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BUFFALO IN THE MOUNTAINS: MAPPING EVIDENCE OF HISTORICAL BISON
PRESENCE AND BISON HUNTING IN GLACIER NATIONAL PARK

By

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Thesis presented in partial fulfillment of the requirements for the degree of

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Buffalo in the Mountains: Mapping Evidence of Historical Bison Presence and Bison Hunting in Glacier National Park

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This study explores 10,000+ years of bison presence and bison hunting within Glacier National Park. Despite significant faunal evidence of bison presence in the area, few people today associate bison with Glacier National Park. Previous archaeological studies have found bison faunal remains and evidence of bison hunting throughout the eastern half of the park going back thousands of years. Furthermore, local tribes such as the Kootenai and Blackfeet maintain oral traditions that detail ancestral hunting strategies and practice in the region. This project reviews all of these sources to contextualize the archaeological signatures of bison and tell the story of bison in Glacier, as well as some of the stories of the people who hunted them. The intent of this project is to provide an aid for heritage management and interpretation as Glacier National Park continues to explore options for reintroducing bison into the Park. The information presented here has been translated into a visual map-based medium to aid dissemination of information to a variety of audiences, contribute to broader management goals related to returning bison to Glacier, and provide a springboard for further research related to bison in the Northern Rocky Mountains.

Contents

Chapter 1: Buffalo in the Mountains	1
Introduction.....	1
Project Goals.....	5
Methods.....	7
Oral Tradition.....	7
Geodatabase	8
Site Visits and Analysis	10
Underlying Theoretical Perspectives	11
Community-Based Archeology	11
Public Archaeology.....	13
Indigenous Archaeology	15
Why Theory?	18
Chapter 2: The People.....	20
An Introduction to the People of Glacier National Park.....	20
A Note on Archaeological Terminology.....	22
The First People: 12,000-7,500 B.P.....	23
A Changing World: 7,500-3,500 B.P.....	27
Emergent Complexity in the Late Archaic: 3500-1600 B.P.....	31
Cultural Specialization: 1600- 200 B.P.	32

From Past to Present	34
Chapter 3: The Bison	36
The First Bison.....	36
Bison and Humans	38
Megafaunal Extinction.....	40
The First Bison in Glacier.....	42
Extinction and Evolution during the Altithermal.....	43
The Seasonal Round	45
Summer	46
Autumn	49
Winter	50
Spring.....	52
Full Circle	54
Chapter 4: The Hunt.....	56
Hunting Bison.....	56
Before (and After) the Hunt.....	56
Songs.....	57
Dances.....	59
Iniskim	61
Paints.....	62

Important People.....	63
The Paleoindian Hunting Pattern	65
Hunting Strategies.....	69
Use of the landscape	69
The Surround.	71
The Corral	71
The Bison Jumps.....	73
A Cooperative Endeavor.....	75
Bison Jumps in Glacier?	77
Hunting In Glacier	78
Chapter 5: Bison in the Mountains	80
Belly River	81
24GL274	82
24GL276	85
24GL283	86
24GL289	87
Many Glacier	88
24GL766	89
24GL764	91
24GL759	92

24GL787	94
24GL201	95
Lower Saint Mary	97
24GL247	98
24GL203	100
Red Eagle	102
24GL742	103
Wild Goose Island Overlook Area.....	104
Baring Creek and Goat Mountain Region	105
Baring Creek Area Faunal Finds.....	106
Goat Mountain Ice Patch Bison	107
Cut Bank	110
24GL725	111
Two Medicine	111
24GL823	112
Recap and Analysis.....	112
Chapter 6: From Past to Present.....	117
Publication bibliography	120

Chapter 1: Buffalo in the Mountains



Figure 1: Bison graze on a spring day with Chief Mountain and Glacier National Park in the background.

Introduction

This is a study of bison presence and bison-hunting in Glacier National Park over the last 10,000+ years. Most people who visit Glacier National Park are surprised to learn that bison once lived within Glacier's present-day boundaries despite clear archaeological, historical, and ethnographic evidence. This lack of attention is likely due in part to the fact that most studies of bison in any discipline are focused primarily on the plains where bison once massed in great

numbers during warmer months. While the plains are the primary habitat for the grass grazing bison, it should not be forgotten that bison can also thrive in the mountains. Bison were once common in the mountains of Glacier National Park and could readily be so again with the cooperation of landowners, tribes, and government agencies along the Rocky Mountain front (DeSanto 1971). Plains-based bison would seasonally seek shelter from harsh winter winds by moving closer to the timbered and more broken terrain near the mountains (Brink 2008). Furthermore, some bison may well have stayed in the mountains year-round, preferring the woodlands and grasslands of mountains to the plains (DeSanto 1971; Reeves et al. 2003).

Regarding bison hunting, most archaeological studies of this activity have similarly focused on the plains and the bison jumps that occurred there (Bamforth 2011). While these bison drives are incredible, they appear to have only happened for a short span of human history, ignoring the far less dramatic but equally important methods of hunting bison that did not involve extended drive lanes and jumps (Bamforth 2011).

This project seeks to add to the story of the iconic North American bison by exploring one of the lesser-known chapters in the history of these creatures: bison in the mountains. And what better place to start than perhaps the grandest set mountains along the entire Rocky Mountain Front: Glacier National Park. Glacier National Park was a natural choice for this study for a number of reasons. First off, as a national park for over a century, Glacier has remained relatively unchanged since the times when bison roamed here. Resource managers have taken care that much of the native flora and fauna remains as it once was, facilitating a greater understanding of the landscape that bison would have made use of. While the park has seen its share of development (in particular along the Going-to-the-Sun-Road corridor) most of the million-acre park remains mostly wild, with only trails to disturb the landscape. This has meant

that archaeological and faunal materials are mostly intact, albeit often quite deeply buried beneath layers of soil and jungle-like vegetation. Secondly, as a federal entity with legal record-keeping obligations, Glacier has archival documents and reports relevant to this research. These archival documents include archaeological site forms, old ranger logs, superintendent reports, and observations from a variety of individuals over the 100+ year history of the park. Yet a third reason to study here: due to its prominence as a national park academic research has gravitated here making Glacier one of the most archaeologically studied mountain ranges in Montana. One could not begin a study such as this without leaning heavily on the work of those who have come before. Finally, and perhaps most importantly, as a resident of Columbia Falls and a regular seasonal archaeologist for Glacier, this place is my home and one of my most treasured places. I couldn't imagine a more enjoyable place to get to know better.

Why bison? When I first began doing archaeology, bison might have been the last thing on mind. I was interested in projectile points, stone features, lithic quarries, rock art and other such tangible connections to the past. What I did not yet understand is that despite its emphasis on material culture, archaeology is ultimately about people, not things. A projectile point is of course exciting in and of itself, but why a projectile point was made to look a certain way, what material it was made out of, or how it came to lie at a high alpine pass are far more exciting prospects than the simple act of spotting something unusual on the ground. And so it was that my search for physical remains eventually brought me to want to understand something of the people who made them. In 2016, I was hired on as a seasonal archaeologist for Glacier National Park. In the performance of my job duties as well as through reading oral traditions, academic articles, and listening to contemporary descendants of these cultures, I came to learn one very important

thing about the people who had lived here for thousands of years: bison were inextricably linked to their culture and livelihood.

Glacier is the traditional territory of many tribes, but the Blackfeet and Kootenai are the most predominantly associated with the area. Both of these groups of people have long traditions of hunting bison out on the plains and within the mountains. Ethnographic reports reveal that the Kootenai regularly crossed the mountains of Glacier in the winter with the express goal of hunting bison (Thompson 2015; Schaeffer n.d.). Furthermore, Blackfeet culture was and still is inseparable from a long legacy of bison hunting (Turney-High 1998; Reeves and Peacock 2001; Wissler et al. 2012). And yet today there are no bison in Glacier National Park due to their near-extinction from overhunting in the mid 1800's. It is almost as if the most important piece to a puzzle were missing. How can we study the people of Glacier National Park without also studying bison? And yet, unlike projectile points, bison are not considered archaeological. Bison bones, which have been found here in spades over the last hundred years, have mostly either been collected for fertilizer or as curiosities if not disregarded and left to disintegrate. Fortunately, some park staff and researchers took note, although the actual faunal remains were usually left in place and have since disintegrated or have disappeared by other means. Through this project, it became my goal to track down all reported locations of bison faunal remains in the park and create a singular reference document for them in order that we may begin to understand where bison once roamed in these mountains and how they might have been hunted.

I must also confess to a further inspiration for this project. I became aware of the work of the Iinnii Initiative, which to quote their website “was launched by leaders of the four tribes that make up the Blackfoot Confederacy (Blackfeet Nation, Kainai Nation, Piikani Nation, and Siksika Nation) to conserve traditional lands, protect Blackfeet culture, and create a home for the

buffalo to return to (Iinnii Buffalo Spirit Center).” This initiative seeks to restore bison to their traditional lands, which include the mountains of Glacier National Park. I am not associated with this project but was inspired by their message and their goal. To see bison once again roam within the park would be incredible and culturally important, and my thesis project represents my wish to imagine what once was and what could once again be.

Project Goals

Simply stated, the primary goal of this project is to tell the story of bison in Glacier as well as some of the story about the people who hunted them. I will tell this story by collecting and compiling several centuries worth of information about bison in Glacier into this one document by incorporating knowledge about bison originating from within Native American oral traditions along with standard archeological methods to answer several outstanding questions regarding bison and bison-hunting in this unique environment. Currently, information about how bison utilized the landscape of Glacier and how humans have hunted them here exists in a disparate set of documents which are only accessible to specialists and park staff or exist as intangible stories. These data sets include archaeological reports, ranger’s logs, trail crew findings, early travelogues, and ethnographies. Native American oral traditions and histories along with ethnographic information also tell the story of bison in the region around and within Glacier. My goal here is to review all of these documents and stories, compile them in an accessible way, and then present this information in both a readable and visual fashion. My hope is that non-specialist readers find this document and the associated materials informational and inspirational, and that future efforts to restore bison to their traditional landscape might benefit in some way from this research.

A secondary research goal for this project is to better understand the cooperative nature of bison hunting. Bison hunting requires many people to be successful: drivelines and corrals as well as simple surrounds and terrain traps all require coordination among a group of hunters (Brink 2008; Bamforth 2011). I am interested in how bison-hunting societies maintained the levels of cooperation necessary to construct monumental architecture such as drive lanes, share in the rewards or cooperative endeavors after a successful hunt, and deal with non-cooperators in the absence of government, police, and codified law which detail enforceable systems for punishment and reward. The bison drive is the premier example of a cooperative endeavor in the northern plains and is comparable to cooperative human activity anywhere in the Americas, and even globally (Brink 2008). Successful bison drives would have required significant cooperation and coordination amongst many people beyond biological kin to not only construct drive-lanes and corrals, but also to drive the bison and harvest and share the meat (Bamforth 2011; Brink 2008). I am interested in the origins of this cooperation, its relationship with the needs of bison-hunting, and how this cooperation was successfully maintained. This is a theoretically driven research question which recognizes that societies engaging in collective action must develop mechanisms for distribution, reward and punishment all without coercion, known as collective action problems (Carballo 2013a, 2013b; Stanish 2013, 2017). The systems which must be developed to deal with collective action problems are immensely cultural, and deal with culturally specific ethics and morals. It is worth noting that oral traditions and oral histories are particularly well-suited for answering these types of cultural questions.

Methods

Oral Tradition

This project will make use of oral tradition when possible, to capture cultural information about bison hunting that simply cannot be gleaned from archaeological records. Oral tradition can mean a wide variety of things, and thus I would like to take a moment to define what is meant by the term for the purposes of this project. Initially oral traditions were often labeled and recorded as ‘myths’ or ‘folklore,’ terms which infer that they are not to be considered as fully-valid accounts of the past. The term ‘oral tradition’ is well defined by Merriam Webster as “the stories, beliefs, etc., that a group of people share by telling stories and talking to each other (Merriam-Webster.com Dictionary).” Oral traditions are easily confused with the term ‘oral history,’ a term more usually applied to an individual’s recounting of events within their own lifetime. This is likely because many oral traditions are often found in their textual form within ethnographic literature alongside oral history, and both oral tradition and oral history deal with oral renditions of past events (Vansina 1985; Mason 2006; Bruchec 2005). However, whereas oral histories represent information deriving from one person’s observed experience or recollection to a single recorder, oral traditions are culturally shared narratives that might be told by many storytellers over a long period of time and to many generational audiences (Mason 2006; Vansina 1985; Bruchec 2005). In short, oral traditions do not originate in the experiences of any single individual but represent a collective story about past events. These narratives often contain more abstract information, and deal with subjects of an ethical or moral value.

Oral traditions are often found within ethnographic literature in their textual form. This leads to the realization that there are some important distinctions between a purely oral tradition and the recorded, or ‘documentary’ rendering of an oral tradition. A purely oral tradition is one

that is still told and retold by contemporary groups and thus likely has adapted to the contemporary situation in some degree (Vansina 1985; Mason 2006; Bruchec 2005).

Documentary oral tradition (a rather oxymoronic term) on the other hand is confined to the temporal and spatial window in which it was collected. Both of these sources have anthropological value, but the questions one might hope to investigate using these sources must be tuned appropriately to the source (Mason 2006). A single oral tradition can in fact be both oral and documentary, or exist in multiple documentary forms (Bruchec 2005). These are particularly useful situations as the multiple mediums and sources can be compared.

This project will rely solely on documentary oral tradition for a number of reasons. Most significantly, collecting oral traditions is a major endeavor and must be done under the most careful of circumstances. Poor collection methods or misuse of collections can in fact do harm to the communities from which an oral tradition holds meaning. While I sincerely believe it is important to do, it was simply beyond the scope of this project to engage in this type of task. Another reason I am relying on documentary oral tradition is that particularly rich and carefully recorded relevant collections already exist. In the 1800s a number of academically trained individuals sought to collect these oral traditions among the Blackfeet and Kootenai, and recorders either fluent in the language or enlisted those who were. These records offer what I believe is a snapshot of some of these traditions during a time when wild bison still roamed the plains.

Geodatabase

As stated earlier, this project seeks to compile existing but disparate data about bison and bison hunting in Glacier and present this data in a way that future researchers, resource managers and

the general public will find useful. Currently, sources for information about bison faunal remains and associated archaeological data exist in separate formats and never with any specific attention to bison. Furthermore, as will be argued throughout this project: bison hunting is highly associated with the landscape and merely noting the presence of bison faunal remains and associated cultural material bone diminishes the importance of the local landscape and environmental features.

For the above reasons, I have chosen to create a geodatabase on ESRI ArcGIS software, which I believe is the most effective way to compile the data for this project. For those unfamiliar, a geodatabase is simply a database much like one creates using Microsoft Excel or related software, but all entries are correlated with geographic data. In this case, all entries are associated with 'point' data corresponding to the physical locations where artifacts and faunal remains have been found.¹ This approach has the effect of highlighting the role of the landscape and allows for future researchers and land managers to make predictions for similar sites in areas that are yet to be surveyed (which is a vast majority of the park).² A geodatabase has the added benefit of facilitating visual presentations of this information. Visual approaches to presenting oftentimes dense archaeological information is important in engaging non-specialists and the general public, as the data can be presented on maps and in popular formats such as Google Earth.

1 In this case, a 'point' feature is chosen over a 'line' or 'polygon,' and represents the simplest form of geospatial representation on a map.

2 Glaciers cultural resource team has kept track of previous survey inventory acreages utilizing ArcGIS. The total acreage surveyed by professional archaeologists amounts to less than 2% of the park's total acreage. Furthermore, no survey can be said to have captured all possible archaeological data in the best of circumstances let alone a heavily wooded mountainous region with little access.

The bulk of this project will be to compile a geodatabase specific to bison and bison hunting in glacier. I will create this database on ArcGIS using existing site UTM's and Smithsonian #s as recorded in Glacier National Park archival data and from other inventory reports. These 'sites' (some of which are not archaeological) will be recorded as point features. Creating this geodatabase will involve reading through hundreds of site forms and several archival reports and translating the information into a geodatabase. A public version of geodatabase is attached to this project as a download in a widely usable KML format which can be viewed in systems such as Google Earth. The actual geodatabase will be stored with the Cultural Resource program at Glacier National Park.

Site Visits and Analysis

In addition to the creation of a geodatabase from paper records I visited as many of the included sites as I was able during the summer of 2020. This endeavor was incredibly rewarding; from climbing up to snowfields at 8,000 feet to packrafting remote river systems, I was able to get a feel for the landscape, flora and fauna which these sites exist within. When visiting a site I recorded landscape features such as slope, vegetation, and natural terrain traps drawing from my research into the subject of bison-hunting. Many sites had no obvious terrain features that might be advantageous for bison hunting, but quite a few did. Typically, sites were located at the bases of large meadows, forest clearings, or alluvial fans. I present the findings from this in-person survey for a selection of sites followed by a general analysis in the final chapter of this thesis.

Underlying Theoretical Perspectives

I began this project with a belief that archeology (and the past in general) must be made relevant to contemporary, non-specialist communities. I believe this is all the more necessary when the pasts' which archaeologists study belong to contemporary communities. I further contend that the way to make archeology relevant is to (A) focus on issues that are relevant to people today, and (B) listen to members of the community whose past is being studied and emphasize knowledge derivative from these communities. As I intend to demonstrate, this belief is merely part of a broader paradigm within anthropology which is currently championed by a number of anthropologists and archeologists working in different arenas (Atalay 2012; Bruchac et al. 2010; Derry and Malloy 2003; Dongoske et al. 2000; Ferguson 2000; Harris 2005; Jameson Jr. 2008; Kovach 2009; Little 2002; Smith and Wobst 2005; Watkins 2013). Because this body of thought is in-development rather than something we can retrospectively analyze, it falls under many different titles such as post-colonial archaeology, decolonizing archeology, public archeology, community archeology, and indigenous archeology. I believe that there is something singular at the core of all these perspectives, and all of them have in their own way informed this project. I will address three of these bodies of thought below in the hopes that this singular purpose might shine through.

Community-Based Archeology

While the term “community-based archaeology” was not coined by Sonya Atalay, her work has come to embody and define this body of thought. Atalay defined community-based archaeology as archaeology done with, by and for any relevant community whose history and culture is in any

way impacted by the archaeological work (Atalay 2012). In her book “Community Based Archaeology”, Atalay conceptualizes community-based archaeology on a grand-scale and primarily in terms accessible to well-funded academic research projects (Atalay 2012). She demonstrates that through community-involvement both the archaeological product and relevant community are benefited. In particular, I appreciate her exploration of the difficulty in obtaining community-support. While conceived as a group of similarly-minded people, communities are not homogenous entities and there may be a huge diversity of opinion within a given community. Discovering who 'speaks' for a community, if anyone does at all, can be a real challenge. There is potentially real, divisive harm that could be done if the process of reaching out to a given community is done without proper consideration. I can easily imagine a scenario in which a community is divided on the value of archeological work and a researcher only listens to the contingent favorable to their own goals. In such cases, a researcher would need to take extreme precautions that their actions not further these rifts. This caution should extend to all aspects of the work, premised upon the understanding that in this case, the ends do not justify the means. Living human beings and the needs of extant communities today should always take precedence over the desires of an archeologist to know what happened in the past. This is not to say archeologists should avoid difficult truths in order to please local communities, but that when the methods of archeological production are damaging to a contemporary community simply for the sake of doing archeology, those methods must be amended.

Atalay’s work is a leading contribution in an emerging paradigm of archeological practice which strives to make archeology relevant and inclusive to non-specialist community members. I think it is important that the ‘community’ remains unspecified, as worldwide there is a huge diversity of communities who might be included in archeological practice. In the United

States we of course need to consider Indigenous communities, but also African-American communities, Hispanic communities, and really any community impacted by research regardless of composition.

While this project was too small in scale to engage in a community archaeology as envisioned by Atalay, I did intentionally choose a topic that I felt was relevant to local indigenous community members. It is my hope that indigenous scholars and students outside of anthropology or even academia might find this research useful in some regard. I also had the opportunity to speak with Blackfeet Tribal Historic Preservation Officer John Murray and some of his staff about this project to ensure that my research was appropriate and sought input and advice from several Blackfeet tribal members whom I know personally about the project. I sent my research proposal to Historic Preservation Officers of both the Blackfeet and Kootenai Tribes as well as submitted the project for formal consultation through Glacier National Parks normal consultation process.

Public Archaeology

It would be easy to assume that public archeology is synonymous with or either highly related to community-based archeology, but the differences between the two concepts are significant enough to warrant unique vocabulary. The most relevant distinction in my interpretation of these terms is that the ‘public’ in public archeology can encompass anyone who may be interested in an archeological project whereas community archeology implies a much more specific, narrower definition of ‘public’ that refers mainly to those who live near or are culturally tied to the archeological project in question (Jameson Jr. 2008; Little 2002). I envision that the “public” in this case includes anyone with an interest in Glacier National Park and its history, including

locals, tourists, park staff and land-managers. While not personally tied to the history being studied, it is important to engage the general public in archaeological projects for several reasons. First, most archaeological fieldwork and research requires funding which is in turn often based upon a perceived interest from the general public. Even when funding is not an issue, it is paramount that the general public sees archaeology as a public benefit. Such benefits of archaeological work might include a greater connection to a shared history, the protection of local cultural heritage sites, as a source of income and experience in the case of excavation, and even as voice for disenfranchised groups (Little 2002). Most archaeologists today are employed in the cultural resource management industry, which relies upon federal laws such as the National Historic Preservation Act (King 2013). These laws are predicated on the belief that cultural resources are worth protecting, which in turn requires the general public to believe this. If archaeological work is hidden from the general public and they in turn cease to find archaeology worth protecting, we as a discipline risk losing it all.

