains data does not significantly alter the PCA analysis, as compared with Figure 49a and 49b.

Figure 50 plots the Colorado Plateau art against the reference dataset of photographs of plains and wood bison (including male and female plains bison and male-only wood bison). Three images (Colorado Plateau A, D, H) plot outside the space occupied by modern reference images for PC2. All of these plot within the area of overlap between plains and wood bison for PC1, although Colorado Plateau A is at the extreme edge, in a space more commonly occupied by wood bison. Four of the remaining Colorado Plateau images (B, E, I, F) plotted within the area of overlap between wood and plains bison on PC1 and 2. The remaining two Colorado Plateau images (C, G) plotted in the plains bison space of PC1 and 2, where there was no overlap with wood bison.



**Figure 49.** PCA analyses showing variance among modern bison from photographs (overlap regions outlined in red): A. male and female plains bison; B. male and female plains bison and male wood bison; C. male wood and plains bison. (Grey dots = male plains bison; grey X's = female plains bison; blue dots = male wood bison). Plot PC1 and 2 that explain approximately: 68% of variance in graph A; 78% of variance in graph B; and 81% of variance in graph C. Red outline indicates areas of overlap of PC space between plains and wood bison

# Colorado Plateau, Utah



**Figure 50.** PCA analysis showing variance among modern bison (photographic reference dataset) and Colorado Plateau art images. (Grey dots = male plains bison; grey X's = female plains bison; blue dots = male wood bison; red squares= Colorado Plateau art). Plot of PC1 and 2 that explain approximately 78% of the variance.

The final three PCA analyses compare the northern Canadian art with the reference photographs of modern bison. (The Colorado Plateau art was not used in these analyses as it did not alter the results and was omitted for greater visual clarity). In all PCAs, PC1 and 2 contributed most to the overall variance (78-79%; Table 12).

Table 12: Percent variance for PCAs comparing Canadian bison art against the reference dataset.

Principal Component	% Variance		
	Region 1: Central Alberta	Region 2: Churchill River Area	Region 3: SE Manitoba/NW Ontario
<b>1</b>	<b>66.6%</b>	<b>65.7%</b>	<b>66.0%</b>
<b>2</b>	<b>12.3%</b>	<b>12.3%</b>	<b>13.2%</b>
3	10.0%	10.2%	9.8%
4	4.4%	4.1%	4.4%
5	3.6%	3.7%	3.4%
6	0.9%	1.7%	1.0%
7	0.8%	0.8%	0.8%
8	0.5%	0.5%	0.6%
9	0.2%	0.2%	0.2%
10	0.1%	0.2%	0.1%
11	0.0%	0.0%	0.0%
12	0.0%	0.0%	0.0%



The PCA loading values (Table 13) reveal which variables (i.e., measurements such as hump angles, hump areas and length ratios) contribute the most to the overall variance in the PCA analyses (i.e., the determination of subspecies). Results show that length ratios contributed the most to the variance between subspecies, followed by hump angle. The hump area contributed the least to the determination of subspecies. A summary of how the art grouped in the PCA-analysis with the plains and wood subspecies can be found in Table 14.

Table 13: Loadings of PC1 and PC2 for all PCA analyses. (Strongest variables are bolded).