One component of a 'public' archaeology is making it accessible to non-specialists, which this project seeks to do in two ways: through a narrative writing style and an accompanied visual display of my results. I intentionally chose a more narrative and less technical form of writing for this thesis in the hopes that readers might find it more engaging. I envision this document as a story and I refer to it as such throughout. When complex terminology or concepts are encountered, I make attempts to explain them in layman's terms. The second way in which I attempted to make this project more accessible to non-specialists was through the creation of a geodatabase which facilitates a visual presentation of information. Geodatabases by themselves are no more engaging than an Excel spreadsheet, but they are the building blocks of modern maps and are intended to be displayed as such. While traditionally associated with ESRI ArcGIS,

a geodatabase can also be presented on popular formats such as Google Earth. The result of this geodatabase is a map with every known location where bison faunal remains have been found. It is my intent to utilize these visual mediums in any presentations that I give on this subject whether in academic settings or in public ones, and I furthermore made Glacier National Park a copy of this geodatabase in order that this visual medium could be used in their public science outreach programs. Researchers who wish to make use of this geodatabase should contact the parks cultural resource specialist for permission, as the data contained within is sensitive in nature. The points contained in this geodatabase are not exact locations and could not by themselves be used to relocate sites³.

Indigenous Archaeology

This project was greatly inspired by new theoretical approaches which seek to privilege indigenous knowledge and make archeology relevant and accountable to the indigenous communities whose heritage is often the subject of study (Bruchac et al. 2010; Harris 2005; Kovach 2009; Smith and Wobst 2005; Watkins 2013). This body of theory is coming to be referred to as ‘indigenous archaeology’ and is merely part of a growing movement to perform all scientific fields in ways that are relevant to and performed by indigenous people. There is no singular definition of ‘indigenous archeology’ as it is a somewhat new term and there are many

³ By ‘exact’ I mean the level of accuracy, typically sub-meter, required to relocate things precisely. In many cases this would not be possible anyways, as the original materials were either collected, moved, or destroyed. It was furthermore not necessary or time-conscious to achieve this level of accuracy. Points should be considered to be within 20 meters of accuracy.

different attitudes toward heritage study and heritage management even within indigenous communities.

One approach I found particularly useful in defining an ‘Indigenous Archeology’ is that of Brien et. al, in which they state: “We define Indigenous Archaeology as: (A) An applied method for investigating the past and present that is grounded in a preservation ethic and that ensures that information gathered goes back to the relevant descendant communities and engages, serves, and shares/archives information with those communities; (B) a practical way of explaining and supporting ongoing efforts to ensure continuity of culture, cultural identity, and human beings; (C) a field that requires oral histories and field ethnographies, as these are essential components of an Indigenous Archaeological approach, along with modern investigations of archived ethnographic material from past anthropologists; (D) a field that relies on videography, visual anthropology, and documentary film to preserve ethnographic interviews and oral histories and to perpetuate far-reaching public information/education/engagement; (E) a field that has the ability to privilege Indigenous place names and language when possible, with associated style guidelines that treat those place names as proper nouns, using upper case letters for each word in the place name and avoiding the use of hyphens between words; and (F) a mechanism to carry out cultural resource laws, but can also standalone via commitment to preservation, protection, and perpetuation of culture (Brien et al. n.p.).”

This approach addresses six distinct ways that archeologists can incorporate into their work that is responsible to and engages with the indigenous communities whose history they study. While this approach is clearly related to community-based approaches such as that championed by Atalay, I believe it is distinct enough to deserve consideration on its own. While Atalay conceptualizes community-archaeology on a grand-scale and primarily in terms

accessible to well-funded academic research projects, she ignores the realities of smaller-scale academic projects and government cultural resource programs. The approach put forth by Brien et. al. has a much broader applicability to those wishing to work ethically and fruitfully in a way that privileges the knowledge of local communities but who are perhaps only writing a compliance report or a graduate thesis.

My only real critique of the above definition is that this 'indigenous archaeology' is perhaps not representative of indigenous communities worldwide. For example, point D states that indigenous archaeology is, "...a field that relies on videography, visual anthropology, and documentary film to preserve ethnographic interviews and oral histories," which is ultimately a rather limiting and specific definition for a potential new paradigm. I would amend this statement to contain only its second half, "to perpetuate far-reaching public information/education/engagement" while leaving the choice of medium for public engagement flexible enough to incorporate any medium which a community prefers. Art, performance and music might all be amazing ways to connect to a given community. Similarly, point E is right on with its "ability to privilege Indigenous place names and language," but finishes the statement with a grammar suggestion which is clearly specific to western North American indigenous communities rather than global indigenous communities. Ultimately, the goal should be to learn from and present information to the contemporary communities whose pasts archaeologists' study in a way that is both responsible and meaningful to those communities.

This project drew inspiration from many of these themes although the product falls far short of the lofty ideals stated above. The principles of indigenous research inspired a review of relevant oral traditions, songs, dances, and other types of information which derive directly from indigenous communities. Unfortunately, because archaeologists are typically so focused on

material culture, less tangible elements such as these are commonly ignored. I will not claim that this project is an ‘indigenous archaeology,’ but I did make a serious attempt to engage with indigenous-derived source material and incorporate these elements throughout this thesis. Readers will find quoted oral traditions deriving primarily from Blackfeet and Kootenai sources throughout this document to highlight areas where ‘western science’ and ‘indigenous’ stories overlap. Furthermore, I believe that the geodatabase created as a part of this project has the potential to be more visually engaging than the typical data tables and thus has the potential to reach a wider audience or is at least a tool for doing so. Finally, I made an attempt to include indigenous place names where possible. The indigenous place names of Glacier National Park have a torturous history, having gone through many undocumented revisions over the years (Pipitone 2019; Reeves et al. 2003; Reeves and Peacock 2001; Holterman 2006; Thompson 2015). However, some of these place names reveal important information about past activities that cannot be gleaned elsewhere.

Why Theory?

It may seem unnecessary to list the above influences on this work, as they are not directly connected to bison in Glacier National Park. However, clearly stating the theoretical background for any research project adds background and explanation for readers who might otherwise miss crucial context. In an academic setting these theoretical concerns inform not only the research methods but also what types of questions we ask as researchers. Here, I am being upfront about my goals with this project as well as the intellectual and theoretical trends I intend to contribute to with this work. Moreover, the summary of such theoretical trends indicates that archaeologists

seeking to do research must consider the wide network of communities and publics with whom our research interacts and impacts.

Chapter 2: The People

An Introduction to the People of Glacier National Park

Today, the Native American groups most associated with what is now Glacier National Park are the Niitsitapi⁴, Séliš⁵, Atsina⁶ Kalispel⁷ and Ksanka (Reeves and Peacock 2001; Reeves et al. 2003; Zedeño 2017; Thompson 2015).⁸ During public presentations on the archaeology of Glacier National Park audience members will often want to know which tribes hold the greatest claim to the interior of the park. One issue with this question is that it presumes that people in the past shared our modern and colonially derived conceptions of time and land ownership. Native American tribes, and particularly those that relied on mobility such as many plains tribes, did not establish political boundaries the way we do today (Zedeño 2000). This is not to say that at given moments certain tribes would have controlled the resources of a given region. We know from 19th century accounts that buffalo jumps and other important places were jealously guarded (Zedeño et al. 2014; Zedeño 2017; Ewers 1958; McClintock 1910; Grinnell 1892; Schultz 1916). It is possible to say that at the time of European arrival the Blackfeet controlled most of the eastern plains directly abutting Glacier and were known to travel in the interior of Glacier up to about the continental divide (Reeves et al. 2003; Ewers 1958; McClintock 1910). Similarly, at this time the Kootenai lived primarily on the west side of the park, such as the North Fork and

4 Known commonly as the Blackfeet Confederacy, comprised of the Siksika (“Blackfoot”), the Kainai or Kainah (“Blood”), and the two sections of the Piikani, the Northern Piikani (Aapátohsipikáni) and the Southern Piikani (Amskapi Piikani or Pikuni).

5 Commonly known as Salish

6 Commonly known as Gros Ventre

7 Commonly known as the Pend d’Oreille

8 Ktunaxa is also appropriate, particularly in Canada. Commonly known as Kootenai, or Kootenei in Canada.

Tobacco Valley regions (Reeves et al. 2003; Turney-High 1998; Schaeffer n.d.). But the Kootenai still seasonally hunted bison out on the eastern plains, and they would have used their generations of familiarity with these mountains to cross and recross the high and rugged passes laden with their food, shelter, and spoils (Schaeffer n.d.; Flanagan 2001). The Blackfeet were similarly intimately familiar with these ancient travel corridors and used them to make raids upon east side tribes (McClintock 1910; Flanagan 2001).

It would be incorrect to assume that this political organization at a given moment in time reflects the human use of this landscape over the course of 12,000+ years. Far from being timeless societies in some sort of stasis, humans worldwide have always been characterized by their ability to adapt technologically and socially. As humans, we learn from our ancestors and continue their traditions, but we also continuously remake ourselves and adapt new lifeways and technologies (Boyd and Richerson 2005). I see no reason to believe that this would be any different for the people who called the mountains of Glacier home. This is a long way of saying that the following review of Glaciers cultural history should not be interpreted as an attempt to disenfranchise contemporary Native American groups whose traditional lands include Glacier National Park from their history. In no uncertain terms, it must be stated that these people are unquestionably the direct descendants of generations of people who lived in these mountains. However, archaeology is useful in understanding how people lived thousands of years ago as revealed through the material culture they left behind. Thus, I will here attempt to tell the story of humans in Glacier as known through archaeology rather than the history of specific culture groups. I am not seeking to create the definitive account of Glaciers cultural history; I simply wish to present a background narrative of the human history of the park as revealed through

archaeology. I believe this approach allows us to appreciate these people's ability to forge lives and rich societies within this rugged and unforgiving environment.

A Note on Archaeological Terminology

Over time, people change. The stories people tell, the tools they make, the clothes they wear, and the places they live all gradually change over the course of hundreds and thousands of years. Archaeologists often struggle with conceptualizing this change, preferring definable and easily distinguishable categories. As such, archaeologists have devised a huge variety of categorical systems such as groups, phases, and subphases to make distinctions between past cultures. Oftentimes, these phases are inextricably linked to a single aspect of culture: projectile points, ignoring the very real possibility that projectile points might be a functional rather than cultural manifestation (Buchanan et al. 2019). Creating distinctions in the material and cultural record is necessary and foundational toward the effort of learning about the past, but it also leaves some with the impression that the people of one subphase or one period, or the makers of one projectile point versus another were not somehow related despite occupying the same region, using similar strategies, and relying on the same resources (Buchanan et al. 2019). It would be a mistake to assume this. While we can easily distinguish cultural and material differences between the 1920's and the 1960's, we would never assume that the people of these periods were not related to each other.

While people of course change, they also remain the same. Some stories have been told over and over since the very first people, passed down generationally through word of mouth. And some hunting strategies have proven so successful as to have remained nearly unchanged over thousands and thousands of years. To be clear, when I speak here of one phase or subphase

replacing another, do not imagine a whole new group of people moving in and replacing the old, but rather the same people innovating and adapting while retaining the memories of their ancestors. It is with these thoughts in mind that I will introduce the following distinctive features and characteristics of the people who lived in Glacier as detected through archaeology.

The First People: 12,000-7,500 B.P.

The first Indians were on the other side of the ocean, and Old Man decided to lead them to a better place. So, he brought them over the ice to the far north. When they were crossing the ice, the Sarcee were in the middle and there was a boy riding on a dog travois. As they were going along, this boy saw a horn of some animal sticking up through the ice. Now the boy wanted this horn and began to cry. So, his mother took an ax and cut it off. As she did so, the ice gave way and only those on this side of the place where the horn was will ever get here.

-Piikani story told to Wissler and Duvall sometime before 1908 (Wissler and Duvall 1908)

The first humans to enter the region of present-day Glacier National Park would have found much of the mountainous interior locked up in ice as prior to around 10,000 years ago Glacier would still have been largely glaciated (Carrara 1989). It was not until around 10,000 to 9,000 years ago during the Altithermal, or Mid-Holocene Climatic Optimum that these glaciers would begin to melt significantly enough to facilitate flora, fauna and humans (Carrara 1989). We know from soil samples that vegetation was established in Glaciers high-country by around 10,000 years ago (Carrara 1989). It is challenging to know exactly what Glacier would have looked like at this time: while many of the major landforms were certainly in place, more recent glacial

periods have completely removed evidence of these first glaciers, and many minor landforms had yet to appear (Reeves et al. 2003).

The earliest confirmed evidence of human occupation in Glacier is a single Clovis point in the Belly River in an area known today as one of the earliest places to become snow-free in spring (Reeves et al. 2003)⁹. Clovis culture is usually cited as being roughly 13,200 to 12,900 years before present and is considered to be among the first if not the first cultures in North America and Montana (Davis 2019; MacDonald 2012). While much of the park would have been glaciated at this time, it is very possible that this location was not as it lies closer to the plains and far from the highcountry. Unfortunately, because the Belly River Clovis point was found on the surface in an area with significant rodent burrowing and subsequent subsurface testing yielded no results, there is very little we can say conclusively about this site or the people who made and used this point. The site itself is on a high, flat bench overlooking the Belly River region's extensive grasslands. If the past was anything like the present, the Belly River would make a fine location for the parks first human inhabitants. Today, Chief Mountain looms over the Belly River valley, known to the Blackfeet as *Ninaistako* and regarded by them as being of utmost importance and the source of much power (Reeves and Peacock 2001). The first humans in Glacier might just have felt the same way as they camped in its shadow hunting bison.

The earliest defined human occupation with multiple stratified sites in Waterton/Glacier is locally referred to as the Lake Linnet complex, named after a site in Waterton that dates to

⁹ Although another possible but currently unconfirmed Clovis-period projectile point was found by archaeologists Brent Rowley and Matt Nelson in 2015 near Lake Sherburne in Many Glacier. The geographic context for this point is very similar to the one found in the Belly River in that it is in a valley bottom location in the easternmost part of the park.

10,000 to 9500 years ago (Reeves et al. 2003). The climate at this time was relatively warm and dry compared to the preceding period (Reeves et al. 2003; Davis 2019). As a result, many of the large proglacial lakes which would have made travel challenging began to drain around 9,900 years ago (Carrara 1989; Reeves et al. 2003). These people made and used distinctive projectile points known as are Windust (stemmed) and Cascade (lanceolate) points (Reeves et al. 2003; Peck 2011). Both of these projectile point styles are likely to have been used for thrusting and thrown spears (Bubel et al. 2012; Peck 2011; Davis 2019). Windust and Cascade points share similarities with other Paleoindian points found across the Western United States and Canada, but they are both particularly associated with the Northwest (Reeves et al. 2003). This indicates that there was likely some shared cultural traits among these early inhabitants of Glacier and other peoples across the Northwest. These people began to utilize several stone quarries found only in Glaciers most remote high alpine region for their tools (Reeves et al. 2003). What these people discovered was the utility of a green stone we today refer to as Metamorphosed Green Argillite.

It is worth briefly pausing the human story to reflect on Glaciers geology. Anyone who has been to Glacier has seen Argillite whether they knew it or not. Typically red or green, these rocks are found nearly everywhere in the park. Argillite exposures often amaze spectators and long-time locals alike with their dune-like ripples and otherworldly hues. While today these rocks are found among Glaciers towering peaks, they were once at the bottom of a very ancient shallow sea known as the Belt Sea (Raup and Tomlin 2018). This seabed turned to stone or lithified under pressure from water and overlying lakebed over millennia, with variations in color resulting from slightly different chemical compositions and unequal exposure to oxygen (Raup and Tomlin 2018). At roughly 1,500 million years old, these rocks are so old that they predate

multicellular life on earth (Raup et al. 1983; Raup and Tomlin 2018; Thornberry-Ehrlich T. 2004). Contained within some exposures in Glacier are fossilized cyanobacteria known as stromatolites which represent one of the very first forms of life on earth (Raup et al. 1983; Raup and Tomlin 2018; Thornberry-Ehrlich T. 2004). Typically, geologic layers of this age remain deeply buried, accessible only to specialists using deep earth coring equipment. However, something unique happened in Glacier that exposed these ancient rocks for all to see. 60-75 million years ago, a mix of much younger sediments was forced underneath the much older rocks of the Belt supergroup and other pre-Cambrian layers of stone (Raup and Tomlin 2018; Thornberry-Ehrlich T. 2004). Chief Mountain in the northeast corner of Glacier is a geographically isolated remnant of the younger sediments which were thrust deep underneath Glacier, explaining its rather unique and contrasting appearance from surrounding mountains (Raup and Tomlin 2018; Thornberry-Ehrlich T. 2004). As a result of the Lewis Overthrust, these ancient pre-Cambrian layers including our red and green Argillites can be seen by all who visit, making Glacier an exciting place to visit for anyone with an interest in geology. These exposed rocks are very brittle, and when acted upon by the series of glaciers which formed here over millennia resulted in the stunning landscape we have today.

Of relevance to the story of humans in Glacier: in a very few and remote places some of the green argillite which once made up the Belt seabed encountered lava flows with enough heat to change its chemical composition slightly (Raup and Tomlin 2018). Most argillite is not suited for stone-tool manufacture, but when significantly heated and cooled it can become more finely grained and “knappable”. Sometime around 9,500 years ago, humans discovered a few outcrops of this green argillite in Glacier's high-country. These quarries are located in the few places where argillite came into contact with lava from the Purcell lava flow 1,075 million years ago

and was subsequently exposed via erosion (Reeves et al. 2003)¹⁰. Its metamorphic composition made it amenable for use in stone tools, albeit much less so than other known materials such as chert and obsidian. However, this argillite was nonetheless used likely because it was local (Reeves et al. 2003). Over the next several thousand years, these quarries would continue to be used in tool manufacture and debitage of metamorphic green argillite (or MGA) can be found distributed all over the park allowing us today a picture of where people at this time travelled. At this time people were travelling across the continental divide and seasonally residing at the foot of major valley-bottom lakes as well as likely hunting in the high alpine (Reeves et al. 2003).

In short, the people who lived in Glacier from around 9,500 years ago to around 7,500 years ago learned about and explored Glaciers interior as the environment stabilized and flora and fauna recolonized previously glaciated regions. These people ultimately established lifeways and seasonal rhythms based on the cyclical nature of their environment. These lifeways would prove successful for thousands of years to come and while many challenges lay ahead, people would always be able to adapt and overcome them.

A Changing World: 7,500-3,500 B.P.

Climate change is not just a modern concern, around 9,000 years ago North America entered a period known as Altithermal or mid-Holocene Climatic Optimum (Davis 2019; MacDonald 2012; Anderson et al. 2007). Rather than a simple raising or lowering of temperatures, climate scientists now believe that globally the Altithermal brought more

¹⁰ For a fascinating map of where this Purcell lava flow can be found in Glacier, see McGimsey 1984 This map has incredible research potential for locating undiscovered metamorphosed green argillite quarries.

temperature extremes in all directions with hotter summers and colder winters (Anderson et al. 2007). In a related way, some parts of the world became dryer, others wetter. In Montana, archaeologists and climate scientists believe that this period became generally warmer and dryer, even more so than today (Anderson et al. 2007; Davis 2019). Two major adaptations to these climactic changes in Montana were expansion of the habitats people lived and hunted in and an expansion in harvested food sources, including much smaller game animals than those hunted in earlier periods and a wider variety of root vegetables, nuts, and berries (Davis 2019; MacDonald 2012; Anderson et al. 2007).

As if global climate change was not enough, sometime around 7,700 years before present the volcanic Mt. Mazama in what is now Oregon erupted, creating the geological feature which is now Crater Lake (Harris 2006; United States Geological Survey 2013). This eruption has been identified by the United States Geological Survey as being one of the largest volcanic eruptions during the Holocene, and ash from this eruption can be found throughout the Northwest United States and into Canada including a majority of Montana. (United States Geological Survey 2013). The Mt. Mazama eruption is most useful to us today in that its ash deposits make for a very useful dating tool: things found above and below this ash layer are likely to be either older or younger than this event. The eruption of Mt. Mazama resulted in what is known as a caldera in which the entirety of Mt. Mazama collapsed into the magma chamber during the eruption leaving instead a giant crater which later filled with water (United States Geological Survey 2013).

Humans who bore witness to this event recorded these events in oral traditions which were passed down from generation to generation. In 1865, a young soldier named William Colvig who was stationed at Fort Klamath near Crater Lake asked a Klamath chief why the Klamath avoided the Crater Lake area. Chief Lalek told the soldier a story about a battle between

the Chief of the Below World and the Chief of the Above World (Budhwa 2002). The story told by Chief Lalek even captured the important detail of the disappearance of Mt. Mazama, which geologists today know collapsed into a subterranean magma chamber forming a caldera. Similarly, the oral tradition records how the caldera filled in with freshwater creating a great lake we now know as Crater Lake (Budhwa 2002). In short, the story Chief Lalek told in the 19th century bears remarkable similarity to the one geologists tell now.

No such story exists which can tell us of how this eruption effected people living in Montana, but there must have been some consequences for people here. Ash from his eruption has been found in buried strata throughout the state and Glacier National Park suggesting that this ash might have coated the mountains and plains. This ash could very well have forced humans and animals to readjust their lives or even leave the region entirely. In fact, Oetelaar and Beaudoin propose plains cultures were forced to flee the region along the Rocky Mountains for nearly 500 years, only visiting the area temporarily rather than seasonally residing (Oetelaar and Beaudoin 2016). During this period of absence, they argue that plains cultures were exposed to boiling pit technologies used by groups on the eastern plains and then modified this technique to boil bison bones and extract grease once they returned. This argument is supported by the emergence of boiling pits along the northern Rockies during the late archaic (Oetelaar and Beaudoin 2016; Davis 2019; Reeves et al. 2003).

Something else unique happened in the late archaic in the Northern Plains of relevance to our story. Up until around 5,500 years ago, bison hunting followed a predictable pattern. People located herds of bison and hunted them in the open or used terrain features such as arroyos to their advantage (Bamforth 2011; Frison 1998; Frison 2004). They processed these bison primarily for meat and marrow, left the carcasses where they lay once finished, and only rarely

reused a kill site (Bamforth 2011). However, in the northern plains of Montana and Alberta, a new technique for hunting bison was developed at or at least is first known archaeologically at a bluff now known as Head-Smashed-In Buffalo Jump in Alberta. People began to drive bison off of the cliff here, allowing for much higher yields of bison and at a relatively lower risk than other hunting strategies (Brink 2008). This ingenious use of terrain however was seemingly short lived, as the bison jump was abandoned around 4000 years ago as evidenced by a sterile layer discovered during excavations (Brink 2008; Reeves et al. 2003). Not until around 3200 years before present would Head-Smashed-In be used again (Brink 2008). One theory put forth for this gap in use was a change in occupancy of the lands around the bison jump with the arrival of a distinct “McKean phase” culture group (Reeves et al. 2003).

In sum, the beginning of the archaic is marked by major environmental changes such as the Altithermal and the eruption of Mt. Mazama. People during this period expanded into new areas and began to diversify their food resources. At the end of this period around 3500 years ago boiling pits are regularly found in sites across the northern plains. This indicates that people were experimenting with ways to optimize the caloric extraction from bison to a degree which would have facilitated surplus and in turn trade (Bamforth 2011; Reeves et al. 2003). Notably, a unique variant of bison hunting involving driving bison off bluffs or cliffs first appeared near Glacier National Park around 5,000 years ago. While this method was not employed nearly as widely as it eventually would, its arrival indicates that people were beginning to specialize in hunting bison in ways that required a deep understanding of the landscape.

Emergent Complexity in the Late Archaic: 3500-1600 B.P.

The most intensive period of occupancy during the Holocene in Waterton-Glacier was between 3500-1600 years ago and coincides with a period of intensification and specialization across the northern plains (Reeves et al. 2003; Zedeño 2017; Davis 2019). While population levels are a very complex thing to deduce archaeologically due to variances in exposure, all indications point to this period being one in which populations were high in the Northern Plains (MacDonald 2012; Davis 2019). In Glacier National Park this holds true, with the majority of currently known and diagnostically dateable sites dating to the period between 3500 and 1600 years before present (Reeves et al. 2003; Zedeño 2017). People during this time intensified many of the patterns seen during earlier times and utilized nearly every part of Glacier from the high alpine to the valley floor, hunted sheep, elk, deer and bison alongside root harvesting (Reeves et al. 2003).

This period is important in the story of bison-hunting, because it is here in the Northern Plains that for the first time bison drives and corrals came into consistent use.¹¹ We know this, because this period is the first in which cultural deposits are regularly associated with bison drive lanes, as evidenced by bison jumps such as Head Smashed In and the Boarding School Jump (Reeves et al. 2003; Bamforth 2011). While other regions across the plains would follow suit, the people who inhabited the Northern Plains at this time were the likely the first to engage in this activity. This is relevant for a number of reasons: First, as will be discussed in greater detail in Chapter 4, driving bison off of set landscape features via a network of pre-arranged drive lanes is an incredible complex operation that would have required significant cooperation among

¹¹ With the possible exception of a Paleoindian bison jump at one site in Texas (Bonfire Shelter), which has yet to yield conclusive evidence that nearby ‘jump’ was in fact a part of the kill rather than coincidental.

individuals and even among different groups of people. Thus, it is possible to conclude that at this time Northern Plains cultures had developed increasingly complex cultural systems to organize people toward collective goals. Second, the bison drives indicate that Northern Plains cultures began to specialize in hunting bison. In fact, as Zedeño et. al. point out, northern plains bison-hunting would eventually become integral among some northern plains cultures to the point that bison became a part of the social fabric of their societies through determining leadership roles and access to resources (Zedeño et al. 2014). Finally, bison driving would have provided a surplus not only of calories, but in trade goods (Bamforth 2011). The grease derived through boiling bison bones would have been very valuable for its high fat content, and the surplus made possible by bison jumps would have provided Northern Plains peoples with a readily-tradeable commodity. This trade network would in turn have brought tools and other resources to the people who lived in and near today's Glacier NP from distant places such as Wyoming, Utah, and Idaho (Reeves et al. 2003).

Cultural Specialization: 1600- 200 B.P.

The late pre-contact period, beginning around 1600 years ago through to the arrival of Euro-Americans in the 1800's, is marked by bow and arrow technology and increasing specialization of bison hunting activities on the plains adjacent to Glacier (Zedeño et al. 2014; Zedeño 2017; Reeves et al. 2003). Various groups occupied the Waterton/Glacier region during this time including the culturally distinct Besant (2000-1400 y.a.), Avonlea who likely developed out of Pelican Lake (1600-800 y.a.), Old Women's (ca. 800-200 y.a.), and Tobacco Plains (800-200 y.a.) (Reeves et al. 2003). To clarify, these are groupings based on projectile point typology and do not necessarily insinuate distinct cultural divisions. It has been suggested by both Zedeño and

Reeves that Old Women's phase projectile points were made by the direct ancestors to present day Blackfeet tribal members, and that similarly Tobacco Plains projectile points were made by Kootenai ancestors (Reeves et al. 2003; Zedeño 2017). These two lithic projectile types themselves evolved gradually out of earlier projectile point types reflecting subtle adaptations and changes over time rather than abrupt differences.

Climatic changes during the last 1000 years ending in the Little Ice Age around 200 years ago resulted in the largest glacial advance in Waterton/Glacier since the end of the Wisconsin 10,000 years ago creating the moraines seen today (Carrara 1989). It these glaciers which the first Euro-American visitors were so stunned by in the late 1800's, and it is these glaciers for which the park is so named (Raup and Tomlin 2018). Many of these glaciers have since melted, leaving just a few clinging to the sides of various high alpine cliffs. The period from 1000 years ago to 200 years ago would have been far more glaciated than at any time following the Altithermal. Occupation and resource harvesting activities in the Rocky Mountains and in Glacier began to steadily decline during this period, or at least archaeological remnants from this period are less common (Reeves et al. 2003). However, as Zedeño has pointed out, the Blackfeet were still regularly using the Rockies for religious and social activities such as vision questing, trading, and raiding (Zedeño 2017). West side Tobacco Plains Kootenei were crossing the divide as well to seasonally hunt bison (Bendremer 2015; Flanagan 2001). The glacial advance thus seems not to have prevented travel across the divide. In fact, it is possible that winter-conditions and snowpack facilitated travel rather than prohibited it, as highlighted in the following ethnographic note from Claude Schaeffer:

The Kutenai did not travel eastward for bison during the summer before horses were introduced: they only went in winter when snow was deep. There was also danger in fording the mountain streams, during spring run-off period. Travel

was easier on snowshoes in winter than travel in summer. - (Schaeffer n.d.; Reeves and Peacock 2001)¹²

People continued to seasonally hunt bison in the mountains now contained within Glacier National Park right up until the mid-1800s, when the last herds roamed within the park (DeSanto 1971). Rifles specifically designed for taking down bison made their way to the Northwest plains, as did a swarm of Euro-Americans with no concept of sustainability who saw in bison not sustenance but profit and sport. Shortly after the bison were eradicated from the interior, the people who had called this place home for thousands of years were disenfranchised from their land through a series of treaties alongside the genocidal treatment (in more ways than one) of Native peoples at this time.

From Past to Present

It is impossible to conclude the human history of Glacier National Park because the cultures and traditions of the indigenous people who have lived in these mountains since the beginning still live on in the cultures of their present-day descendants. Today, the park's eastern boundary is entirely shared with the Blackfoot Tribe, and other tribes such as the Kootenai and Salish have reservations nearby south of Flathead Lake. To attempt to characterize these tribes' complex cultural traditions in any meaningful fashion would require more space and time than I could possibly hope to devote to in a thesis about bison hunting. One wonderful review of the more recently historical and contemporary indigenous people of Glacier National Park was

¹² Claude Schaeffer was an ethnographer and archaeologist who took an interest in the Kootenai and Blackfeet. Most of his information about the Kootenai comes from Chief Paul David, although certainly other Kootenai members were involved. This story comes from a collection of his unpublished notes which were helpfully reproduced in the appendices of Reeves and Peacock 2001. I list both sources as reference.

organized by Sally Thompson in her edited work “People Before the Park,” which lends significant voice to tribal members themselves (Thompson 2015).

One predominant theme that emerges out of this historical review is that the people who have called these mountains home have co-existed with bison for the entirety their history. Bison and bison hunting are fundamental elements of the cultural systems many of the indigenous cultures of Montana. And while Glacier is both the traditional land of many indigenous people and the bison, today there are no bison in the park, and the mountains of Glacier are managed by the federal government. The park has taken some initial steps towards recognizing the injustices of the past as well as the fact that Glacier is the traditional territory of the Pikuni, Kootenai, Selis, and Qlispe among others. However, bison no longer roam within the park boundaries. Bison reintroduction efforts outside the park have been met with the realities of the modern world, and these bison are not free to roam as they once were. Bison remain a critical missing link between the past and the present, and their reintroduction has the power to heal old wounds as well as educate others about their importance not just to indigenous people but to the well-being of the park itself. Today, tribal leaders, tribal members, and those who now manage the park face a much different set of challenges in managing and maintaining this place where millions of people come to see a wild place. We must ensure that people both today and in the future can continue to find meaning here. It seems to me that restoring the bison to this landscape is one powerful means by which to do so.

Chapter 3: The Bison

The First Bison

The story of the North American bison begins long before the presence of humans, and as with any good story is surrounded in a fair bit of mystery. The first positively identifiable bison remains in North America dating to the Illinoian stage of the Pleistocene around 130,000 years ago (McDonald 1981; Froese et al. 2017). Much of what we know from this period is derived from two well dated bison fossils: a steppe bison (*B. priscus*) fossil found in the Yukon dated to 130,000 years ago at a site called Ch'ijee's Bluff, and a giant long-horned bison (*B. latifrons*) found at a site near Snowmass, Colorado dating to 120,000 years ago (Froese et al. 2017). Recent research into these fossils revealed some interesting details, such as the fact that despite rather unique phylogenetic traits, both share a relatively recent common ancestor among the first wave of bison to enter North America around 195,000 years ago (Froese et al. 2017). This is noteworthy, as steppe bison and giant-long horned bison would have been fairly distinct in appearance. While both were quite large, steppe bison would have been more similar to contemporary *B. bison* other than being generally larger (Froese et al. 2017). Neither the ancient *B. priscus* nor modern *B. bison* would have been mistakable for the giant long-horned *Bison*

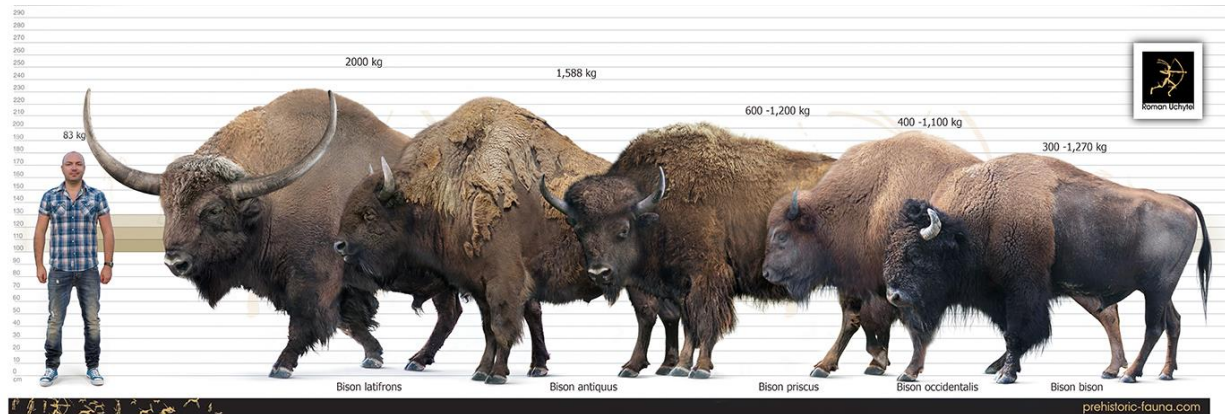


Figure 2: Artists rendition of various bison species extinct and modern. Source: prehistoric-fauna.com

latifrons in either horn size or body size. *B. latifrons* would have been up to 50% larger than today's bison, weighing nearly 3,000 pounds and standing over 6 and half feet tall (Froese et al. 2017; McDonald 1981). Even their massive size was eclipsed by unfathomably large horns which could have measured up to 85 inches from tip to tip¹³ (McDonald 1981). Because *B. priscus* is found in Europe as well as North America while *B. latifrons* is only found in North America and yet share a common ancestor in North America it is inferred that *B. latifrons* evolved from *B. priscus* in North America (Froese et al. 2017). *B. latifrons* then rapidly expanded across the continent suggesting great ecological success, becoming both the largest sized and largest horned bison to ever live. While *B. latifrons* have been found primarily in the great basin and great plains of North America, it is likely that they ranged further north into ice-free regions of Alberta prior to the beginning of the Wisconsin Glaciation around 75,000 years ago. The largest bison to ever live, climate change associated with the late Wisconsin is a likely cause of the demise of *B. latifrons* which are believed to have gone extinct by 20,000 years ago (McDonald 1981). These climatic changes favored the smaller (but still quite large) *Bison antiquus* which likely evolved from *B. latifrons* around this time.

Bison antiquus is thought to have evolved directly from *B. latifrons* sometime around 30,000 to 20,000 years ago (McDonald 1981). While smaller than *B. latifrons*, *B. antiquus* were still quite large, up to 25% larger than modern bison, although their horn size was more in line with modern bison (McDonald 1981). *Bison antiquus* remains have been found all across North America including Mexico and Canada (Frison 2004; McDonald 1981). While perhaps initially

¹³ Compare this to modern bison's average of 25 inches!

limited to the southern plains, the demise of *B. latifrons* led to a northward expansion of the *B. antiquus* range (McDonald 1981).

Bison and Humans

Humans in North America around 13,500 years ago encountered and hunted *B. antiquus* (Frison 2004; Bamforth 2011).¹⁴ The Hudson-Meng archaeological site in Nebraska uncovered *B. antiquus* bones in association with Alberta culture projectile points suggesting that humans had killed or at least butchered these bison roughly 10,000 years ago (Agenbroad 1978). While the actual hunting of bison is the subject of a later chapter, it is relevant to note that hunting pressure by humans has been proposed as a possible reason that *B. antiquus* populations evolved into two distinct taxa of *Bison antiquus* and *Bison antiquus occidentalis* around 10,000 years ago (McDonald 1981). Although sharing morphological characteristics with both *B. antiquus* and *B. bison*, *B. a. occidentalis* is perhaps better understood as a variant form of *B. antiquus* that co-existed with *B. antiquus*, albeit with a different range (McDonald 1981). Both variant forms of *B. antiquus* have been found in association with human Paleoindian projectile points, as well as the remains of mammoth, camels and horses across North America (Frison 1998; Frison 2004; Bamforth 2011). Important to the story of bison in Glacier, one such site lies just 30 miles north of the park at the Wally's Beach archaeological site at St. Mary reservoir.

¹⁴ The timing and method of human arrival in North America is obviously the subject of much debate of which I have no intention of entering here. There is an increasing body of evidence which suggests humans could have made it to North America during an earlier glacial period during which the Bering Land Bridge was open, perhaps as early as 30,000 years ago. However, bison kills do not appear until the end of the Wisconsin around 11,000 years ago, and the first bison species to have irrefutable evidence of human hunting is *Bison antiquus* (Frison 2004).

The Wally's beach site provides excellent insight into the life of a bison 11,000 years ago grazing in sight of the mountains which would one day comprise Glacier National Park. Today, Wally's Beach is a campground along the St. Mary reservoir, but 11,000 years ago this would have been an undammed river, which will be referred to here as the Paleo St. Mary River. This river just so happens to originate in the St. Mary drainage of Glacier National Park today, and nearly three million visitors a summer drive over it on the Going to the Sun Road. The retreat of the Laurentide Ice Sheet following the end of the Wisconsin glaciation would have left the area around the Paleo St. Mary River an undulating prairie rich in loess and in turn rich in vegetation (Kelley and Kooyman 2004). Geological analysis performed by Brian Kooyman et. al. showed that while much of the Paleo St. Mary river was deeply incised into the plains, Wally's beach was located on a gentle earthen ramp down to the river (Kooyman et al. 2006). It is thus not a surprise that this would have been a prime place for flora, fauna and in turn humans. After 11,000 years of soil deposition at this site the landscape remained relatively stable until the 1950s when the site was inundated by the damming of the St. Mary river to create a new reservoir. In the next few decades locals began to notice that during annual draw-downs of the reservoir artifacts would be exposed in the mud. In 1996, a particularly exciting find revealed the remains of butchered Pleistocene horse and camel, Clovis points, a *Bison antiquus* skull fragment, and preserved mammoth tracks (Kooyman et al. 2006). While the site does not tell us a whole lot about bison hunting, it does confirm that 11,000 years ago human hunters, bison, mammoth, camel, and horse all coexisted on the Rocky Mountain front 30 miles north of Glacier National Park.

Megafaunal Extinction

The Wally's Beach site begs another question: what happened to all these mammoths, camels and horses? The period between 11,000 and 9,000 years ago saw the extinction of nearly all Pleistocene megafauna in an event commonly referred to as the North American megafaunal extinction. Did human hunters overhunt these creatures destabilizing their population? Or did climatic changes associated with the Younger Dryas occur so rapidly that these cold-adapted mammals lost access to important food sources and water?

One explanation is climate: from about 15,000-11,000 years ago North America (and most places worldwide) endured a rather striking climatic shift known as the Younger Dryas. The Younger Dryas is difficult to characterize, as it was not one single trend from cold to warm or from wet to cold. Some of these temperature shifts (as measured in Greenland) would have seen nearly 15 degree global temperature changes in less than 1000 years (Meltzer 2010; Cowie 2009). One local study posits that within Glacier National Park this period did result in a glacial advance, suggesting that at least locally this period was relatively cool (MacLeod et al. 2006). Colder periods would have facilitated migration of Eurasian species and humans into North America, while warmer periods would have facilitated expansion of humans within North America. Climatic variability is never beneficial to species which cannot quickly adapt, and it seems likely that most megafauna would be among these.

The other oft cited explanation is that human hunting was responsible for the megafaunal extinction. However, the idea that humans could be solely responsible for killing off all the sloth, mammoth, horse, camel along with other megafaunal species across the entirety of North America during one relatively short period seems perhaps a bit anthropocentric. In reality, periods of overlap between megafauna and humans in North America would have been

regionally distinct and relatively brief (Emery-Wetherell et al. 2017). The longest period of overlap near the Great Lakes is now assumed to be around 3,000 to at most 4,000 years, with this overlap period significantly shorter in other parts of North America such as Montana where the first appearance of humans and the last appearance of megafauna are within a 1000 year window (Emery-Wetherell et al. 2017). While on the surface these tight windows might seem to infer that humans are indeed responsible for megafaunal extinction, studies of human-caused extinction worldwide have concluded that much longer spans of time are usually required for extinction to happen (Prowse et al. 2014). However, it would be obstinate to deny that human hunting added some degree stress to a species already dealing with environmental challenges. Rather than attributing such a major and complex event to a single cause, it is far more likely that a suite of factors resulted in the demise of nearly all Pleistocene megafauna during this period.

In any case, what is important for the purposes of understanding bison in Glacier is that while some combination of factors killed off nearly all megafaunal species, the bison survived. *Bison antiquus* populations certainly experienced a crash in population around 11,000 years ago (McDonald 1981, p. 248). Faunal bison remains from this period show an unbalanced polymorphism diagnostic of small gene pools and population stress (McDonald 1981, p. 248). However, although diminished, *B. antiquus* managed to survive for several thousand more years, and bison as a species would successfully weather this storm, and many other to come. Compared to today's bison, *Bison antiquus* were still relatively K-selected, meaning there would have been less of them, they would have lived longer, but reproduced less frequently (McDonald 1981).