Variables (Measurements)		Loadings													
		Reference set						Art							
		Plains M/F (Figure 49a)		Plains-M/F & Wood-M (Figure 49a)		Plains-M & Wood-M (Figure 49a)		Colorado Plateau (Figure 50)		Region 1: Central Alberta (Figure 51)		Region 2: Churchill River Area (Figure 52)		Region 3: SE Manitoba/ NW Ontario (Figure 53)	
		PC1	PC2	PC1	PC2	PC1	PC2	PC1	PC2	PC 1	PC 2	PC 1	PC 2	PC 1	PC 2
Hump Angles (degrees)	BHA	-0.10	-0.07	-0.03	<b>-0.53</b>	0.31	<b>-0.63</b>	0.00	<b>-0.51</b>	-0.05	<b>-0.45</b>	-0.10	<b>-0.52</b>	-0.02	<b>-0.53</b>
	HPA	-0.07	<b>0.95</b>	<b>-0.83</b>	<b>0.48</b>	<b>-0.89</b>	<b>0.35</b>	<b>-0.82</b>	<b>0.48</b>	<b>-0.83</b>	<b>0.48</b>	<b>-0.83</b>	<b>0.48</b>	<b>-0.83</b>	<b>0.48</b>
	ASA	-0.27	<b>0.66</b>	-0.44	<b>0.61</b>	-0.50	<b>0.59</b>	-0.44	<b>0.63</b>	-0.44	<b>0.64</b>	-0.44	<b>0.63</b>	-0.44	<b>0.62</b>
	DSA	-0.06	0.70	-0.76	0.35	-0.81	0.19	-0.75	0.35	-0.76	0.36	-0.77	0.32	-0.76	0.35
Hump Areas (proportions)	Tri 1	0.61	0.17	0.74	0.41	0.71	0.43	0.71	0.47	0.74	0.41	0.75	0.41	0.72	0.45
	Tri 2	0.82	<b>-0.08</b>	<b>0.90</b>	0.16	<b>0.91</b>	0.17	<b>0.89</b>	0.19	<b>0.90</b>	0.17	<b>0.89</b>	0.16	<b>0.90</b>	0.18
	Tri 3	<b>0.85</b>	0.29	0.87	0.37	0.88	0.33	0.86	0.38	0.87	0.37	0.87	0.35	<b>0.87</b>	<b>0.37</b>
	Tri 4	<b>-0.91</b>	<b>-0.22</b>	<b>-0.92</b>	<b>-0.35</b>	<b>-0.93</b>	<b>-0.33</b>	<b>-0.91</b>	<b>-0.37</b>	<b>-0.92</b>	<b>-0.35</b>	<b>-0.92</b>	<b>-0.34</b>	<b>-0.91</b>	<b>-0.36</b>
Length Ratios	BL/TBL	<b>-0.86</b>	0.26	<b>-0.95</b>	0.04	<b>-0.95</b>	0.00	<b>-0.94</b>	0.07	<b>-0.94</b>	0.04	<b>-0.90</b>	-0.00	<b>-0.93</b>	-0.08
	SHBL/TBL	<b>0.89</b>	-0.24	<b>0.97</b>	-0.09	<b>0.97</b>	-0.07	<b>0.96</b>	-0.10	<b>0.96</b>	-0.09	<b>0.95</b>	-0.13	<b>0.96</b>	-0.09
	ATHSL/BL	<b>0.92</b>	-0.08	<b>0.95</b>	0.03	<b>0.96</b>	0.02	<b>0.94</b>	0.02	<b>0.94</b>	0.04	<b>0.94</b>	0.02	<b>0.95</b>	<b>0.03</b>
	DSBL/TBL	0.74	-0.18	0.88	-0.10	0.91	-0.07	0.88	-0.08	0.88	-0.08	0.86	-0.11	0.89	-0.09

PC (Principal Component), BHA=Back Hump Angle, HPA = Highest Point Angle, ASA = Anterior Shoulder Angle, DSA = Dorsal Shoulder Angle, Tri1= Triangle 1 (anterior shoulder hump), Tri2= Triangle 2 (dorsal shoulder hump), Tri3 = Triangle 3 (ventral shoulder hump), Tri4=Triangle 4 (back hump), BL=Back Length, TBL = Total Back Length, SHBL = Shoulder Hump Base Length, ATHSL = Anterior Total Hump Slope Length; DSBL = Dorsal Shoulder Back Length

Table 14: Summary of the PCA-based subspecies designations

Region	Site	Sample Name	PC1 & PC2 Biplot	PC1 only	PC2 only
Central Alberta	1	Barrhead A	Wood/Plains	Wood/Plains	Wood/Plains
	1	Barrhead B	Wood/Plains	Wood/Plains	Wood/Plains
	2	Beauvallon	Wood	Wood/Plains	Wood/Plains
	3	Ardmore	Wood/Plains	Wood/Plains	Wood/Plains
Churchill River	4	Rattler Creek	Outside	Wood/Plains	Plains
	5	Cow Narrows	Wood	Wood	Wood/Plains
	6	Stanley Rapids A	Wood/Plains	Wood/Plains	Wood/Plains
	6	Stanley Rapids B	Wood	Wood	Wood/Plains
	7	Island Portage	Outside	Wood/Plains	Plains
	8	Conjuring River Mouth	Outside	Wood	Outside
	9	Reindeer lake	Wood/Plains	Wood/Plains	Wood/Plains
	11	Kipahigan Lake	Wood	Wood	Wood/Plains
	12	Tramping Lake A	Plains	Wood/Plains	Plains
	12	Tramping Lake B	Outside	Wood	Plains
SE Manitoba/ NW Ontario	15	Sasaginnigak Lake A	Plains	Wood/Plains	Plains
	15	Sasaginnigak Lake B	Outside	Wood/Plains	Outside
	16	Bloodvein	Wood/Plains	Wood/Plains	Wood/Plains
	19	Whitefish Bay	Wood	Wood/Plains	Wood/Plains
Colorado Plateau	-	Colorado Plateau A	Outside	Wood/Plains	Outside
	-	Colorado Plateau B	Wood/Plains	Wood/Plains	Wood/Plains
	-	Colorado Plateau C	Plains	Wood/Plains	Plains
	-	Colorado Plateau D	Outside	Wood/Plains	Outside
	-	Colorado Plateau E	Wood/Plains	Wood/Plains	Wood/Plains
	-	Colorado Plateau F	Wood/Plains	Wood/Plains	Wood/Plains
	-	Colorado Plateau G	Plains	Wood/Plains	Plains
	-	Colorado Plateau H	Outside	Wood/Plains	Outside
	-	Colorado Plateau I	Wood/Plains	Wood/Plains	Wood/Plains