The First Bison in Glacier

Bison antiquus was possibly the first bison species to enter Glacier National Park, as it is unlikely that anywhere in the park would have been suitable for bison prior to around 11,000 years ago. Paleoclimate and vegetation studies have revealed that by 11,000 to 10,000 years ago plants and therefore animals had recolonized valley bottoms within the park (Carrara 1989). As the ice melted, vegetation colonized valley bottoms and eventually the high alpine. Faunal evidence from this period is scant, but it is likely that herds of *Bison antiquus* along with many other mammalian species would have freely entered and exited Glaciers present boundaries and grazing in the newly vegetated areas. Presumably, most bison would have preferred grazing in the lower-elevation valleys on the east side of the park. These east side drainages connect to the plains and support extensive grasslands which then as now extend right up to the alpine. Research results (chapter 4) for this project support this conclusion generally, as nearly all bison remains found in the park have been in the east side valley-bottom areas.

It should be noted that the above statements are speculative: faunal evidence of *B. antiquus* does not exist at this point in Glacier National Park. Faunal remains of this age (8,000-11,000 years ago) would have to be in a rare depositional context to remain intact over such long period. Reservoirs (such as in Two Medicine and Many Glacier), peat-bogs, and deeply buried sediment layers such as those at the base of alluvial fans are areas in which evidence of *B. antiquus* might be forthcoming. Even if found, it takes some experience with faunal material to recognize remains as belonging to *B. antiquus* and not as another species of bison or even bovid. I recommend that archaeologists working for the park familiarize themselves with these faunal differences and make occasional forays into environments with higher preservation possibility. A targeted research project with goals to relocate faunal remains would be ideal.

Extinction and Evolution during the Altithermal

Important to the evolutionary story of modern bison is the period discussed in an earlier chapter known alternately as the Altithermal or mid-Holocene Climatic Optimum, which occurred from roughly 9,000-5,000 years ago. Recall that this was a period of global climatic flux with regional variations: rather than a simple raising or lowering of temperatures, the Altithermal brought more temperature extremes in both directions (Anderson et al. 2007; Cowie 2009). Locally, the climate seems to have become generally warmer and dryer: less than ideal for brushy grasslands and large grassland-dependent species such *Bison antiquus* (Davis 2019; MacDonald 2012; McDonald 1981; Lott 2003; Lewis et al. 2007).

It is as easy as it is misleading to attribute complex evolutionary events such as extinction of a species or the arrival of a new one to simplistic causes such as climatic shifts or overhunting. In this case, we do not truly know why *B. antiquus* went extinct, or why the smaller and more r-selected *B. bison* replaced them. However, if grasslands did indeed suffer in some regard this new environmental shift would have favored a smaller and more r-selected species in general (Lewis et al. 2007). *B. bison* likely evolved directly from *B. antiquus* during this period (McDonald 1981). Horn cores and other faunal remains from bison during the period from 10,000 years ago to 5,000 became progressively smaller (McDonald 1981; Lewis et al. 2007). Based on faunal evidence across North America it seems that at the onset of the Altithermal and extinction of *B. antiquus* around 8,000 years ago populations of bison would have been relatively small. The Altithermal ended around 6,000 to 5,000 years ago, with the local climate again becoming more temperate and favorable toward grassland development (Anderson et al. 2007; Cowie 2009). After this period populations of *B. bison* seem to have rebounded, or at least faunal

and archaeological evidence of *Bison bison* became more notably present in the northern plains (McDonald 1981; Lewis et al. 2007).¹⁵

Some authors recognize two variants of bison: the so-called plains bison (*Bison bison*) and the wood bison (*Bison bison athabascae*) (DeSanto 1971; McDonald 1981). There have been many debates regarding the differences between these two very similar bison subspecies as well as debates regarding the accuracy of such classification. The point has some relevance to Glacier, as plains bison and wood bison are largely differentiated by their ecological niche. Plains bison are usually described as being somewhat smaller and stockier than wood bison, are generally lighter in color, and have other subtle differences such as a less blended cape (McDonald 1981; DeSanto 1971). Historically, the larger wood bison seems to have occupied the more northerly and mountainous regions of the *Bison bison* range, making them the expected variant to occupy Glacier. This is indeed the finding proposed by Glacier National Park naturalist-ranger Jerry DeSanto in his report on Bison in Glacier, which took into account oral histories from early trappers (DeSanto 1971). However, differentiating between plains bison and wood bison is near impossible based solely on faunal evidence alone and no attempt was made to do so in the geodatabase created for this project.

¹⁵ Recall that this period around 6,000-5,000 years ago is also the period in which the first bison jumps occurred at the Head-Smashed-In Buffalo Jump (Brink 2008; Bamforth 2011). It seems likely that as populations of bison began to rebound people at the time began to rely more heavily on bison for food.

The Seasonal Round

Modern bison, or *B. bison*, were the only species of bison in North America after the extinction of *B. antiquus*. As such, we will transition from the evolutionary story of bison into a discussion of modern bison ethology and biology. In particular, this section will focus on the seasonal rhythms that modern bison likely followed in the northwestern plains of Montana (Peck 2002). Unfortunately, bison no longer roam freely across their former range and all modern bison populations are managed by humans to some degree or another (Brodie 2008). Data on how bison migrated in pre-modern times is largely speculative based on modern populations or reliant on oftentimes unreliable historical sources. The people who hunted bison certainly knew these things well, and much of what we know today about bison was long-known by the Indigenous people who relied upon them for sustenance, shelter, and more (Peck 2002). Here I will attempt to utilize both Indigenous peoples' and western scientific knowledge bases. While sometimes discussed as such, there is truly no rift between these two ways of knowing, both of which are based on observation, testing, and costly trial and error.

While it may seem initially off-topic to discuss ecology and biology in a thesis about anthropology, it is important to remember that the seasonal round of bison would have directly affected the seasonal round of human hunters (Peck 2002). Where the bison found shelter from the wind in the winter, so did the humans who hunted them. Where the bison roamed in summer, humans too would have followed. The people who relied on bison in so many ways knew when calves were born, when cows were the fattest, and when bulls were in the rut and would have made decisions about how and when to hunt based on this knowledge. In order to understand these people, we must learn about and from the bison as well.

Summer

It is convenient to begin with summer, the time of year in which bison would have gathered together in huge herds of bulls, cows, and calves. Today, it is also the season when most visitors visit Glacier National Park. When Euro-American explorers first encountered bison they were usually visiting in the summer months when bison gather together in large herds. Their chronicles tend to feature this aspect of bison predominantly and sometimes to the exclusion of all else. Alexander Henry, a fur-trapper known for his exhaustive diary-keeping, wrote in 1801:

At daybreak I was awakened by the bellowing of buffaloes. I got up, and was astonished when I climbed into the S.W. bastion. On my right the plains were black, and appeared as if in motion, S. to N. Opposite the fort the ice was covered [with buffalo]; and on my left, to the utmost extent of the reach below us, the river was covered with buffalo moving northward ... I had seen almost incredible numbers of buffalo in the fall, but nothing in comparison to what I now beheld. The ground was covered at every point of the compass, as far as the eye could reach, and every animal was in motion. -Alexander Henry (Coues 1897)

Accounts such as these were frequent, and in turn merged into the popular culture and romantic notion of the American West. To this day when bison are evoked they are often represented in popular culture as these seemingly inexhaustible vast herds which blacken the prairie. In reality, it is only during summer that bison would band together in such numbers (Lott 2003). Not only is this the only season in which grasslands could support these large groups, but summer months are when bulls began to seek out cows in preparation for mating, calves stay near the herd for protection, and cows jealously guard their newborn offspring (Brink 2008; Lott 2003). Prior to the introduction of fencing and cattle, summer herds of bison would indeed have been vast, and they would have roamed widely.

During the summer bison herds would certainly have grazed in Glacier's lowland east-side valley bottoms, although likely in smaller numbers than out on the prairie. Grasslands on the plains would have been more than enough to support the large herds, and the mountains would not have offered any particular advantages over the plains for bison. The bison herds which grazed inside Glacier during summer months would thus not only have been smaller in number, they might even have been a subspecies of *bison bison* known as *B. b. athabascae*, or wood bison (DeSanto 1971). As a reminder, wood bison are larger and stockier than plains bison, and tend to prefer more timbered terrain (McDonald 1981). One Blackfeet story written down by George Bird Grinnell tells of an encounter by a young women with one such bison:

“When she got there, just as she was going to fill her bucket, she saw standing by her a great bull. It was a mountain buffalo, one of those who live in the timber ; and the long hair of its head was all full of pine needles and sticks and branches, and matted together. It was a Su'ye- stu'mik, a water bull. (Grinnell 1892, p. 53)”

Wood bison such as these may well have stayed close to Glacier year-round, preferring the well-timbered foothills which would have and still do exist within Glacier National Parks' boundaries. And while faunal remains of wood bison and plains bison are difficult if not impossible to distinguish, many people from Native Americans to fur-traders seemingly recognized the difference (DeSanto 1971).

Native American hunters would have more than herd composition or location in mind: they would have cared about the quality of the buffalo skins, the meat, and the fat content (Brink 2008). In the early summer, bison are at their leanest, having just weathered three to four months of snow, wind, and lower forage. This is even more so for calving cows, whose fat reserves from pregnancy are especially low (Brink 2008; Lott 2003). Native American hunters would not have

wanted lean bison meat, they would have sought individuals with higher fat yields. This is illustrated in one story of the Blackfeet culture-hero Kutoyis (Blood-Clot).

Now there were some bears who ruled over this camp. They lived in a bear-lodge and were very cruel. When Blood-Clot had driven the buffalo over, he noticed among them a scabby cow. He said, "I shall save this for the old women." Then the people laughed, and said, "Do you mean to save that poor old beast? It is too poor to have fat." However, when it was cut open it was found to be very fat. Now, when the bears heard the buffalo go over the drive, they as usual sent out two bears to cut off the best meat, especially all the fat; but Blood-Clot had already butchered the buffalo, putting the fat upon sticks. He hid it as the bears came up. (Wissler and Duvall 1908, p. 55)

In this story is the fat of the bison which is particularly prized, rather than simply just meat and calories. When living off the land, dealing with the elements and nearly constantly moving, fat can make all the difference between feeling full, energized, and healthy instead of lethargic and hungry. In fact, many early euro-American hunters, trappers and explorers found that with only lean meat starvation was still possible even when enough calories were being consumed (Brink 2008).

Fat content was a crucial primary consideration for bison-hunters, but bison were definitely hunted in the spring and early summer despite sub-par fat content, and this reminds us that bison were more than just a source of food. Their hides were used extensively and became the raw material for clothing, lodge covers, and footwear to name just a few (Ewers 1958; Brink 2008). Not only does the quality of bison meat vary throughout the year, but so does bison hide. For every season, hunters would have considered a myriad of factors when engaging in a bison hunt beyond simple sustenance (Brink 2008).

Autumn

For bison, autumn would have begun with the mating season, which usually takes place as the nights begin to get shorter and the first hints of chill linger in the morning (Brink 2008; Lott 2003). The mating season would have been relevant to human hunters for reasons. First, fall is the season when most mammalian male ungulates engage in the rut. The rut is a term used to describe aspects of a mammalian reproduction season in animals such as elk, deer, bison and others characterized by an increase in testosterone in the males, who often violently battle for supremacy with the goal of obtaining sole access to a female (Brink 2008; Lott 2003). For bison, who have dangerous hooking horns, these fights can be very injurious if not fatal to combatants (Lott 2003). Typically, male bison will jealously guard females they see as potential mates during this season and are far more likely to charge and challenge than at other times of the year (Brink 2008; Lott 2003). For a hunter, especially a spear wielding one, it would have been incredibly dangerous to attempt to hunt bison on foot during this time of year. Certainly the risk of personal harm would have been a primary consideration, approaching a male bull during the rut would have been uniquely dangerous. But hunters would have avoided male bison for another reason as well: levels of testosterone in bulls during this time of year can make the meat taste overly gamey. Furthermore, the added activity of bulls during the rut leads to their meat becoming stringy and lower in fat content (Brink 2008; Lott 2003). As stated by early explorer David Thompson: “Bull meat is not regarded, it is seldom fat, and always tough (Coues 1897).”

While the meat of bulls in the rut would not have been particularly good, fat levels in bison in general are decidedly higher in late summer and autumn (Brink 2008; Lott 2003). Cows expecting winter pregnancy would be particularly concerned with fattening up. A summer's worth of good grazing and summer temperatures behind them, cows and bulls alike are not only

at their fattest during the fall, but their hides are also at their thickest (Brink 2008; Lott 2003). While these thicker hides were not suited to tipi covers and summer clothing, they were ideal for other purposes such as shields or tough winter clothing (Brink 2008; Ewers 1958; Grinnell 1892; Hungry Wolf 1980; Wissler and Duvall 1908). After the rut, bison disperse into smaller groups, typically consisting of cow/calf groups numbering in the hundreds, and smaller bull groups of which there is rarely more than ten (Brink 2008; Lott 2003). Thus, early autumn hunting before the rut would have been favorable for large drives in terms of sheer numbers, but late autumn hunting would have allowed for greater precision, as hunters could have singled out cow/calf groups with better fat reserves and higher quality meat.

Winter

During the summer and fall, bison ranged widely across the plains far away from the mountains. With the onset of winter, however, bison would have sought shelter from the wind exposed plains. John Palliser in one of his many early ventures to the area wrote in 1847 that “the buffalo in winter approach the edge of the woods, and so also do the Indians, seeking fuel and thickwood animals, in the case of the buffalo failing them during the winter (Spry 1968).” Bison seem to instinctively know when it is time to make plans for winter, and this involves finding more sheltered grazing areas in broken terrain (Brink 2008; Lott 2003). The long Montana winter brings constant ferocious winds to the plains, and humans and animals alike have always seasonally prepared themselves by wintering near timberland and other local features which block the wind. Humans have the added need of a source for fire, the fuels for which can be scarce out on the plains. While buffalo chips were certainly used, a more ideal source of fuel would be the dense timberlands extending down from the mountains and Glacier National Park.

It is no surprise then that many of the largest and most settled archaeological sites in Glacier National Park are east-side, sheltered locations near water and timber (Reeves et al. 2003).

In this rugged environment it is impossible to fully escape winter's wrath, and even the most sheltered of places will experience occasional periods of strong wind and blizzards. Even today the communities of Cut Bank and Browning struggle to deal with these particularly potent winter storms and are sometimes forced to shut down schools and stores. Four feet of snow fell on Browning on Sept. 30, 2019, prompting emergency declarations. It is difficult to imagine how people in pre-modern times would have weathered such storms without relying on a deep knowledge of the landscape and the bison. Not only did pounded and dried bison meat sustain these people throughout the winter, but their particularly resilient hides covered their tipis and their bodies.

Bison are particularly well suited to withstanding these at times brutal winter storms. Not only do they disperse into herds to adapt to lower quantities of food and seek sheltered areas, their biology allows them to thrive in conditions that other species (notably cattle) simply cannot (Lott 2003). I have already touched on the thickness of a bison's winter coat, but it is worth emphasizing the point again here. In winter, a bison's hide can be several centimeters thick, thicker than any modern cattle (Brink 2008; Lott 2003). On top of this hide lies an incredibly dense mass of hair, particularly around the chest and head (Lott 2003). While bison hair is thinner than that of cattle, bison have about 10 times more hair per square inch than do cattle (Lott 2003; Brink 2008). The insulative capability of bison hide was demonstrated during research at Elk Island National Park in Alberta when park biologists used aerial infrared (heat sensitive) equipment to perform a seasonal count of animals (Lott 2003). The study occurred in mid-winter during some particularly freezing temperatures, which allowed biologists to easily

spot the heat signatures of moose and elk. However, the bison herds laying in the snow were missed on the first scan, as they were not releasing enough heat for the equipment to pick up (Lott 2003). Another experiment at Elk Island showed that bison's supreme winter durability can be attributed to more than just their hide and fur, but their metabolic responses to cold. In this experiment, calves of cold-adapted mammals (bison, yak, Scottish Highland cattle and Hereford cattle) were put into a refrigeration chamber set to -22 degrees Fahrenheit. Every species other than the bison responded predictably, with a rise in their metabolism to burn more energy and thus heat up internal body temperatures. But the bison calf did the opposite, its metabolic activity actually lowered when subject to these frigid temperatures (Lott 2003). As Brink states: "[Bison] have evolved over countless millennia to save, rather than burn up, their body energy reserves. Animals that increase their metabolism to fight off a sudden cold spell are trying to get through the moment, hoping for better time; bison, by lowering their metabolism, illustrate the evolutionary adaptation to the inevitability of future cold spells, saving critical body reserves for the many difficult times that lie ahead (Brink 2008, p. 172)."

Spring

Winter bison herds remain in dispersed groups until well into early-summer, and as such spring would not have been the primary season for the buffalo jumps (Brink 2008). Furthermore, as the first signs of spring return bison are likely to have depleted fat reserves as a result of a winter of poor browsing (Lott 2003). This is even more true for pregnant cows, who not only face lower quality browse throughout the winter but also must eat enough calories to sustain and grow the fetal bison (Lott 2003). Pregnant cows will typically give birth in March or May, and cows will be in particularly poor condition until this time (Lott 2003). For the above reasons, the thick late-

summer/fall hides that bison rely on for warmth in winter become gradually thinner and become the most thin in springtime (Lott 2003). This is partially due to a lack of calories to sustain the thick coat and partially as a seasonal response to the upcoming summer. While the caloric return on hunting bison in spring would have been minimal, there would still have been reason to hunt them. In speaking with Blackfeet members on this subject in the mid 1900's, Ewers records that the thin hides sported by spring bison were actually highly valued for use in lodge covers (Ewers 1958). The thick hides of fall and winter bison were simply too thick to make good use of in this regard.

There is yet a further element of spring-time bison that Native American hunters would have considered: this is the season of newborn calves. Newborn calves, which due to their red coats and size were sometimes referred to as 'Red Dogs', stay very close to their mothers through their first year, and in the springtime are very vulnerable to predation (Lott 2003). Cows are justifiably very protective of their newborns during the spring, and rarely allow their calves to wander off too far (Lott 2003). Since calves would not be able to run quickly in the spring, it would have been more difficult to instigate a cow/calf to break into a full run. This would have been an important consideration for native hunters that might further dissuade the use of drive-lanes and bison jumps during spring (Brink 2008). However there was at least in Blackfeet society at some point a social component of newborn bison robes.

Every spring the people went out to hunt for buffalo. At this time of the year, the buffalo-calves are red, and their skins are much desired for children's robes. Now as the parents of these children were very poor, and not able to do much hunting, these boys had to wear brown robes or those made of old buffalo-skins. As the children grew up, they were constantly reminded of the fact that they had no red robes. The other children of the camp sometimes made fun of them because of this. - (Wissler and Duvall 1908, p. 71)

The boys in this story complain of having lower social status due to their lack of calf-robies, a result of parents who could not afford to participate. This story reveals some of the cultural and economic aspects of bison hunting that are often ignored in purely archaeological texts. And while it is unlikely that bison would have been hunted solely to provide calf-robies to children, it is interesting to note that in this story socioeconomic status is related to one's ability to hunt bison.

Full Circle

As the days stretch into summer, the lifecycle of the bison come full circle. The herds would once again leave their more sheltered grazing areas closer to mountains and move out into the vast expanse of the plains. And slowly but steadily, the herds would once again rejoin into the massive, plains-blackening proportions which so stunned early writers. For over 12,000 years bison would have followed similar seasonal rhythms, and the humans who hunted them would never have been too far behind. Season after season, year after year, century after century this rhythmic relationship would have provided the foundation of plains peoples' lives and culture (Brink 2008; Tarka 2007; Zedeño 2017). But the modern world seemingly had no place for these vast free-roaming herds. Beginning with the arrival of horses in the 1700s to the arrival of Europeans, guns, trains, and the fur-trading industry: bison were quite nearly driven to extinction in America.¹⁶ Today, bison exist only in places set aside by humans specifically for them, and

¹⁶ The near-extinction of the bison in the 18th century is too large and complex of a subject to cover here. For further reading on this subject, see Cunfer, Waiser 2016.

usually in the confines of fencing¹⁷. The native grasses they once grazed on have been largely replaced with non-native agricultural grasses. The effect of the loss of the bison on the native people who relied on them for everything from food and shelter to their cultural traditions cannot be overstated and these real damages continue through to today.

These prairies now seem bare of life, but it was not always so. Not very long ago, they were trodden by multitudinous herds of buffalo and antelope; then, along the wooded river valleys and on the pine-clad slopes of the mountains, elk, deer, and wild sheep fed in great numbers. They are all gone now. The winter's wind still whistles over Montana prairies, but nature's shaggy-headed wild cattle no longer feel its biting blasts. Where once the scorching breath of summer stirred only the short stems of the buffalo-grass, it now billows the fields of the white man's grain. Half-hidden by the scanty herbage, a few bleached skeletons alone remain to tell us of the buffalo; and the broad, deep trails, over which the dark herds passed by thousands, are now grass-grown and fast disappearing under the effacing hand of time. (Grinnell 1892, pp. 178–179)

¹⁷ Bison herds in Yellowstone are free roaming but are often killed by livestock agents and hunters upon leaving the park boundaries as bison are viewed by many as a threat to cattle operations.

Chapter 4: The Hunt

Hunting Bison

This chapter we will reviews the predominant methods employed by Native American people to hunt bison over the 12,000+ years in North America, with a focus on the Northwest Plains. We will begin by reviewing a selection of Blackfeet cultural traditions associated with bison hunting including songs, dances, and other ceremonial tasks. While only a shallow treatment of this topic, it is important to remember that hunting bison was not an isolated event but part of an integrated cultural system for many bison-hunting people. Next, we will consider specific bison hunting strategies employed across North America as revealed through archaeology and ethnography. It is challenging to understand how bison were killed specifically without extensive excavation, and because this project was not associated with any excavation or particular site it is useful to review other such sites outside of the park. Finally, we will speculate what methods might have been employed to hunt bison specifically in Glacier National Park.

Before (and After) the Hunt

Before delving into specific hunting strategies employed by Native Americans for hunting bison, it is worthwhile to regard that for many bison-hunting cultures the hunt began well before anyone ever threw a spear or set-up a drive-line. It is worthwhile to cover just a few of the cultural traditions held by one tribe, the Blackfeet, as recorded in documentary ethnographic research. This is by no means a complete treatment of this subject, and further exploration of these cultural traditions represents a ripe avenue for future research. I rely mostly on text drawn from Wissler and Duvall's ethnographic research in the late 1800s published in

1908 (Wissler and Duvall 1908). This is a particularly valuable source material as Clark Wissler was a dedicated and academic ethnographer and anthropologist, and his translator D.C. Duvall was fluent in the Blackfeet language and was part Blackfeet himself. Several stories are also reproduced from George Bird Grinnell's collection of Blackfeet stories, "Blackfeet Lodge Tales (Grinnell 1892)." While I don't consider Grinnell's work to be on par with Wissler and Duvall, I do believe the stories contained within are genuine attempts to translate the story into English with minimal editing. Grinnell takes pains to state as such in his introduction¹⁸¹⁹.

Throughout the following excerpts I will draw attention to elements related to bison-hunting. I have attempted to thematically separate elements here for ease of reading and presentation, please note that these distinctions may not have existed in real practice.

Songs

One of the most anthropologically valuable and yet understudied elements of any culture has to be song. Among most Native American cultures there seems to be or have been a song for nearly every event of importance (Pete and Brien Ongoing)²⁰. These songs are often deeply layered

18 "I give the Blackfoot stories as they have been told to me by the Indians themselves, not elaborating nor adding to them. In all cases except one they were written down as they fell from the lips of the storyteller. Sometimes I have transposed a sentence or two, or have added a few words of explanation ; but the stories as here given are told in the words of the original narrators as nearly as it is possible to render those words into the simplest every-day English (Grinnell 1892)."

19 Another source that I recommend for Blackfeet oral tradition is Percy Bullchild's "The Sun Came Down." This is a collection of stories told to and eventually by Bullchild in the mid 20th century. It unfortunately lacks academic rigor and it can be difficult to tell when the author is inserting unique elements into the story (Bullchild 2005).

20 I am here citing a podcast hosted by Dr. Shandin Pete and Aaron Brien that frequently covers and introduces segments of their show with a historical or contemporary indigenous-recorded song. These songs are typically followed by an explanation of the song and a discussion of its relevance to both historical and present day indigenous people.

with meaning, and small details such as whom is doing the singing or what time of year the song is sung can be incredibly important. Take the following excerpt from Wissler and Duvall:

In the circle was a young unmarried man who had been chosen to lead the buffalo over [the drive]. She said to him, "You sit here at the head of the lodge. I shall paint your face first. You are going to eat first. for you are to drive the buffalo." Then he sat by her. Now she was painting his face. She was going to give him something to eat, and, changing the words of the song, teach him the way he should sing it when the buffalo were being driven up; also tell him how he should stand at the edge of the declivity where the buffalo are to fall over. He was to sing four times: — "I want to fall [them]. Kidney-fat, I want to eat it." The reason for all this was that the people might be fed (Wissler and Duvall 1908, pp. 86–87).

In this passage a woman is singing a song to a young man chosen for the central role of being a buffalo-runner. This man's role is fundamental to the bison drive, but for now let's focus on the woman's role in this story. This woman teaches the young man the song which he must sing to successfully drive the bison over, at some point changing the song to fit the circumstance. The song here is tantamount, and the right words must be sung in the right place and the right number of times to ensure success.

This is not the only mention of a woman adhering men to sing a song a specific way, only sometimes the song does not go as intended.

"You shall have food," she said. Then she began to sing and then to dance. All joined in the dancing. They made a noise like the buffalo. The woman sang, "A hundred shall I lead over [the drive]". She said, "When you sing, do not say more than a hundred." Now a man said when he sang, "Over a hundred shall I lead over [the drive]." The woman said, "We have made a mistake now. So

many will go over, that the enclosure will be burst; they will jump out of it (Wissler and Duvall 1908, p. 88)."

Here again we have a woman leading a song of instruction to the men who are to implement the drive. In this case, the wrong words of the song seem to create a potential disaster whereby too many buffalo would be drawn to the jump²¹. This story continues and overlaps into other themes and will be revisited.

Dances

Now the next day the young man said to his wife, "Go tell your father that I shall give a buffalo-dance. This dance is called the 'Bull's Dance,' and have him put up three or four lodges together so as to have a place to dance in, and to have the lodges close to the brush (Wissler and Duvall 1908, p. 125)"

Just like songs, there are many references to specific dances associated various important events in many Native American cultures. Among the Blackfeet to whom bison hunting was of utmost importance this is certainly the case for bison hunting, and some evidence of these dances have been recorded in various sources. Just like the songs, dances were likely performed by specific people who were responsible for the correct performance and instruction of the dance. The above story is too lengthy to repeat here, but it details an intricate and four part dance in which the young man mimics the buffalo four times, each in a different stage of a bison's life: a calf, a two-year old bull, a three-year old bull, and a fourth year old bull. In this story the woman struggles

21 While this might not seem like a problem, there are many reasons it might be. For example, if the bison overwhelmed the hunters and escaped, they might be able to tell the other bison about the jump, as Brink records (Brink 2008). Furthermore, the bison may overwhelm the corral causing danger to the hunters.

to follow directions as she is frightened and mistakes her husband for a real bull. More typical is when the men fail to follow directions fully, such as the story below:

The next night it was called out again that the woman was to make medicine. This time she gave orders that only the women were to dance, so that cows might come to the drive. So the women danced. The men tried not to make another mistake. In the morning they looked from the hill again. They were made glad by the rock falling again on its face. Again the young men went out, and all was as before. Now all in the enclosure were cows. They were all killed with arrows. None of them got out. The people were happy now. They had plenty of meat (Wissler and Duvall 1908, p. 89).

This above story is one of many with a similar theme of men not performing a song or dance correctly to the chagrin of a female instructor. In this story, the men's earlier mistake caused only bulls to come to the hunting spot.²² In this passage, the women correct the issue and the next day only cows arrive, which satiates the people. In both of these passages, the dance seems to have the effect of 'calling' the herd to the people, or to a place where they can perform the hunt. This speaks to the anxiety that these people must have felt when no bison could be located. The ability to call bison towards oneself, call a specific element of bison, or somehow track the bison herds across the vast landscape would have been very valued and carried high prestige. Dancing it seems was one important way to do this.

²² Recall from chapter three that during many times of year a bull would not have been the ideal hunt. For example, during the fall they are in the rut, and as a result their meat is less desirable. There are also generally fewer bulls in a group than cows during the high summer, spring, and winter (Brink 2008; Lott 2003).

Iniskim

The one who took the buffalo rock, I-nis'-kim, it afterward made strong to call the buffalo into the pis'kun. He would take the rock and put it in his lodge close to the fire, where he could look at it, and would pray over it and make medicine. Sometimes he would ask for a hundred buffalo to jump into the pis'kun, and the next day a hundred would jump in. He was powerful (Grinnell 1892, p. 134).

The importance of iniskim or buffalo-rocks is well documented in nearly all early ethnographic accounts dealing with the Blackfeet, and the importance of these rocks has not diminished today (Ewers 1958; Reeves and Peacock 2001; Thompson 2015). In fact, Iniskim are specifically listed as cultural property by the Blackfeet in the Blackfeet Tribal Preservation Act (Blackfeet Tribal Business Council 2004). I have met several Blackfeet members who have their own iniskim and have wonderful stories to tell about their origin and use. Importantly, these stones have long had an association with bison-hunting.

While the young woman was going along the path to the river, she heard a beautiful song. It sounded close by, but she looked all around and could see no one. The song seemed to come from a cottonwood tree near the path. Looking closely at this tree she saw a queer rock jammed in a fork, where the tree was split, and with it a few hairs from a buffalo, which had rubbed there. The woman was frightened and dared not pass the tree. Pretty soon the singing stopped, and the I-nis'-kim [buffalo rock] spoke to the woman and said: "Take me to your lodge, and when it is dark, call in the people and teach them the song you have just heard. Pray too, that you may not starve, and that the buffalo may come back. Do this, and when day comes, your hearts will be glad." The woman went on and got some water, and when she came back, took the rock and gave it to her husband, telling him about the song and what the rock had said. As soon as it was dark, the man called the chiefs and old men to his lodge, and his wife taught them this song. They prayed, too, as the rock had said should be done.

Before long, they heard a noise far off. It was the tramp of a great herd of buffalo coming. Then they knew that the rock was very powerful, and, ever since that, the people have taken care of it and prayed to it (Grinnell 1892, p. 134).

This story clearly links iniskim to the buffalo both in its origin and its purpose. Of note, this story once again tells of a woman who learns an important song to be sung, who in turn teaches it to the men.

Paints

There is a well-documented importance attached to various paint colors among most Native American groups. The Blackfeet are no exception, and many stories are attributed to the gathering and use of various paint colors (Reeves and Peacock 2001). Oftentimes, the exact location where a type of paint could be found would be considered personal and kept secret, at least to the prying eyes of the ethnographer (Reeves and Peacock 2001). These locations are usually places where natural minerals in the soil cause a yellow or red (for example) pigment, which could be combined with other ingredients to create paint. These paints have various meanings and purposes, far too many to detail here. However, at least among the Blackfeet there are some applications of paint in the bison hunts.

One day the Whirlwind Boy requested his mother to rub some yellow paint upon the baby's forehead, then to go out and paint one of the buffalo bones yellow. When they gave this to the child, he also stopped crying. From that time on, a crying male child was always given a yellow-painted bone from the right front-foot of a buffalo, and had his forehead painted yellow. After a time the same woman had another child, this time a girl; and, like the others, it cried all the time. One day the Whirlwind-Boy requested his mother to take a bone from the left hind-leg of the buffalo and paint it red. Also to paint the baby's forehead red. When this had been done, the baby ceased to cry. This is the way children

are kept from crying, even to this day. Now Whirlwind-Boy would sometimes take the right hind-leg of the buffalo and paint one side yellow. Then he would go out and wander about the prairie, repeating to himself, "This bone says all the buffalo will go down the drive and over the cliff." Then he would throw the bone out in front of him. If it fell with the yellow side up, it would be as he said. At another time he would take a bone, lay a stick across it, and then drop a braid of sweet-grass. If the braid fell on the stick hanging, the buffalo would go over. These things people do even to this day (Wissler and Duvall 1908, pp. 126–127).

In this story the painted bison bone has many functions including as a children's toy and as a diviner of sorts for the success of an upcoming bison hunt. At least in this narrative, the painted bison bone does not have the same function as a song or dance in that throwing the painted bone does not have any agency over the success or failure. Instead, the painted bone reveals the outcome to the user with no apparent ability to call the bison. This story should not be interpreted as a universal practice, it is presented as something performed by a single individual. However, the fact that this practice existed highlights the role that paints and bison bones could play in a society dedicated to the bison hunt.

Important People

Any communal buffalo hunt would involve many different people, some of whom would have specific and critical roles in the event. In the oral tradition excerpts so far we have already seen a young man chosen as a buffalo-runner, several women who sang and taught others songs, holders of iniskim as well as those endowed with specific power to bring or predict the bison. I would like to take a moment to explore some of these roles in more detail.

The buffalo-runner is a figure known to any with an interest in the great bison jumps as well as the general public (Brink 2008). This person had a central and fundamental role in the

bison drive and it was surely a prestigious position, but also one which incurred great risk. These individuals would run in front of the herd dressed in a disguise such as a bison calf to prompt the herd toward the cliff (Brink 2008). In one of the excerpts above the young man is painted first and eats first highlighting his prominent role and prestige status. If the buffalo runner did not perform their task correctly the entire orchestration of the buffalo drive could easily fail. Such an event would have been disastrous as the bison might escape entirely leaving the hunters hungry and tired.

Several of the stories above have featured women who are taught or already know a song relevant to the bison hunt. These songs had to be sung at the right time and place for a successful hunt or to call the bison to the hunting ground. Oftentimes these women teach the male hunters the song right before the hunt, reprimanding them to ensure accuracy. If we think about what role these women are fulfilling, it seems to be that of a coordinator and holder of knowledge. This would be someone who understands how the hunt or drive must work from past experience and who teaches this to the less experienced. Buffalo running clearly required athleticism, but the task also required the cunning and intelligence drawn from experience. The women in these stories seem to be instrumental in teaching the hunters how to perform their task well.

There were yet other crucial roles in a bison hunt. In the following passage, it is insinuated that certain individuals could have the power to call the buffalo, or at least know of their location.

After this no buffalo were seen in the country, because the crows took the buffalo over the mountains. Beaver and his people were soon driven to starvation; but the crows returned, flew around over their lodges and mocked them. So Beaver called the people together in council and said to the young men, "What can you

do? Has any one power to bring back the buffalo ?” No one seemed to have such power. This was in the winter (Wissler and Duvall 1908, p. 50).

Before modern fencing, bison herds had access to and would have roamed across a truly staggering amount of terrain. Not only is a herd of bison quite capable of quick and lengthy travel: the rolling hills of the Montana prairie are also notoriously deceptive and could hide an entire herd behind a seemingly small hill (Brink 2008). For people who relied on bison for nearly everything, this would have been a regular problem. It is no surprise then that certain individuals might be tasked with tracking the herds or predicting their locations. And as the story above indicates, when there was no such person it could be a real problem. In fact, missing bison herds are a common theme not just among Blackfeet oral traditions but among many North American bison-hunting cultures (Reeves and Peacock 2001; Wissler and Duvall 1908; Grinnell 1892; Ewers 1958). In most variants of the story, the bison have been hidden away by an individual in natural feature such as a cave or in the mountains.

The Paleoindian Hunting Pattern

In those days there were buffalo. Now the people had no arms but those black animals with long beards were armed; and once, as the people were moving about, the buffalo saw them, and ran after them, and hooked them, and killed and ate them. One day, as the Maker of the people was travelling over the country, he saw some of his children, that he had made, lying dead, torn to pieces and partly eaten by the buffalo. When he saw this he was very sad. He said: "This will not do. I will change this. The people shall eat the buffalo" -Blackfeet Story (Grinnell 1892, p. 140).

Imagine what must have gone through the mind of a Paleoindian hunter, always on the lookout for calories, upon encountering a herd of bison out on the prairie 11,000 years ago. Imagine

sitting upon a rock surveying this herd armed with only a stone-tipped spear, pondering how to even approach one. Contemporary *B. bison*, not to speak of *B. antiquus*, can weigh between 1,000 and 2,000 pounds, run up to 35 miles per hour, have incredibly thick hides and skeletal features and on top of their heads are a set of sharp hooked horns. Bison are nearly always in groups occasionally numbering in the hundreds or more, are aggressive and suspicious defenders, and show little fear. As the Blackfeet story above highlights, early attempts by humans to kill bison would likely have proven incredibly fatal to the hunters, even compared to other megafauna such as mammoth which would have been slower and easier to isolate.

Archaeologists love a good story; and when it comes to bison hunting there is perhaps no better story than the bison jumps in which hundreds of bison would have been driven over the edge of cliffs in elaborate orchestrated events. The bison jumps are indeed fascinating, and they did indeed take place just outside of Glacier National Park for thousands of years. However, it is easy for the exceptional stories to override the more mundane. In the case of bison hunting, the bison jumps have become the dominant narrative of how humans hunted bison despite it representing merely one admittedly notable strategy (Bamforth 2011). For most of human history across North America and even in Montana during the time of the jumps, bison hunting would have been done on a smaller scale.

So what did these hunters do? The record for Paleoindian bison hunting across North America is scant, but what sites do exist display three notable archaeological features: single event kill sites as represented via stratigraphy, no post-kill burning of remains, and a relatively low amount of processing (Bamforth 2011). First, in contrast to bison jump sites such as Head-Smashed-In with evidence of regular repeated use for thousands of years, Paleoindian kill sites are usually single use and only contain a single stratigraphic layer of faunal remains (Bamforth

2011). Thus, we can imagine that these hunters were following the herds across the prairies and foothills and killing them when they saw opportunity. Groups of individuals would be more effective for a hunt, as groups are able to employ tactics such as surrounding the bison or driving them into a nearby terrain trap (Carlson and Bement 2013). Others would have been nearby to process the meat from slain bison, and camp would not have been far away (Bamforth 2011; Brink 2008; Frison 2004). Kill sites would not have been random, they would still have to have access to water (hunting and processing is thirsty work), and terrain features such as arroyos or box canyons (Brink 2008; Bamforth 2011; Frison 2004; Frison 1998; Carlson and Bement 2013). However, once the kill had been made, the meat processed and hides stretched and dried, the hunters would move on, in search of their next kill.

Other than stratigraphy, there is another element to these single-use kill sites to consider archaeologically: since these sites would not be expected to be used again in the near future, bison carcasses were simply left to deteriorate on their own (Bamforth 2011). In comparison, faunal remains from bison jump sites such as Head-Smashed-In contain evidence of burning (Brink 2008). The idea here is that the stench of rotting carcasses would certainly have scared away bison herds in the immediate future. Thus, prior to leaving a kill site, hunters at bison jumps were known to intentionally start fires to ‘clean’ a site and prepare it for future use (Brink 2008; Bamforth 2011). Excavations at jumps such as Head-Smashed-In have regularly discovered layer after of layer of charred faunal remains.

Finally, another important archaeological feature of Paleoindian bison hunting is the limited processing of bison. We have no evidence that Paleoindian hunters were interested in trade, they would likely only have processed bison for their immediate needs (Frison 1998). These needs were many, and much of the bison would have gone to use. From clothing to food to

children's toys and other cultural goods, a significant amount of the bison would have been utilized (Frison 1998; Frison 2004). However, as compared to processing at sites such as Head-Smashed-In, Paleoindian kill sites display far more intact bones representing less overall processing (Bamforth 2011). Why the difference? One reason might be more mouths to feed. Not only would greater populations require more fresh meat, they would also require more bone marrow or bone grease which is instrumental in the production of pemmican (dried meat mixed with fat and berries and stored for winter). Doug Bamforth suggests yet another possible factor: trade (Bamforth 2011). Bison jumping really only ever occurred in a specific region at a specific point in time. Namely, bison jumps occur in Montana, Alberta, Saskatchewan and Wyoming; and they only really occur between 2500-200 years before present. At this time and place people were connected to a continent-spanning trade network which would have sought goods produced from bison such as pemmican or bison hide. In this way, the bison jumps might have facilitated a near industrialization of bison hunting (Bamforth 2011).

While many advanced tactics for the killing of bison emerged in later eras such as corrals and bison jumps, the Paleoindian pattern never disappears, even occurring concurrently with the bison jumps in the same region. While less dramatic than the bison jumps, these Paleoindian hunting patterns should be seen as the norm for hunting bison in the plains and foothills of the Rockies through to the contact period. Even during the heyday of the bison jumps, this Paleoindian pattern would still have held true in areas such as Glacier National Park, where no bison jumps with evidence of repeated use and a high level of processing have yet been found.

To recap, the Paleoindian bison hunting pattern best represents a small scale, one-time hunting event using communal tactics with the end goal of feeding a mobile group. Processing of the bison was limited to the immediate needs of the group rather than for trade goods.

Paleoindian bison hunting was certainly communal, used the terrain and a knowledge of bison biology; however this pattern was nowhere near the systematic and almost industrial nature of the late archaic bison jumps.

Hunting Strategies

There are a wide array of strategies which were used to hunt bison by the people of this region over the thousands of years that people have hunted bison. A general review of these strategies reveals the unique nature of hunting bison, which often requires communal tactics and clever utilization of terrain and landscape to be successful. The strategies used for hunting in Glacier can at this point only be inferred from some of the strategies employed elsewhere, and thus I will here make comparisons to the landforms and vegetation in Glacier and those from known bison kills elsewhere.