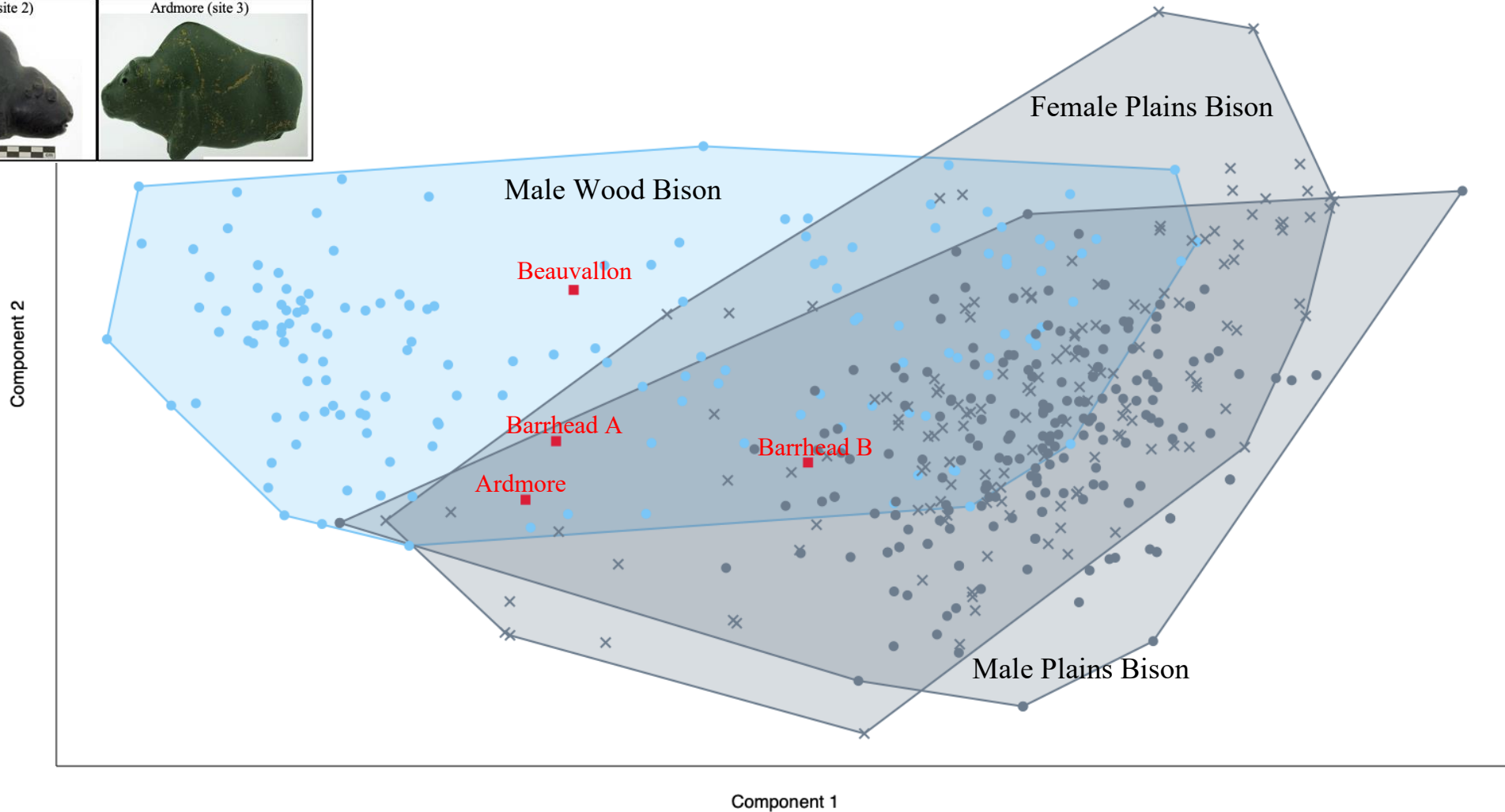
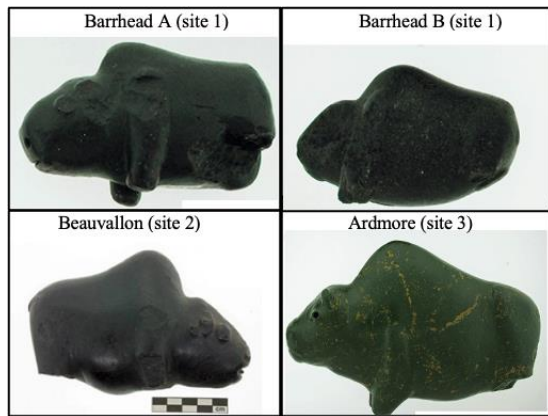
PC (Principal Component), 'Wood' = art plots in the wood bison space only, 'Plains' = the art plots in the wood bison space only, 'Wood/Plains' = art plots in the overlap space of wood and plains bison, 'Outside' = art plots outside the PC range for modern bison morphology

Figure 51 plots the bison effigies from central Alberta against the reference dataset of photographs of plains and wood bison. Along PC1, all four effigies plot within the area of overlap between wood and plains bison, but to varying degrees. Three effigies plot more with wood bison and one of the effigies plots more with plains bison. When both PC1 and 2 are taken into account, the Beauvallon effigy plots with wood bison whereas the Barrhead and Ardmore effigies plot in the area of overlap between wood and plains bison. Overall, the quantitative analysis of central Alberta effigies suggests greater morphological similarity to wood than plains bison.

In the Churchill River area (Figure 52), the majority of rock paintings (n=6) plot solely with wood bison along PC1, whereas the others (n=4) plot within the overlap space of wood and plains bison. One of these four (Rattler Creek) is outside the range of either subspecies of bison for PC2. Taking both PC1 and 2 into account, the Stanley Rapids A and Reindeer Lake images are in the area of overlap between plains and wood bison. The Tramping Lake A image is the only bison art from the Churchill River area that plots in the plains bison space, where there is no overlap with wood bison. Overall, the Churchill River art patterns suggest greater morphological similarity to wood than plains bison.

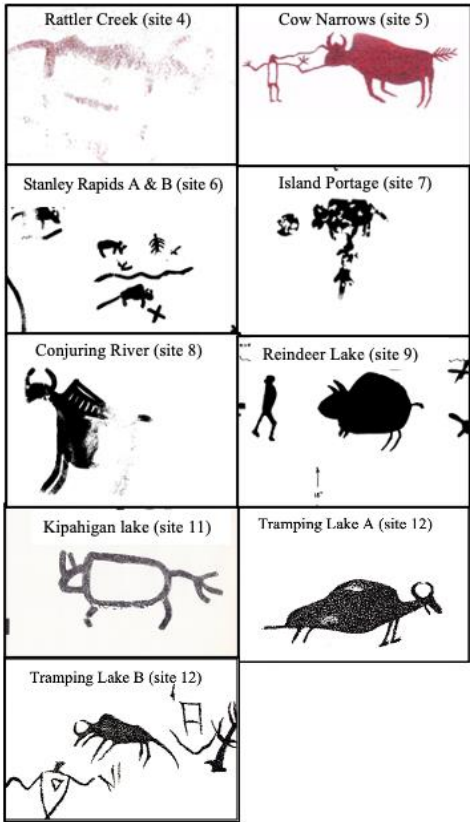
In southeastern Manitoba/ northwestern Ontario, all paintings plot within the area of PC1 in which plains and wood bison overlap (Figure 53). When PC2 is taken into account, one image (Whitefish Bay) falls within the wood bison space, one image (Bloodvein River) falls in the area of overlap that is closer to the wood bison side of the distribution, and another image (Sasaginnigak Lake A) plots with plains bison, just outside the limit of the wood bison range. Overall, the southeastern Manitoba/ northwestern Ontario art patterns suggest greater morphological similarity to wood than plains bison.

# Region 1: Central Alberta



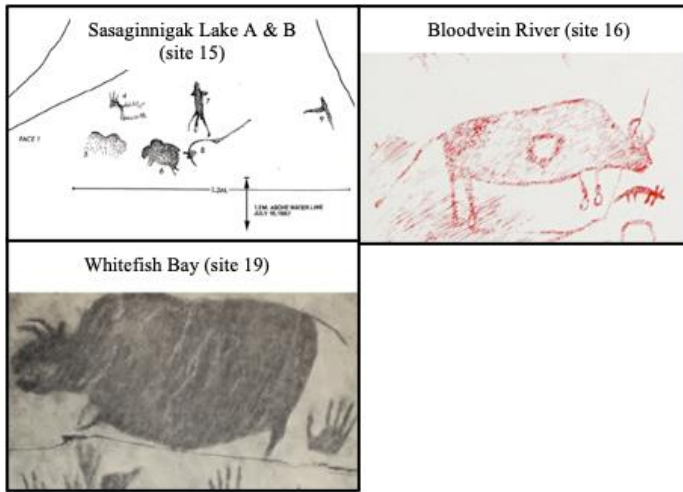
**Figure 51.** PCA analysis showing variance among reference dataset of modern bison and central Alberta effigies. (Grey dots = male plains bison; grey X's = female plains bison; blue dots = male wood bison; red squares = effigies). Plot of PC1 and 2 that explain approximately 79% of the variance.