Use of the landscape

Nearly all forms of pre-modern bison hunting required some basic use of the landscape. Bison are usually found in herds, they can have massively thick hides, run surprisingly quickly, and become very dangerous when threatened or startled. For all the above reasons, hunting bison with pre-modern weaponry would not have been as simple as getting close and letting loose with your chosen projectile. In most cases, a single projectile would not be enough to make a kill and a hunter would run the risk of losing their prey or worse, their life (Frison 2004; Frison 1998; Brink 2008; Bamforth 2011). It makes sense then that people looked to find ways to slow bison down or trap them so that multiple hunters could get in close safely while the bison had reduced mobility.

Throughout the entire length of time in which humans have hunted bison, they have usually utilized some terrain feature to limit the bison mobility or to kill them outright (Bamforth 2011; Frison 2004). Archaeological data from across North America has revealed bison kill sites in terrain features such as swamps, wetlands, arroyos, and slot canyons to name just a few (Frison 2004). In some cases the intent is to pressure bison into these features where they would be less able to charge or escape, allowing a multitude of hunters to get within range and focus fire on individual bison. In other cases, such as at the Olsen-Chubbuck bison kill on the plains of eastern Colorado, the intent appears to have been to simply direct bison into the arroyo features and allow the bison to stampede themselves to death upon approaching an impassible section of arroyo (Frison 2004). In both scenarios, a small group of hunters could find success in hunting many bison at once by working as a group's and utilizing the available landforms. Bison kills of this nature have been dated to the earliest Clovis times and continue well though to the late pre-contact (Frison 2004).

The landscape of Glacier does not contain many if any suitable arroyo or slot canyon features due to the predominant glacially carved u-shaped valleys, but a number of marsh/wetland areas exist throughout the valley-bottoms which could well have served as traps. As of yet no excavations have been performed in any of Glacier interior wetlands to confirm or deny this possibility, and this remains a ripe avenue for future research. There are furthermore several natural terrain traps that are unique to the region's cold winters: frozen lakes and snowdrifts (Reeves et al. 2003). Due to the ephemeral nature of these cold-weather features, archaeologically associating a kill with a snowdrift or frozen lake can be challenging if not impossible. The seasonal nature of snowdrifts requires archaeologists working on a site to revisit the site in winter to establish the presence of snowdrifts on site. In the case of frozen lakes, the

seasonal thaw would erase all evidence of the kill having taken place, meaning that all evidence of this activity comes from oral histories and ethnographic research.

The Surround.

In those days the Pi-kun'-i were very numerous, and sometimes when a lot of buffalo were found in a favorable position, and there was no wind, the people would surround them, and set up their lodges about them, thus practically building a corral of lodges. After all preparations had been made, they would frighten the buffalo, which, being afraid to pass through between the lodges, would run round and round in a great circle, and when they were exhausted the people would kill them (Grinnell 1892, p. 234).

As described in the above quote, one method of hunting a small amount of bison involved surrounding them with either mounted hunters, lodges, or perhaps even pedestrian hunters in large numbers. Bison in such a circumstance will become agitated and attempt to escape the surround but will ideally be unable to. Eventually, the bison will wear down, facilitating a closer approach from the hunters (Frison 2004). To see such an event take place would be incredible, especially in the above described case of setting up lodges. Because of the difficulty of this task, the length of time it would require, and the mobility needed by the hunters to be successful; it seems likely that surrounds such as these would be more common after the arrival of the horse in North America.

The Corral

The buffalo will not dash themselves against a barrier which is entirely closed, even though it be very frail; but if they can see through it to the outside, they will rush against it, and their great weight and strength make it easy for them to

break down any but a heavy wall. Mr. Hugh Monroe tells me that he has seen a pis'kun built of willow brush ; and the Cheyenne's have stated to me that their buffalo corrals were often built of brush. Sometimes, if the walls of the pis'kun were not high, the buffalo tried to jump or climb over them, and, in doing this, might break them down, and some or all escape. As soon, however, as the animals were in the corral, the people — women and children included — ran up and showed themselves all about the walls, and by their cries kept the buffalo from pressing against the walls. The animals ran round and round within, and the men standing on the walls shot them down as they passed. The butchering was done in the pis'kun, and after this was over, the place was cleaned out, the heads, feet, and least perishable offal being removed (Grinnell 1892, p. 231).

The use of constructed corrals to hunt bison is well documented across North America (Frison 2004). Bison are not generally inclined to enter enclosed spaces, and some trickery is required to encourage bison into any form of corral. One method of doing this is a variant of the buffalo jump, where instead of building drive-lines towards a cliff, the drive lanes head towards a pre-constructed corral (Frison 2004). Yet another variant which is evidenced by the Boarding School jump near Browning, Montana is a buffalo jump with a corral at the base of the jump. In this case the jump itself does not necessarily serve to incapacitate the bison outright but to trick bison into the corral where they are more easily dispatched. At this site cottonwood logs were combined with cottonwood posts and covered in manure and water which created a challenging surface for bison to escape (Frison 2004). Other corrals were not always so sturdy, as bison are reluctant to run towards the edges and will instead begin to circle and become agitated. Some corrals appear to have been constructed using the bones of earlier dispatched bison themselves (Frison 2004). It is important to note that corral construction is the most labor and tool intensive method of hunting bison, and this type of hunting occurred predominately during later periods, such as the last two thousand years, although there is evidence of corrals going back 4,500 years

before present (Frison 2004). Corrals would allow hunters to work together to target bison from close range with a greater degree of safety than out in the open, and their construction expanded the usefulness of the landscape through modification.

The Bison Jumps

Morning came. The people climbed the bluffs and went out on to the prairie, where they hid behind the piles of rock and bushes, which reached far out from the cliff in lines which were always further and further apart. After a while, he who leads the buffalo was seen coming, bringing a large band after him. Soon they were inside the lines. The people began to rise up behind them, shouting and waving their robes. Now they reached the edge of the bluff. The leaders tried to stop and turn, but those behind kept pushing on, and nearly the whole band dashed down over the rocks, only a few of the last ones turning aside and escaping. (Grinnell 1892, p. 160)

[The bison drive] is surely one of the great dramatic stories in the course of human history. If a herd of one hundred bison were run off a cliff at a single event (a number considered average), there is nothing in the four million years of human evolution when a comparable amount of food was procured at one time...Through millions of years of adaptation, mass killing of bison on the Great Plains of North America, using jumps and wooden corrals, was the most productive food-getting enterprise ever devised by human beings. (Brink 2008, pp. 3–4)

The bison jumps hardly need an introduction as they have garnered enough academic and popular attention that they are arguably common knowledge. Driving an entire herd of stampeding bison over a cliff or into a constructed enclosure is clearly one of the most amazing

things humans have ever done. This may sound like a superlative, but consider for a second the achievement that the buffalo drive represents. At the very minimum, a bison jump requires coordination of a large number of people. In our modern world economy with employment, police, and state government there are many methods by which to get many people to coordinate on a single task. However, it must be appreciated that during the late archaic no comparable systems existed. As will be discussed below, bison hunting cultures must have developed cultural systems for organizing and incentivizing participation in these communal endeavors. Beyond coordination, a bison jump further requires a precise and tactical use of the landscape in a way not much different than modern military strategy. Drive-lanes regularly extend for miles in astonishingly organized fashion.

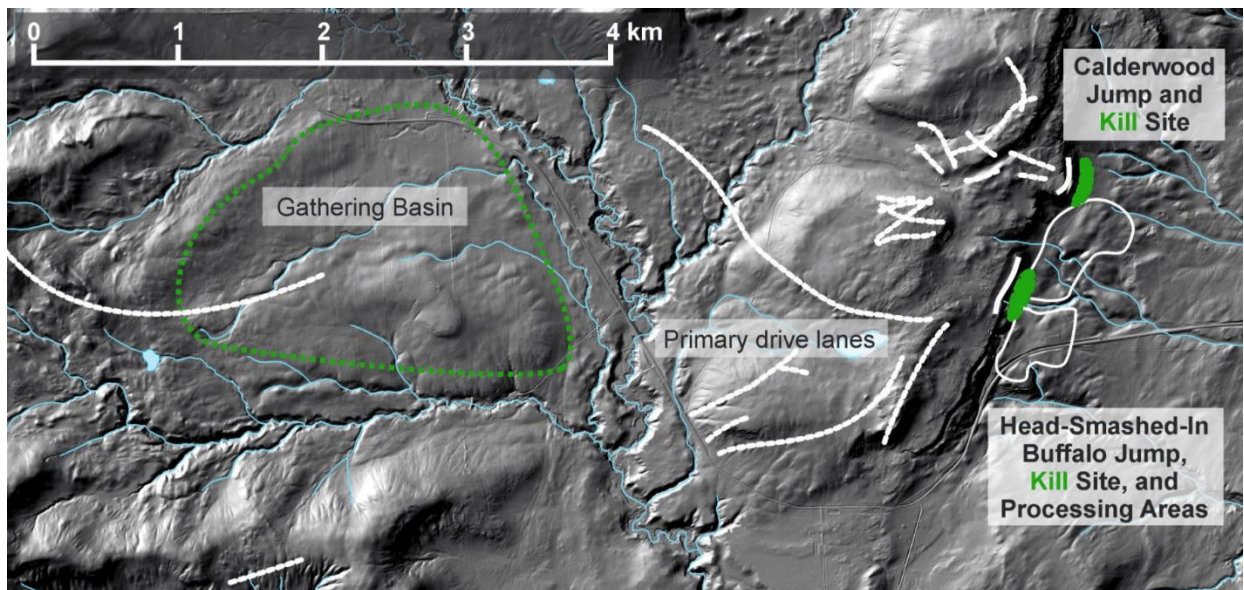


Figure 3: Overview of the Head-Smashed-In and Calderwood Buffalo Jump landscape with archaeological features highlighted. Note the massive scale that these features occupy. Source: albertahistoricplaces.com

These drive-lanes should be considered among other human achievements in constructing monumental architecture. While buffalo jumps have been found in Wyoming, Alberta and Saskatchewan, Montana is widely regarded as the epicenter of this activity. Two of the most famous jumps are in Montana just outside the park: the Two Medicine and Boarding School

jumps and the UNESCO world heritage site Head-Smashed-In is just under fifty miles north of the Canadian border from the park. The mountains of Glacier are visible from each of these important sites, and while no evidence exists of jumping within the park, it is necessary to understand that the people coordinating and executing these jumps were the same who occupied Glacier.

A Cooperative Endeavor

We have already discussed many of the important people required for a bison hunt even outside of the hunt itself. Let's consider now the individuals who would take part in the operation of a bison drive. People must build the drive lanes in a fairly linear fashion for miles across the undulating prairie, a manipulation of the landscape that should be considered monumental (Oetelaar 2014)²³. Someone at one end of a drive lane would have no hope of seeing the beginning, relying instead on planning and knowledge of the landscape. Someone must also keep track of the bison herds location for days and even weeks prior to the hunt and then signal others when the bison are in the correct location to begin a drive. Once the bison are near the jump, they still must be coaxed into a 'gathering basin'²⁴. This could be done in variety of ways, such as wearing a wolf-hide to indirectly pressure the bison in a general direction (Brink 2008). Finally, someone must be the buffalo-runner, a highly prestigious and dangerous job in which one instigates the herd to run in a specific direction by mimicking a buffalo-calf. Once the herd is

23 The manipulation of the landscape does not end with drive lanes. There is now plenty of evidence that indigenous people used fire to create desirable grasslands for bison in strategic locations (Roos et al. 2018).

24 Russel Lawrence Barsh and Chantelle Marlor have suggested that people might have learned these innovative techniques by observing other animals in the environment. From the wolf they learned how to 'herd' the bison, and from the beaver they learned the value of modifying the landscape to suit their needs (Barsh and Marlor 2003).

charging, there would be scant time to escape from being trampled or run over the edge. And finally, someone must coordinate all of these tasks throughout the endeavor. While nearly all forms of bison hunting should be considered communal, the bison drives could be argued to be the apex of communal hunting in North America in pre-modern times.

Communal activity presents a series of problems identified by Charles Stanish, David Caballo and others as 'Collective Action Problems' (Carballo 2013a, 2013b; Stanish 2017, 2013). One such problem is known as the 'freeloader problem.' As described by Charles Stanish, the freeloader problem essentially recognizes that all cooperative enterprises are easily undermined by those who are able to cooperate but choose not to, thus benefiting on the cooperation of the group without individual effort (Stanish 2017). For example, an individual might show up to a bison drive after the bison had been killed and take some meat without helping build the lines or risking their life in the hunt. Bison-hunting cultures would have had to develop cultural systems to incentivize these people to cooperate, either through some reward or punishment. This helps explain how one's social standing might be involved in the bison hunt: a non-participant might be shunned whereas a buffalo-runner might become a widely-regarded person with great power. Exactly what these cultural systems were is worthy of a separate research project which would require a deep analysis of the available ethnographic literature. One clue comes in the following passage from Grinnell's research in Blackfeet Lodge Tales:

“If a man left camp to hunt buffalo by himself, thereby driving away the game, the All Comrades were sent after him, and not only brought him back by main force, but often whipped him, tore his lodge to shreds, broke his travois, and often took away his store of dried meat, pemmican, and other food. (Grinnell 1892, p. 220)”

This passage highlights one possible collective action problem and the solution. An individual hunting for oneself could spoil a hunt for the entire group. This would have been a serious problem and would have required some incentivization for individuals to not hunt alone. Here we see that among the Blackfeet a certain society existed which had a ‘police-like’ role, which is a feature of the modern state. Today there is a multitude of systems in place which incentivize communal labor: governments, militaries, police forces, employers and more all offer rewards and punishments for engaging in communal activity. What is interesting about the communal nature of the bison drives and the Grinnell passage above is that there is clearly some ‘state-like’ forces in place during the era of the bison drives among the cultures who participated in them. This is no small feat, as the development of these systems is not universal and has only occurred independently in regions on the verge of major cultural changes (Stanish 2017). This fact supports the claim the bison drives represent something truly unique in North American history rather than simply an interesting hunting strategy.

Bison Jumps in Glacier?

The people who maintained and used the Head-Smashed-In Buffalo Jump would have familiar with the mountains of Glacier. When standing on top of the bluffs at Head-Smashed-In in Alberta, one can view the northern peaks of Glacier, in particular Chief mountain. Despite all of this, there is no reason to believe that any such jumps exist in Glacier National Park itself. While many of the pieces to the puzzle were in place, one key piece was missing: suitable terrain. Glacier’s topography is characterized by large U-shaped valleys with rapidly rising peaks, much too large for a jump. This is not to say bison were not driven inside the park. On the contrary, a

confirmed bison drive lane has been found inside Waterton National Park, and many other sites in Waterton/Glacier appear to be the terminus of drive lanes. However, the drive lanes do not lead to a jump, but rather other terrain features or a constructed corral might have been used to trap the animals, or a constructed corral.

It is important to remember that not all bison-hunters were as solely devoted to bison as the Blackfeet were. Ktunaxa bands crossed over the Rockies for millennia to seasonally hunt bison within Glacier National Park itself, rarely leaving the security of the mountains and foothills. There is little evidence that they would have orchestrated or even desired to drive bison over cliffs to the degree that plains tribes did. One statement from Ktunaxa Chief Paul David collected by Claude Schaeffer are instructive in this regard. "The Akanahonek never travelled far into the plains, as the distance was too great to pack the meat back; they also lacked horses and were too few in numbers to withstand Blackfoot attack (Schaeffer n.d.)." The Ktunaxa at this time (1700s-1800s) primarily lived on the western slopes of the continental divide, crossing at least once a year to hunt bison. While David mentions the small numbers of those who crossed the mountains as being no deterrent to the Blackfeet, they would also not have had the numbers to drive Bison over cliffs. Even were they to do so, they would have no need for such a large amount of meat. Thus, once again, their hunting strategy would have fit the "single-use/expedient-processing" model rather than the more "industrial" model found at the jumps.

Hunting In Glacier

Reviewing the variety of methods used to hunt bison allows us to speculate as to how people might have hunted bison in the mountains of present-day Glacier National Park. I have already mentioned that bison-jumping was likely not employed here due to the lack of suitable terrain,

although bison driving was certainly employed to some degree. Waterton National Park in Canada contains the regions only located drive lane involving the use of stone cairns, but these features are easily obscured over time and it is entirely possible that such features may have existed in the Glacier National Park portion of the international peace park. Furthermore, drive lanes involving cairns are not strictly necessary when there are natural tree-lined meadows or other features that can contain a herd in a panic. Glacier National Park contains many open meadows surrounded by dense timber, particularly on the less vegetated east-side. Many of these meadows occur on sloped alluvial fans which would have aided hunters in getting bison into a full run downhill where they could be driven into some form of man-made or natural trap. In fact, many of these meadows lead directly into marshland or lakes, providing a natural barrier that could contain the bison long-enough to hunt. We should expect that bison-hunters would have made use of these natural features when possible. We should also expect that much hunting of bison in Glacier occurred on a smaller scale following the single-use pattern, with small groups coordinating to take out isolated or small groups of bison. These hunts would not involve man-made features, nor any regular reuse of hunting sites.

The above statements should be interpreted as speculation based on extrapolating information about plains-based hunting. The following chapter will review some of the hard data: physical locations where bison faunal remains have been found with or without cultural association. This review will bring into focus some of the above speculations as they are applied to actual landforms and environments in Glacier National Park.

Chapter 5: Bison in the Mountains

This chapter will take a closer look at the physical locations within the park where bison have been found. What follows represents the culmination of a summer's worth of in-person site visits, extensive archival research, and the creation of a geodatabase. During the summer of 2020 I combed through hundreds of records and talked with various park staff in order to ascertain where bison have been found in Glacier, ultimately collecting this data in the form of a geodatabase. The goal of this compilation was to learn in what contexts bison have been found and compare this data with knowledge about bison hunting gleaned from archaeological studies outside the park and oral traditions collected from bison-hunting societies.

This section will delve into more than just archaeological statistics: I am interested here in what geographical features are present, the local vegetation, access to water, and association of faunal material with cultural material. In order to better understand these locations, I visited a good number of them in person during the summer of 2020, in some cases even shovel testing site and making faunal collections as a part of my regular job duties as an archaeologist for the park.

While the final geodatabase has sixty-six entries, only a selection of these sites are discussed here. This is because many sites are nearly identical in their context to one another, and it would be tedious to review each and every one. The goal here to review sites that are in some way unique or representational of a larger array of sites or any unique circumstances.

Belly River

Even for Glacier National Park, the Belly River drainage is unique. It is one of the only major east-side drainages to not contain a valley-bottom lake in its plains-adjacent lower reaches. Instead, the eponymous Belly River winds its way through one of the most intact grassland habitats in the park. Very little has disturbed this drainage from how it would have looked thousands of years ago, with only a trail, a barely visible old wagon road, and a backcountry ranger station (built in 1926, with the barn going back to 1912) as evidence of modern activity. Towering above the Belly River Ranger Station is Bear Mountain, a locale for prayer and fasting, and Mt. Cleveland, the tallest peak in the park at 10,479'. Chief Mountain can be also

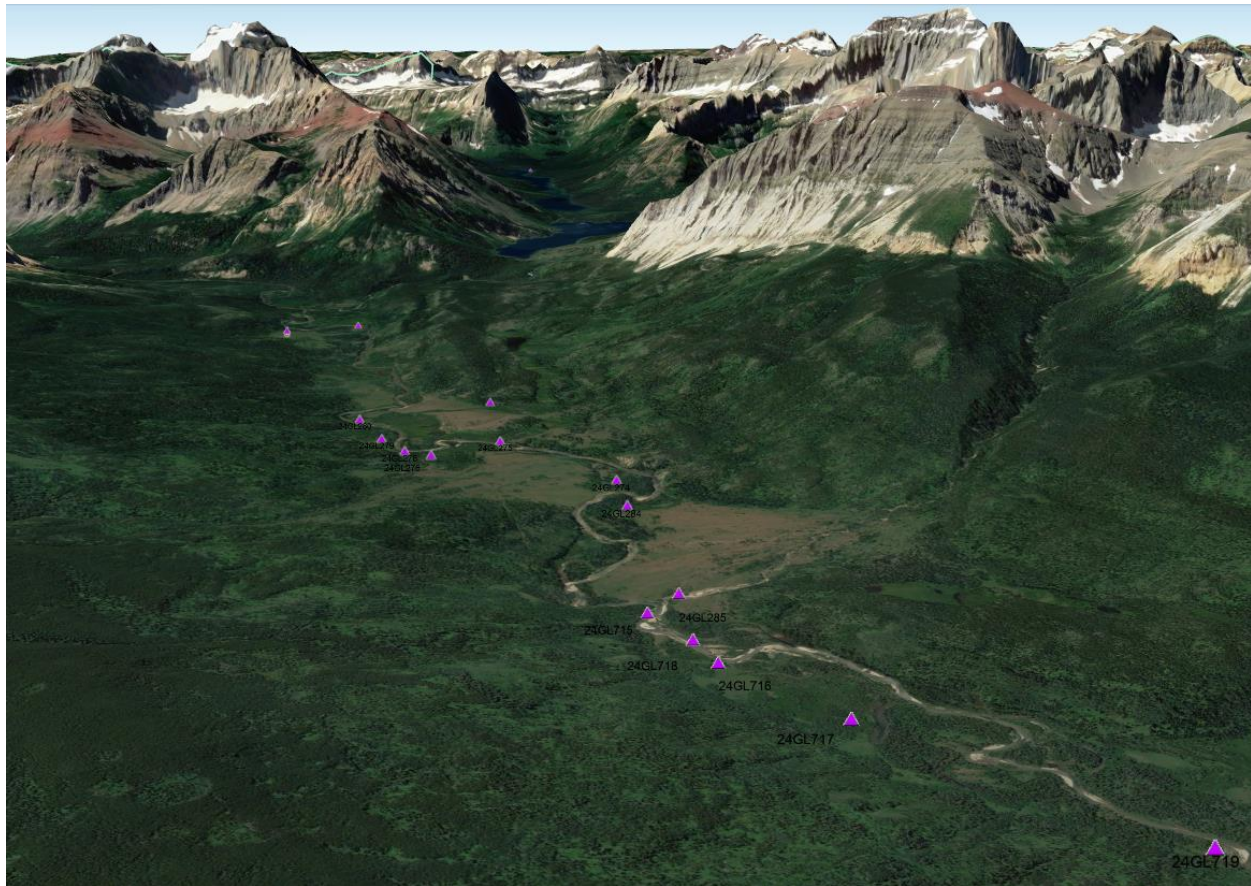


Figure 4: Google Earth view of the Belly River region. Pink triangles are sites with bison faunal evidence from the geodatabase created for this project.

seen from some vantages in the Belly River, which has always been of the greatest importance to the Blackfeet and other tribes whose traditional homelands included Glacier National Park.