# Region 2: Churchill River Northern Saskatchewan/ Manitoba

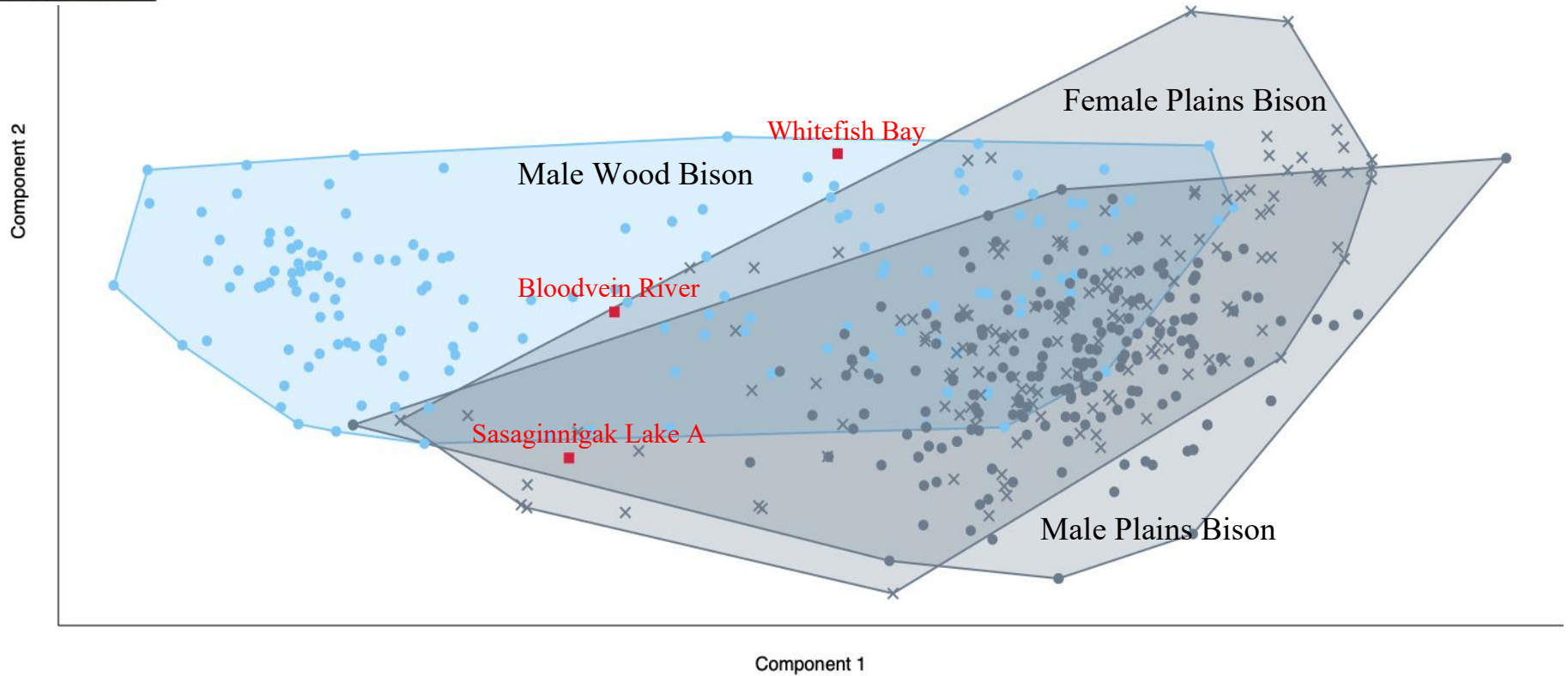


**Figure 52.** PCA analysis showing variance among reference dataset of modern bison and Churchill River area art. (Grey dots = male plains bison; grey X's = female plains bison; blue dots = male wood bison; red squares= effigies). Plot of PC1 and 2 that explain approximately 77% of the variance.

# Region 3: Southeastern Manitoba/ Northwestern Ontario



Sasaginnigak Lake B



**Figure 53.** PCA analysis showing variance among reference dataset of modern bison and Ontario art. (Grey dots = male plains bison; grey X's = female plains bison; blue dots = male wood bison; red squares= effigies). Plot of PC1 and 2 that explain approximately 79% of the variance.

## Discussion

Multiple examples of bison art and skeletal remains have been found outside of the known Late-Holocene bison range in Canada. While results from both the qualitative and quantitative analyses are discussed below, the quantitative PCA analysis provided the preferred results about subspecies designations. The PCA analysis was based on objective evidence, while the qualitative analysis was based on subjective questions, subject to opinion.

Some bison art from central Alberta clearly resembled wood bison, whether they were assessed using qualitative or quantitative methods. Beauvallon was designated as wood bison in both the qualitative and quantitative analysis. The subspecies of the other Alberta bison art was not clearly distinguishable, but the quantitative analyses suggested greater affiliation with wood bison. Since these findings were within the transitional area of wood and plains bison geographical ranges, it is possible that both plains and wood bison were in this area when the effigies were created. It is also possible that interbreeding between the two subspecies occurred in this area, though this is unconfirmed. It is very likely that people living in this area were accustomed to seeing both bison subspecies.

In the northern Churchill River area, the majority of the images resembled wood bison, according to both qualitative and quantitative analyses. Along with the art, bison skeletal remains were found along Churchill River region in northern Manitoba, but their subspecies has not been determined. These findings are consistent with the hypothesis that at times, wood bison territory may have extended further east in Saskatchewan than is currently realized. It is also possible that people from this area travelled ~200-400 km west into wood bison territory, or that people from the west travelled into the Churchill River area and created the art. However, there is

remembered history of local Cree families being creators of the art, suggesting they had personally encountered bison, perhaps in their home region (Jones 1981).

The qualitative analysis of art from southeastern Manitoba / northwestern Ontario suggested that all paintings had plains bison features. According to the PCA results, these depictions plotted in areas of overlap between plains and wood bison, but overall they occupied PC spaces that were more common for wood bison. In comparison to the Churchill River area samples, however, those from southeastern Manitoba / northwestern Ontario are less strongly affiliated with wood bison. The arguably ‘less pronounced’ wood bison features in central Alberta and Manitoba / Ontario in comparison to the northern Churchill River art may reflect the closer geographical proximity of the former regions to plains bison territory.

Although there was a great deal of individual variation among the Colorado Plateau art, overall they were more strongly affiliated with plains bison than were the northern art examples (e.g., 2 examples plotted within plains-only PC space, and the majority of the others plotted in areas of overlap between wood and plains bison). To some degree, this validates the quantitative method of determining subspecies of bison art using morphometric measurements, since the opposite result were obtained for bison in the south (i.e., more plains bison characteristics) compared with in the north (i.e., more wood bison characteristics). Because of the significant overlap in the PC results for wood and plains bison, the clearest understanding emerges when results are plotted as a group, rather than attempting to identify the subspecies of isolated examples. Multiple samples of art can more accurately show the range of morphological variability within a region relative to modern wood and plains bison. An individual sample can only indicate one point in this range; it may be a peripheral point and not a fulsome representation of the overall trend of the region. Therefore, when using this methodology, the



number of samples from an area needs to be considered as it may contribute to the efficacy of the results.

It is also important to take into consideration the mountain bison ecotype in the Colorado Plateau (Cannon 2001; van Zyll de Jong 1986). This plains bison ecotype which has wood bison features, may have influenced some of the art representations. Future research could focus on rock art in the southern United States, but further east of the Rocky Mountains, outside of the potential mountain bison range. This additional analysis could provide another comparative example of plains bison for the northern art, and potentially an indication of the influence of mountain bison features in the Colorado Plateau region.

The qualitative examination of tail positions provided additional context about how bison were perceived by their artists, and potentially communities. The highest frequency of tail positions in the northern Canadian art was position 2, suggesting that bison were often drawn as active, interested and engaged participants in their environment. Jones (1981) states that some of the art may be representative of vision quests, and images may have been drawn by shaman and spiritual entities (Jones 1981:74). Both of these instances would involve active engagement of animals, where they communicate powerful medicine or knowledge to humans.

In colonial-era maps, Ontario is not included as part of bison's Late-Holocene range (COSEWIC 2013; Gates et al. 2010). However, people in this region must have had contact with bison either through human migration/mobility, bison migration/mobility, or resident bison populations. Multiple findings of bison art and skeletal remains are found in both northern and southern Ontario. While the majority of the findings are within 100 kilometers from known plains bison territory, in one instance (site 14, Ghost Point) the remains are over 300 kilometres from either plains or wood bison known Late-Holocene territory. These skeletal remains could

have been imported to these areas, as small foot bones were commonly used as children's toys (W. Olson, personal communication, October 8, 2021).

While there is still much to learn about bison's precolonial range, this research provided evidence and insights into bison living and interacting with people outside of their generally-accepted Late-Holocene habitat. These findings are important for informing future bison conservation locations. It also poses questions for further research, such as if bison could survive and thrive in the Churchill River region or in northwestern Ontario? It has been posited that bison hunting and their movements was a factor in Dene people migrating from subarctic Canada onto the plains, and eventually into southwestern United States (Ives 1990 & 2010). The findings from this research support the idea that people could have followed bison through multiple ecological zones. The art and skeletal remains discussed in this thesis suggest that bison and possibly the people that hunted them, had greater mobility, adaptability, and traversed more ecological zones than western scholars may have previously acknowledged.