Of all the places I have travelled in Glacier, nowhere does the absence of bison strike me as plainly as the Belly River, where the extensive grasslands seem oddly empty. Even the name Belly River originates from and refers to bison. “Belly River bears one the oldest known names in the International Peace Park. In Blackfoot this river is called Mokowánisz, referring to the digestive system of the buffalo (Holterman 2006, p. 32).” The archaeological record in the Belly is replete with evidence that this place was an important bison habitat. To date there are sixteen bison faunal find locations in the Belly River drainage, the vast majority of which were found rather deeply below surface and only located through shovel-testing. This suggests that the valley bottoms grasslands have regular deposition and a high likelihood for buried deposits. There is also a lengthy human record here, including one of the parks earliest known sites dating to the Clovis period (Reeves et al. 2003).

24GL274

The first site we will discuss is one that truly deserves a research project dedicated to it alone. Approaching this site from the south (the only access from land), it is nearly impossible to detect the sudden, roughly 20 foot drop in the wide grassland to a small tree-ringed meadow below. The meadow forms a perfect natural corral: there is no escape except for into dense trees or the river itself, both of which bison generally avoid, especially in a panic. The meadow contains no surface artifacts or faunal remains, but the Belly River is actively eroding a large section of the meadow every year, revealing a large quantity of bison bone. Several samples of bison bones were analyzed in 1994-5, revealing a three distinct dates of 1060 ± 80 radiocarbon years B.P. for

one sample, 950 ± 60 years radiocarbon years B.P. for another, and 1440 ± 60 radiocarbon years B.P. for a third (Reeves et al. 2003, p. 129).



Figure 5: Overview of site 24GL274. Below the natural drop-off bison bones have been found with evidence of human butchering. Some of the bones were found near charcoal lenses possibly associated with cooking or 'firing' the site after hunting.

The eroding bank contains not just bison bones, but a high quantity of fire cracked rock and even more importantly, several distinct charcoal lenses which appear to be the remains of hearths. This would be expected at a bison kill/ processing site, as fires must be started for both cooking and dehydrating meat for long term storage. These lenses did not appear to be 'boiling pits' necessary for grease extraction, but excavations could reveal otherwise. Supporting this conclusion was the location in 2020 of bison bones near these charcoal lenses with apparent

human modification²⁵. Despite all this, only one single definitively cultural artifact has ever been found here: a quartzite decortication flake found in a shovel test a 55cm below the surface (Reeves et al. 2003). However, only one shovel test has ever been performed anywhere in the meadow and conclusions should not be drawn at this point.



Figure 6: A cross section of some charcoal lenses found at site 24GL274. Although not visible in this photo, bison bones are regularly found eroding out this same strata.

²⁵ I am excitedly awaiting the results of an Carbon-14 isotopic analysis on these faunal remains, which could yield a estimate age of these bison.

I wholeheartedly recommend this site for future research for multiple reasons. First, if this is indeed a bison kill site, it would exemplify the creative use of the environment often necessary to hunt bison. The combination of an almost imperceptible natural drop-off and a natural 'corral' would be perfect for trapping bison. Furthermore, the grassland above the site is a prime bison habitat, and so would have required minimal effort to serve as a gathering basin for a small herd. Finally, the meadow has direct access to water via the river, an often-underappreciated element in any game processing locale. Processing meat is time-consuming, hard work and access to water would facilitate spending greater amounts of time on-site (Brink 2008). Finally, the facts that this site is actively disappearing due to river erosion and yet has so much data potential means this site is a good candidate for further investigation. What has been found here has been found deep: between 50cm to over 150cm below surface. Sites with deep stratigraphy are the most useful to archaeologists because not only do they have the potential to be older, but they can also yield information about past climates, vegetation, and landforms. Until more research can be done, Glacier National Park should continue to make a practice of revisiting this site regularly.

24GL276

In a meadow further up the Belly River drainage and far away from the river itself lies another bison faunal site, 24GL276. At this site seven bison bones were located within ground-squirrel holes in a 50 x 15 meter area (Reeves et al. 2003)²⁶. This is somewhat regular for exposures in

²⁶ Looking through ground-squirrel holes is a tactic of utmost importance for doing archaeology in Glacier, where vegetation is often very dense and deposition of soils regular. Many a site has been located using this method, and

the Belly River, and this is but one of sixteen sites with similar faunal components found in rodent back-dirt piles. This site is slightly unique due to the presence of one bone which had evidence of having been burned (Reeves et al. 2003). There is no way to prove that this burning was cultural (i.e. that someone burned this bone rather than a wildfire). However, shovel testing at this site revealed uncommonly shallow deposits, suggesting that this bison would have died relatively recently, such as in the 19th century (Reeves et al. 2003). At this time, no major wildfire had occurred in the Belly River recently leaving open the possibility that these bones were in fact burned by humans. Further evidence of this is that one of the rib bones showed inconclusive evidence of butchering. In short, this site leaves us with more questions than answers, but certainly hints at past human activity. There is nothing geographically remarkable about this site which might facilitate bison hunting, other than it being in a semi-enclosed meadow.

24GL283

This site is one of the rare bison faunal sites on the North side of the Belly River and is far away from the river itself by a good margin. The isolation of this site seems peculiar, but it reflects the fact that most survey has been undertaken near the trail system, which is presently on the southern side of the Belly River. However, this was not always so: an old wagon road once traversed the meadow nearby 24GL283, and it is likely for this reason that a former backcountry ranger noted this site in 1987 (Reeves et al. 2003). This site has yielded six pieces of bison bone and a single quartzite flake, which would be mostly unremarkable were it not for the additional

there is no greater animal ally to the archaeologist in Glacier, as long as one is careful about setting down ones backpack (a favorite salty snack for small rodents).

find of an Avonlea-style projectile point fragment, which dates from around 1,700–1,400 B.P.. to 1,100–900 B.P. (Peck 2011; Reeves et al. 2003; Bubel et al. 2012). This point is thought to be one of the first projectile point styles in the region of Montana and Alberta that can be associated with the bow and arrow rather than atlatl (Peck 2011). While the point cannot be linked to the bison bone, it is worth mentioning nonetheless as it is rare to find cultural material and faunal material so nearby in Glacier on the surface.

24GL289

So far, all the sites in the Belly River have been in a similar geographic setting and not far removed from each other. This allows us to conclude that the lower Belly River valley was certainly a place where both bison and humans lived and interacted, although a lack of carbon-14 dating prevents any more definitive statements. Most of these sites have been around the Ranger Station or downriver from it, with the Ranger Station itself being a common surface find location suggesting it was once a seasonal camp (Reeves et al. 2003). Upriver from the Ranger Station there is only one site with faunal material, but this site is interesting enough to warrant mention.

24GL289 is a site with only one component, fragments of a bison skull were uncovered during the excavation of a pit toilet in 1988 (Reeves et al. 2003). These were positively identified as bison via their molars, which are easily identifiable due to the presence of a stylid (Reeves et al. 2003). These fragments were found at a depth of just over 1 meter below surface, which precludes useful surface examination. I did visit this site in 2020 and performed two shovel tests as part of the installation of a new food-hanging pole but was unable to dig below 70 centimeters below the surface (cmbs). This site is primarily worth mentioning because it is significantly closer to the continental divide than any of the other bison sites in the Belly River. The presence

of bison this close to the divide supports the hypothesis that bison could and did travel over the divide into the western half of the park here where no bison remains have ever been found.

Many Glacier

At first glance, Many Glacier seems like a poor place to find anything archaeological, as there is very little available real estate not taken up by roads, chalets, ranger stations, campgrounds, parking lots, or indeed mostly lakes. However, the Many Glacier area is home to some of the most dense and varied archaeology in the park indicating that this area was used extensively from the earliest of times (Reeves et al. 2003). In order to understand the archaeology here, one must ignore the extensive modern human modifications to the landscape, starting with Lake

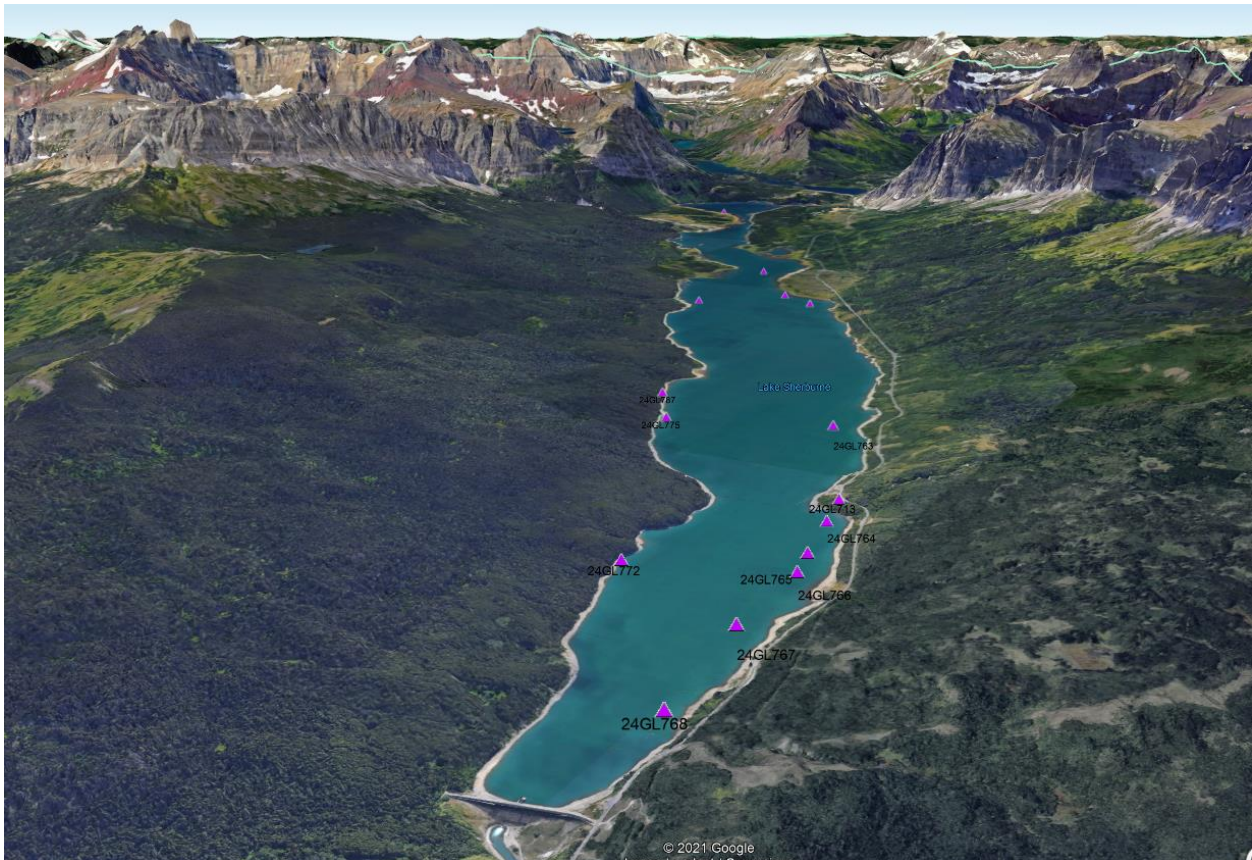


Figure 7: Overview of the now dammed Lake Sherburne in Many Glacier with 'bison sites' represented by pink triangles.

Sherburne. The lower region of the Many Glacier Valley was not always a large lake, it would once have been a series of small lakes connected by Swiftcurrent Creek. However, in the early 1900's (1914-1921), the Bureau of Reclamation constructed the Sherburne Dam, inundating the lower stretches of the valley with the lake seen today²⁷. In the process, they flooded countless archaeological sites which would not be seen again until the 1990s. While this may seem like a tragedy, in all likelihood these sites would never have been located were it not for this flooding. As I have mentioned before, most of Glaciers archaeology is deeply buried or in dense vegetation and is obscured from view via pedestrian survey. However, as revealed dramatically in Waterton after the 2017 Kenow Fire, archaeology is literally everywhere once you scratch (or flood and burn) the surface (Dunn 2018). During a planned annual drawdown of Lake Sherburne, archaeologists under the direction of Dr. Brian Reeves Inventoried the exposed muddy flats with stunning results (Reeves et al. 2003). Unfortunately, the reservoir is almost never drawn down to the levels they were for this original inventory, and thus most of the records for these sites come from a single site visit. Furthermore, the 2020 field season saw unusually high-water levels in the reservoir and no annual drawdown. Therefore, the following site descriptions are entirely reliant on documentary rather than personal observations.

24GL766

Prior to the damming of Swiftcurrent Creek, this site would have been perfectly situated for a seasonal camp or processing area. It would have been within a large clearing associated with an

²⁷ If you have ever driven to Many Glacier and complained about the horrible road conditions, look no further than the dam to blame. Seasonal fluctuation of water levels has an incredible destabilizing effect on nearby landforms, and the landform which the road was built on is not a particularly stable one to begin with.

alluvial fan which still exists above lake levels. Furthermore, a seasonal stream (also still in existence) would have cut right through this clearing and joined Swiftcurrent Creek. Here archaeologists found three fire-cracked rock features here along with hundreds of animal bones scattered across a fifty square meter area (Reeves et al. 2003). Unfortunately, they were unable to identify these bones or at least declined to do so in the site records. However, they did perform some shovel testing and positively identified a *B. bison* talus bone, confirming the presence of bison in this location.

The presence of fire-cracked rock features is worth mentioning. Fire-cracked-rock is easily identifiable; when rock is heated it will eventually crack in fairly predictable patterns and often has a distinguishing red or pink color. Fire-cracked rock on the surface is a fairly common occurrence in areas with lots of natural wildfires and means nothing on its own. However, a concentration of fire cracked rock in one place is often identified as an archaeological feature, as they are often the remains of hearths or boiling pits. These types of features would be expected at sites where people camped or where they processed meat after a hunt²⁸.

Bones and fire-cracked rock features are enough to insinuate that people once used a place but is often too little to say much more definitively. Fortunately, archaeologists also located three green argillite choppers and a “pointed black silicified siltstone uniface (Reeves et al. 2003)”. The uniface is clearly cultural and appears to be some form of knife (Reeves et al. 2003). The argillite choppers are as far as I know unique to the Mountain regions of Northwest

28 Keep in mind, without refrigeration preserving meat quickly would have been tantamount. This often involved drying meat over a fire, or in the open area via wind and sun if the weather was appropriate. See Brink 2008.

Plains (Montana, British Columbia, and Alberta) and have mostly been found at sites around Sherburne Lake, Lower Two Medicine Lake and St Mary. These argillite choppers are not made of the finer-quality metamorphosed green argillite mentioned earlier to make projectile points. Rather, these tools were made from locally available garden-variety green argillite found regularly in Glacier. These are not “good-looking” tools: they are clearly expedient tools used for a single purpose and then discarded. Furthermore, they are usually quite large, requiring both hands to manipulate. They are hardly sharp enough to cut though hide or even meat, but they look perfect for scraping along bones to extract meat or to later crush bones for marrow extraction, although this is admittedly conjecture. Studying these stones in more detail and in particular ascertaining their possible use in meat extraction would be a fruitful avenue for future research.



Figure 8: A green argillite chopper found near Lake Sherburne in Many Glacier. These tools are likely associated with big game processing.

24GL764

This site is just west of 24GL766 along the same shoreline and is primarily typical of sites along Sherburne Lake in that it consists of some bison bones (in this case a rib bone) and fire cracked rock concentrations. However, archaeologists found one unique tool here worth mentioning: a grooved maul. Grooved mauls are simple but important tools, consisting of a large round rock

with an abraded groove. The groove allowed the maul to be hafted to a wooden handle, which served to make a tool capable of crushing and grinding. Grooved mauls are associated heavily with animal processing in general, but are in particular associated with plains bison-hunting societies (Schultz 2002). The grooved maul would have been particularly valuable in cracking open long bones for marrow extraction and also in pounding meat in the making of venison (Schultz 2002). The presence of a maul here affirms that this area was used prehistorically for hunting.

24GL759

Moving significantly further west along the northern shoreline of Sherburne lies one of the most complex and dense sites in the entire Sherburne Lake area. Before Swiftcurrent Creek was flooded, this site would have been on a terrace created by a stream flowing into Swiftcurrent Creek and at the base of a large alluvial fan, the Windy Creek Fan. This would have created a natural place to drive bison into either a natural or man-made corral, with the Windy Creek Fan serving as an ideal gathering basin.

Archaeologists found a fairly complex arrangement of cultural and faunal material here scattered across the surface in a 50m x 50m area (Reeves et al. 2003). To begin, they recorded over 100 positively identifiable bison bones, including bison humeri, femora, metacarpals, pelvis', scapulae, ribs, radii, ulnae, crania, horn cores, a maxillary tooth, and a large number of mandibular teeth. They also found a horse humerus which almost certainly modern and not a Paleolithic-era North American horse. While it is unclear exactly how many different individual bison these bones represent, clearly this is not an isolated bison occurrence. Unfortunately, positive signs of butchering were not noted but this is difficult to spot on weathered bones.

However, the sheer number of bison in one place raises questions about the reason for and timing of their ultimate demise.

Answers to these questions are found, or at least suggested, by the cultural component of this site, which is rather robust. To begin, archaeologists found two green argillite choppers similar to those described above and still found along the Sherburne Lake flats in low water (Reeves et al. 2003). They also found a Bear Gulch Obsidian point fragment which they recorded as being most likely a Pelican Lake Corner Notched point. Bear Gulch obsidian comes from the Big Table Mountain area on the Idaho-Montana border near 1-15 west of Yellowstone National Park. It represents a high-quality lithic source not local to the Glacier area which would likely have been traded for. The style of the point, if accurately recorded, it listed as being “likely Pelican Lake,” which tells us that this point was likely used during a period of intensive occupation of Glacier during which atlatl technology was still in use (Peck 2011). If this point is associated with the myriad of bison bones, then we can begin to answer the questions of how and when these bison were killed. Other artifacts on-site included an obsidian parallel-sided flake side scraper (also Bear Gulch Obsidian), an end scraper fragment made of Bowman Chert, a pointed unifacial basalt knife, and a utilized Bowman Chert flake²⁹. Archaeologists also found five thinning/reduction flakes (two of quartzite and one each of Bowman Chert, mottled grey chert, and heat-treated red dendritic chert). The greater prevalence of tools in relationship to

²⁹ Bowman chert is a local lithic source found all over the park. Bowman chert is an off-white to light grey material which often contains imperfections. It is decidedly lower quality than other available materials but its local availability was clearly important as it is found in sites all over the park. Geologically similar deposits have been found in mountain ranges north and south of the park and stone tool quarries have been found in other locations with different names for the same material.

flakes immediately suggests that this site was associated with hunting and processing meat rather than long-term occupation, where tools were refined manufactured.

24GL759 is a complex site in desperate need of more conclusive relationships between its faunal and cultural components. These relationships cannot be established based on surface inventories alone as they require intact subsurface deposits and in-situ artifacts. Archaeologists during the 1994 inventory of this site noted that while the upper soil layers had been disturbed from flooding, it appeared to them that intact deposits still existed throughout the site which would lend this site toward having good excavation potential (Reeves et al. 2003). It is unknown if this is still true today, and this site should be visited the next time lake levels allow for it.

24GL787

Moving the southern side of Sherburne Lake, 24GL787 is unique not for what materials have been found but rather the on-site depositional context. This site sits on the highest levels of the reservoir, right where the forested treeline begins and is usually visible at any snow-free time of the year. Unfortunately, getting to sites on this side of the lake is challenging in higher water levels due to a lack of trails or roads. Usually, one must approach from the western areas of the lake when levels are low.