## **Conclusion**

In this study, 22 sites with bison art images and skeletal remains were identified in areas outside of or peripheral to the generally-accepted areas in which plains and wood bison were historically known to reside. The strongest evidence for bison outside of their Late-Holocene range was in the Churchill River area, where rock paintings generally had strong and consistent wood bison features. In central Alberta, the transition zone between wood and plains bison, the PCA showed that overall, the art had stronger wood bison features. This could suggest that people in central Alberta were in contact with wood bison within the transition zone, or that people travelled north from the parkland region into wood bison boreal forest territory. Overall,

the findings from this research support the idea that people followed bison through multiple ecological zones.

There were also multiple findings of skeletal remains in Ontario, an area that is not included in colonial-era maps of bison's Late-Holocene range. These findings suggest that people in this region had contact with bison, and that Ontario may have been part of bison's historical territory, which is not currently acknowledged. In comparison to the Colorado Plateau art, the bison art in northern Canada grouped more strongly with wood bison, suggesting that the methods described here can reliably differentiate between artistic depictions of plains and wood bison, at least on a group-analysis level.

For future research, expanding the search for art and skeletal remains into surrounding areas such as British Columbia or Québec, or increasing the sample size for existing areas could help provide additional evidence about the Late-Holocene range of bison. Radiocarbon dating of the bison skeletal remains would provide further evidence about the age and subspecies of bison remains discovered in areas outside their known historic range. There is still much to learn about the ancestral range of bison.

## Thesis Conclusions

My thesis explored traditional relationships that Beaver people had with animals (with a focus on bison), including their communal hunting methods and locations. Through Beaver stories, oral histories, ethnographic and historical records, it is evident that Beaver people had social relationships with animals based on cooperation, reciprocity, and respect, and that animals were considered a broader part of society. This differs significantly from Western human-animal relations, which tend to view animals, particularly livestock and food animals, as passive and non-sentient resources. I argued that when learning about traditional hunting practices or engaging in reconciliation efforts, it is critical for Western audiences to shift their gaze and attempt to understand the complex and nuanced roles of animals in traditional contexts rather than assuming Western human-animal relationships.

While communal hunting was an integral part of society for Beaver people, little has been written about Beaver communal hunting practices compared to other areas. Beaver communal hunting methods relied on their extensive knowledge of the environment. As highly mobile people, there was an emphasis on tools that could be devised from local materials. While the use of bows and arrows and spears were often used, the snare was a common and effective animal trap that could capture and kill both large and small animals (i.e., moose and rabbits). These tools required extensive knowledge of the environment, landscape and animal behaviour. Beaver communal hunting practices also involved social roles and expectations, particularly for bison hunting. For example, for Beaver people of Paddle River, bison hunting was strictly done on a communal basis.

There are historical and ethnographic records, as well as oral histories, of Beaver people using surrounds, pounds, drives and jumps. My thesis examined five potential Beaver communal

hunting sites in northeastern British Columbia, northwestern Alberta and Northwest Territories (two possible jump sites, two possible drive sites, and a bison bonebed). All sites had some key features associated with expectations for communal hunting sites, but further on-the-ground investigation is necessary. The designations of these sites are important because they validate the traditions of Beaver communal hunting that are not recognized by all scholars or the general public.

The final chapter of my thesis worked to better understand the presence of wood and/or plains bison in areas of central Alberta, northern Saskatchewan, Manitoba, and Ontario. I conducted literature searches and consulted with faculty, curators and archaeologists to locate bison skeletal remains and art images outside of bison's known Late-Holocene range, and in the 'transition zone' where plains and wood bison may have coexisted. Five sites with skeletal remains provide additional material evidence of bison possibly living outside of their known Late-Holocene range, however the dates and species/subspecies designations of some of these remains are in question. To determine the bison subspecies depicted in northern art, I used morphometric measurements from photographs of modern bison along with the same measurements from bison art images (Olson 2013; Olson n.d. b). Characteristics of much of the bison art from northern Canada matched those of modern wood bison, while art from the Colorado Plateau (i.e., plains bison territory) compared well with plains bison or bison with both plains and wood bison characteristics. The strongest art-based evidence of wood bison in Canada was found along the Churchill River of northwestern Saskatchewan. Wood bison were also depicted in art from central Alberta, which is south of the known wood bison (northern boreal forest) habitat. This suggests that either the territory of wood bison may have extended further

south than currently indicated, and/or that people who hunted bison followed them across crossed multiple ecological zones.

Ultimately, there is still much to do and learn to help support Beaver (and bison) reconciliation and revitalization. Indigenous-led efforts (e.g., Tsattine Resurgence Society, Buffalo Treaty, Ininii Initiative) are making significant strides in these directions. My hope is that this thesis can add to these efforts.

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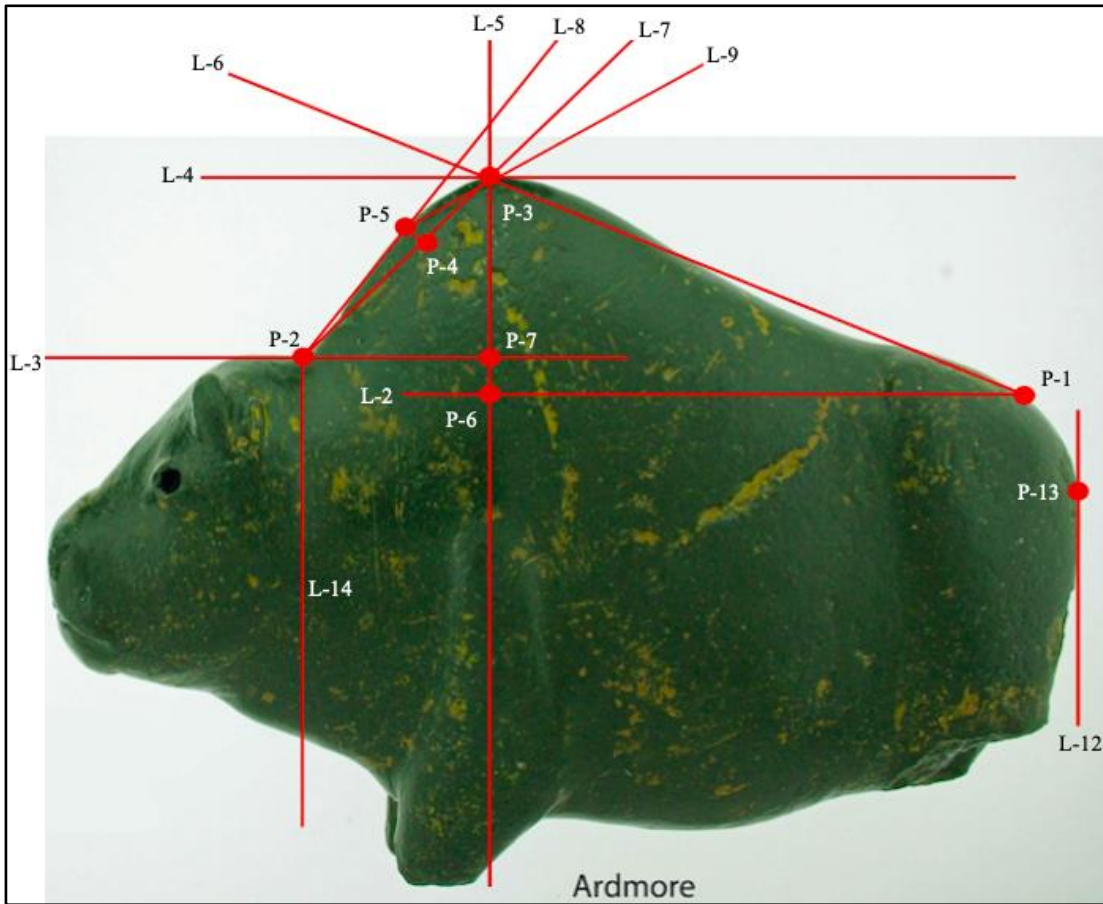
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## Appendix A

Methodology developed by Wes Olson (Olson n.d. b) for placement of points and lines on photographs of modern bison.



**Figure 54.** Completed lines and points for morphometric measurements on bison art

**Table 15.** Instructions for line and point placement

Steps	Instructions
1	<p>Place dots (using a sharp marker or using image software such as InkScape or ImageJ) on the following locations:</p> <ul style="list-style-type: none"> <li>• P-1: junction of the back and sacrum. It is identified by a slight notch just ahead of the tail head, roughly equal to the vertical centre of the hip.</li> <li>• P-2: junction of the head and anterior line of the hump.</li> <li>• P-3: highest point of the hump.</li> <li>• P-13: posterior edge of the hip</li> </ul>
2	<p>Based on these locations, add the following lines and points:</p> <ul style="list-style-type: none"> <li>• L-5: line passes through P-3.</li> <li>• L-2: drawn from P-1 to L-5. <ul style="list-style-type: none"> <li>○ P6 is created from the junction of L-2 to L-5.</li> </ul> </li> <li>• L-3: drawn from P-2 and L-5. <ul style="list-style-type: none"> <li>○ P7 is created from the junction of L-3 to L-5.</li> </ul> </li> <li>• L-4: drawn through P-3. Must be perpendicular to L-5.</li> <li>• L-6: drawn from P-1 to P-3.</li> <li>• L-7: drawn from P-2 to P-3.</li> </ul>



	<ul style="list-style-type: none"> <li>• L-12: drawn vertically through P-13.</li> <li>• L-14: drawn vertically from P-2.</li> </ul>
3	<p>Add in P-5: This is the divergent point, located at the furthest point from L-7.</p> <ul style="list-style-type: none"> <li>• P-4: junction of a line drawn from P-5, perpendicular to P-7.</li> <li>• L-8: begins at P-2 and passes through P-5.</li> <li>• L-9: begins at P-5 and passes from P-3.</li> </ul>