The site consists of an exposed soil profile where erosion from the lake causes soils to be visible. Places like these can be incredibly valuable for archaeologists, as exposed artifacts can be matched up with the soil stratigraphy to gain an understanding of their temporal context. When archaeologists first recorded this site, they found several large bison phalanges and a

quartzite core eroding out of the exposed wall (Reeves et al. 2003)³⁰. They also recorded a layer of Mazama Ash, which as I have previously mentioned was the result of a massive volcano around 7,700 years before present. Just below the Mazama Ash layer is a peat-bed. Peat is an accumulation of decaying organic material which often form in cool, wet regions where glacial activity has ceased. Peat is acidic and anaerobic which leaves fossil remains intact for far longer than in other soil types and makes it excellent for studying past climates and for finding faunal remains. Indeed, contained within the peat layer at 24GL787 are rather large bison phalanges, allowing us to conclude that bison were present in glacier before 7,700 years ago. The large size of these phalanges is also interesting, as it is possible that they belong not to *B. bison* but *B. antiquus*. *B. antiquus* is assumed to have ranged in Glacier, but so far no conclusive evidence can confirm this. The cultural component of the site (the quartzite core) was found above the Mazama ash, which means that the faunal remains are not directly related. However, this site deserves regular site visits and hopefully some subsurface testing in the future.

24GL201

The final site worth mentioning in the Many Glacier region is 24GL201, which sits on the southern side of Sherburne Lake all the way up at the head of the lake. The entire site is quite large and exists both above and beneath the reservoir at normal lake levels. Importantly, the site is within the Cracker Fan, a large alluvial fan that has created an open meadow which would have made for excellent grazing and would have served as an ideal gathering basin for bison. The site contains nearly all the expected artifact assemblages discussed in other Many Glacier

³⁰ A core is generally regarded as a piece of stone suitable for knapping with obvious flake removals. These are often round or square in shape and contain some amount of cortex.

sites, fire cracked rock concentrations, bison bones, and large green argillite choppers. Here archaeologists found butchered large ungulate bones which appeared to be bison but were ultimately inconclusive. Butchered bones are usually fairly obvious: they have clean lines and scrapes which could only be created through human modification. An important caveat is that this site shares a space with a known historical site, the former mining town of Altyn. This leaves open the possibility that the butchered bone is associated with the town of Altyn rather than the site's pre-modern occupants. The entire site is relatively easy to access via trail and shows clear evidence of regular collecting and likely as a result no diagnostic prehistoric artifacts have been recovered from the surface. There are also no complete historic bottles on the surface despite many broken ones which is also a sign of collection. 24GL201 is a site that deserves regular visits for the above reasons, as well as the possibility of finding more direct evidence of prehistoric bison butchering. Unfortunately, in its current state the site cannot tell us much more.

Lower Saint Mary

The St Mary Valley is one of the largest valley bottoms in the park, sporting an extensive grassland in its lower reaches and some of the largest lakes. Today, the St. Mary valley is also one of the busiest, containing one of the two major entrance stations to the park and the going to the sun road. These grassy meadows most certainly were important bison habitat throughout the

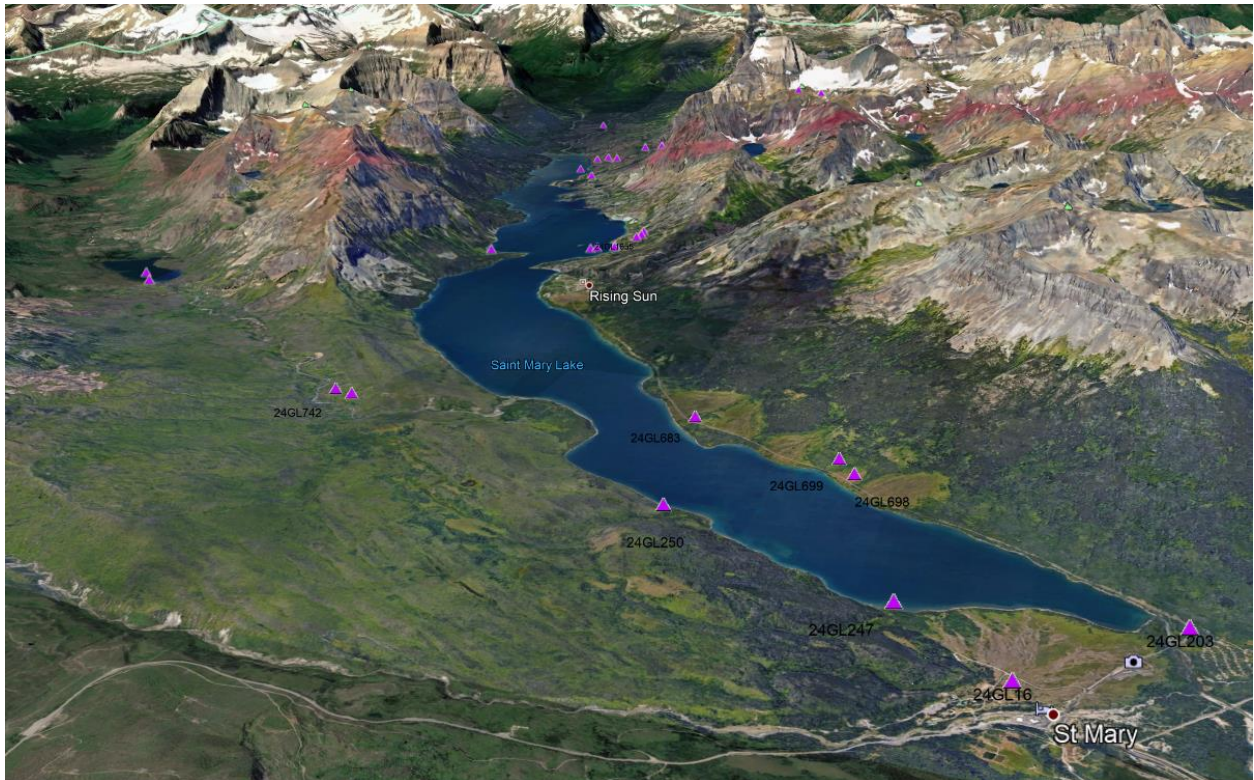


Figure 9: Overview of the Red Eagle (left), and St. Mary regions (right). 'Bison sites' are represented by pink triangles.

thousands of years bison lived in these mountains. They directly border the plains with no natural barriers to access. There is also plentiful water and even thick stands of trees to seek shelter from the at times brutal winds.

The grasslands of the lower sections of the St. Mary drainage result from large alluvial fans such as Two Dog Flats which run right into the lake from the slopes of Singleshoot Mountain. These large fans would have served as excellent gathering basins for bison which could ultimately have been driven down towards the lake into corrals. Several archaeological

sites at the toe of these fans (24GL698, 24GL699, and 24GL683) would seem to support this hypothesis. Each of these three sites consist of bison faunal fragments with no associated cultural material found just beneath the surface. 24GL698 and 24GL699 were both found during road construction and maintenance along the GTSR corridor.

Having surveyed these meadows personally, they are conspicuously absent of cultural materials on the surface. The reasons for this should not be assumed to be a lack of cultural deposits, but a lack of subsurface testing. Being an alluvial fan, these soils are in a constant state of deposition resulting in very deeply built soils. I have had the opportunity to shovel test in the vicinity of these meadows as well as monitor construction projects in the area, and in all cases the soil stratigraphy has contained unusually thick soil horizons that extend meters below the surface before hitting any major rocks or boulders. In a post-glacial environment large rocks and boulders are literally everywhere and are usually encountered within a meter of excavation, which means that surface examinations should not be relied upon to determine archaeological potential in this area, and the sites located here are often characterized by being subsurface.

24GL247

Site 24GL247 has only yielded one bison rib fragment, but the grassy knoll on which this site lies directly adjacent to the plains and would have been an obvious location for bison to frequent. Furthermore, the bison rib fragment was found subsurface during excavations in the same cultural layer roughly 20-40 cmbs., allowing us to associate this rib fragment with these artifacts. To quote the report “Associated artifacts included a Besant Side Notched point (made) of an opaque brown chert, two retouched flakes (basalt, petrified wood), a utilized Bowman Chert shatter, and a variety of thinning/resharpening flakes including three obsidian (two Bear Gulch,

one Obsidian Cliff Plateau), one Knife River Flint, two Metamorphosed Green Argillite, six Bowman Chert, one basalt, two coarse green argillite, and one grey quartzite (Reeves et al. 2003, p. 181).”

The Besant Side Notched Point is worth discussing. The Besant Phase in Waterton/Glacier is cited as being from roughly 2000 to 1250 years before present (Reeves et al. 2003). Besant points and the sites they are associated with are usually cited as being manufactured by a strongly bison-hunting culture that co-existed with but was distinct from early Pelican Lake cultures (Reeves et al. 2003; Peck 2011; Zedeño 2017). As I have stated before, I am skeptical of making cultural claims based on projectile point typologies, but I do agree that Besant projectile points are derivative from people who relied heavily on bison. This is a view held by nearly all archaeologists who study the northern great plains, associating the Besant projectile points with the people who perfected the bison drive lanes and bison jumps found so extensively in this region (Zedeño 2017; Reeves et al. 2003; Peck 2011). Furthermore, I do not think it a stretch to state that these are the very cultural traditions embodied by contemporary plains culture groups such as the Blackfeet whose reservation border is less than a mile away.

As for the other artifacts found on site 24GL247, they represent a materially diverse lithic assemblage indicative of the extensive trade networks known to have existed during the late archaic and through to the contact period. Finds included obsidian from the Bear Gulch quarry southwest of Yellowstone, Obsidian Cliff material from within Yellowstone proper, Knife River flint from western North Dakota, and local lithic sources such as metamorphosed green argillite and bowman chert. The lack of bison faunal finds here is disappointing, but this site has never been properly excavated and could still yield significant deposits. The above finds are from a small number of 1x1m test excavations and are thus only a small sample.

24GL203

Site 24GL203 is the most extensively excavated and studied archaeological site in Glacier National Park and is thus impossible to summarize in a brief statement. Just after entering the park through the St. Mary entrance station and visitor center, the GTSR crosses the outlet of St. Mary Lake. It is here that 24GL203 was first visited in 1966 by archaeologists Brian Reeves, Les Davis and John Brumley (Reeves et al. 2003). At this point, the site was known by locals and surface artifacts had likely been collected. The crew of archaeologists in 1966 noted butchered bison bone eroding out of the banks into the river along with some fire cracked rock and unspecified artifacts (likely lithic reduction flakes) (Reeves et al. 2003). Butchered bison bone is incredibly important to our story of bison in Glacier for obvious reasons. It means that definitively at this place in some point in time humans were butchering bison.

About a decade later, the park decided to expand the Going to the Sun Road corridor into its present-day highway width prompting a formal archaeological inventory in 1978 as a result of the newly passed National Historic Preservation Act. This survey unfortunately failed to relocate the site, likely due to its focus on the GTSR corridor itself and not the immediate surroundings. When the road was finally installed in 1992, it destroyed one of the more stable and likely important parts of the site (Reeves et al. 2003). As so frequently happens, a waterline was later installed through the site with no additional archaeological review. Perhaps as a result of the soil disturbance, several artifacts were located on the surface of this site in 1992, including an Oxbow Point and a Salmon River point base. These two points represent a significant portion of time hinting at a long occupancy of 24GL203. Salmon River projectile points are associated with the early to middle archaic, or more specifically 7,500 - 6,500 B.P. which would have been just after

the Mazama Eruption (Peck 2011). Oxbow points on the other hand range from 4,700 to 3,000 B.P.. taking us clear to the late archaic (Peck 2011). These two points represent a possible time span of 4,500 years of occupancy at this single location! Unfortunately, it was determined in 1992 that site did not meet the National Register criteria to be an eligible site based on largely negative surface findings.

In 1993 Brian Reeves and his crew visited 24GL203 and found a plethora of artifacts with over 150 individual find locations (Reeves et al. 2003). These included another Salmon River projectile point along with a variety of lithic materials including chert from Canada, Obsidian from Yellowstone as well as local lithics such as MGA and Bowman. They also noted multiple bison bone finds which they did not collect as well as a large chopper and net sinker stone used for fishing. Encouraged by these results, Reeves and his crew began evaluative excavations of the site on both sides of the highway using a series of 1x1m and 1x3m excavation units. To detail every find from these excavations would be an inefficient use of space here, but these excavations yielded significant amounts of bison faunal material. In some cases, over 100 fragments of bison bone were recovered from a single unit. Other animal bones found in excavations included deer, elk, beaver, bear, canid (dog or coyote), fish, and duck. Several of these bones including at least five of the bison bones show clear evidence of butchering or other human modification. Artifact assemblages found during these excavations found an incredibly diverse array of lithic artifacts supporting a lengthy use of this spot as a seasonal campsite from the mid to late 1800s to at least 5000-4000 years before present.

The site was chosen for excavation under the direction of Dr. Maria Zedeño in 2013 and 2014 and was largely excavated by Blackfeet Tribal members in close coordination with the Blackfeet Tribal Historic Preservation Office (Zedeño et al. 2016). Their findings were

consistent with those of Brian Reeves et. al. in the 1994 excavations, and importantly confirmed the presence of butchered bison and a boiling pit. In fact, Zedeño was able to conclude that many of the bison and elk bones found during excavations showed evidence of disarticulation, marrow extraction and boiling/cooking (Zedeño et al. 2016). Zedeño also concluded with Dr. Reeves that the site shows evidence of use going back thousands of years, with the caveat that the vast majority of artifacts date the last 1500 years (Zedeño et al. 2016). Of final note, Zedeño concluded that the St. Mary bridge site shows the strongest evidence of use during the colder months, a finding which would correlate with the period during which bison would be expected to range within the parks boundaries (Zedeño et al. 2016). Excavations at this site were concluded due to flooding and wall cave-ins without ever reaching the “bottom” of the cultural layers indicating that this site was used extensively and for quite a long time.

Red Eagle

The Red Eagle drainage stems away from the main St. Mary drainage in a southwesterly direction, with only a large morainal ridgeline separating it from the massive St. Mary Lake. Today, nearly the entire drainage is burnt as a result of the 2006 Red Eagle Fire. Prior to this event, the drainage would have consisted of an extensive grassland/woodland habitat near ideal for large grazers such as bison. Red Eagle Creek itself cuts through the drainage and is large enough to require attention and care in fording, but is crossable by large animals most times of the year. In its lower reaches, the creek gouges a rather substantial gorge through the landscape, creating a natural terrain trap.

Bison bones have been found all throughout the Red Eagle drainage in low densities, supporting the claim that this would have been a common location for bison to be for thousands

of years. After the fire, crews found a number of bison bones around Red Eagle Lake itself as well as along the trail connecting Red Eagle Lake to the Lower St. Mary area. Several pre-moder archaeological sites dot this trail network as well, reflecting the drainages use as a cross-continental divide travel corridor as well as a likely hunting location.

24GL742

The original recording of site 24GL742 records it as a possible kill site, stating the presence of a number of faunal remains with some evidence of butchering (Reeves et al. 2003). However, these remains were never identified, nor was any cultural material located along with them. Were it not for a bison skull found here years later by the trail crew this site would not be worth mentioning in this report. However, with the confirmation that bison bones are among the faunal assemblage here, this site becomes more interesting. 24GL742 lies directly adjacent to Red Eagle Creek in a significant gorge. Due to the creek and the gorge, 24GL742 is really the only place that bison attempting to travel from the lower St. Mary grasslands at the upper Red Eagle Lake meadowed woodlands would have be able to travel. 24GL743 is thus a natural bottleneck and would be a likely place to hunt ungulates moving though the terrain. Above this gorge on either site are excellent meadows with commanding views of the area including the gorge itself, which would make for a quality campsite. One of these meadows did indeed yield an archaic age campsite with a high density of lithic material within the existing trail tread. Therefore, it is likely that humans would have been able to observe animals travelling through the gorge with minimal effort. Unfortunately, without cultural material at site 24GL742 to back these claims up, the site is merely a location with a relatively high density of faunal material. This site should be examined regularly, especially after the high-water runoff of Red Eagle Creek.

Wild Goose Island Overlook Area

Further up the drainage, Most of the St. Mary valley is taken up by St. Mary Lake leaving very little room for travel by either human or animal. Natural barriers exist in several places on the north shore of St. Mary Lake and were likely a bottleneck of sorts for wildlife and bison, although due to bison faunal finds up-drainages from major pinch points it is clear that bison navigated through these areas.

In 2015, the Reynolds Fire burned over large sections of the St. Mary drainage revealing a number of bison bones which up until this project had been buried beneath layers of vegetation. The Montana State Historic Preservation Office standards for recording and documenting archaeological sites has changed since the 1990s, when a bison faunal site used to qualify. Nowadays, bison faunal sites are not eligible for a Smithsonian number and thus formal documentation due to a lack of cultural artifacts. However, keeping track of where bison were before their eradication from the park in the 1800s is a key to understanding the human story of Glacier National Park and thus one of the purposes of this project is to capture this data in a meaningful and sharable way. The geodatabase created as a part of this project is intended specifically to house and document sites in the park where bison have been found with or without culturally derived artifacts.

After the 2015 fire, eight new bison faunal finds were clustered on the North half of St. Mary Lake near the Wild Goose Island overlook. This is important, because this location is separated from the extensive grasslands of the lower St. Mary area by a large cliff band which runs right into St. Mary Lake forming a natural “roadblock”. Today, the Going-to-the-Sun Road (GTSR) weaves around this cliff-band as a result of clever engineering and rock-blasting. Before

the road was built however, this would have been a major obstacle to travel. Navigating around the north side of this cliff-band one winds up travelling up the Otokomi drainage along Rose Creek for several miles before the cliff-band subsides, making this route unlikely. Around the southern edge, the cliff quite literally drops off right into the lake. Quite possibly there was a navigable route along this edge of the cliff-band prior to the construction of the GTSR, but it would have been very narrow. Other routes also exist up an over the cliff-band from rising sun, but these require some careful route-finding. However they managed it, we know that bison most certainly navigated the Rising Sun cliff band because of the bones found after the 2015 fire. The concentration of bones in the area just west of this cliff band suggests that perhaps bison would have gathered here, perhaps due to a bottleneck. It would follow that human hunters could have taken advantage of this terrain trap, although direct evidence of this has not been found. Artifacts that would lead to more evidence of hunting such as butchered bone, fire-cracked rock, and meat processing tools such as argillite choppers have not been found in this location yet.

Baring Creek and Goat Mountain Region

As discussed, the Golden Stairs Dead Horse Point would have presented major obstacles to both humans and bison prior to the construction of the GTSR, so much so that Reeves wrote that there is little ethnographic or archaeological evidence that people used the upper reaches of St. Mary lake prior to the later precontact period, preferring instead to use other access routes further toward the divide such as Piegan Pass. However, bison faunal remains have been found on both sides and in-between these two major obstacles on the northern shore of St. Mary lake, indicating that bison must have established trails though these cliffs. In fact, the area around Baring Creek has become one of the areas with the most evidence of bison activity in the park, particularly

after the fire season of 2015 revealed several previously unknown bison remains. Bison up here either navigated the Golden Stairs and Dead Horse point or travelled over Peigan Pass from the Many Glacier region, over Siyeh Bend, and down Baring Creek. The first route makes much more sense, as modern bison are rarely found at high elevation passes and one would assume that bison generally prefer grassy valley bottoms even in pre-modern times. However, bison bones were found in 2012 eroding out of an ice patch at nearly 8,000 feet up near Goat Mountain, shattering any notions that bison avoided mountainous terrain or high elevations (Kelly and Lee 2017). In short, the Baring Creek and Goat Mountain region is the most intriguing of all places in Glacier in terms of past bison activity.

Baring Creek Area Faunal Finds

The 2015 Reynolds fire was incredibly hot and burned off nearly all the vegetation around the Baring Creek trailhead area. While fires are a natural part of any ecosystem, the Reynolds fire was particularly destructive in this area to the degree that the original native vegetation may never truly grow back. However, for archaeologists, fire presents a fleeting opportunity to see the exposed ground without the usual jungle of vegetation³¹. When park archaeologists visited the area around Baring Creek Trailhead, they found a surprising density of bison bones. The archaeologists were able to identify at least seven different bison based on the presence of skulls, and the number of individuals is likely to be much higher. All of these bison finds are within a relatively small area just at the exit of Baring Creek into the St. Mary valley. While some scattered archaeological materials have been found in the vicinity, none have met the present-day

31 At least until it grows back, which in Glacier can be a matter of one or two summers depending on burn severity.

definition of an archaeological site in the state of Montana. So, all we can say for now is that bison made it this far past the major natural barriers of the Golden Stairs and Dead Horse point.

In 2021, I visited this site with Brent Rowley and recorded over 15 individual bison jawbones, numerous longbones and vertebra, and one bison skull. None of these bones showed evidence of butchering nor were any artifacts, historic or prehistoric, located. This leaves us with a perplexing question: what killed these bison, or at least why are so many found all in one location? A natural cause is suspected given the current lack of evidence of human intervention. This site warrants further study.

Goat Mountain Ice Patch Bison

Hiking up to Siyeh Bend from the Baring Creek trailhead, hikers must climb about a quarter of the way up Goat Mountain and then traverse across its slopes to reach Siyeh Pass. Goat

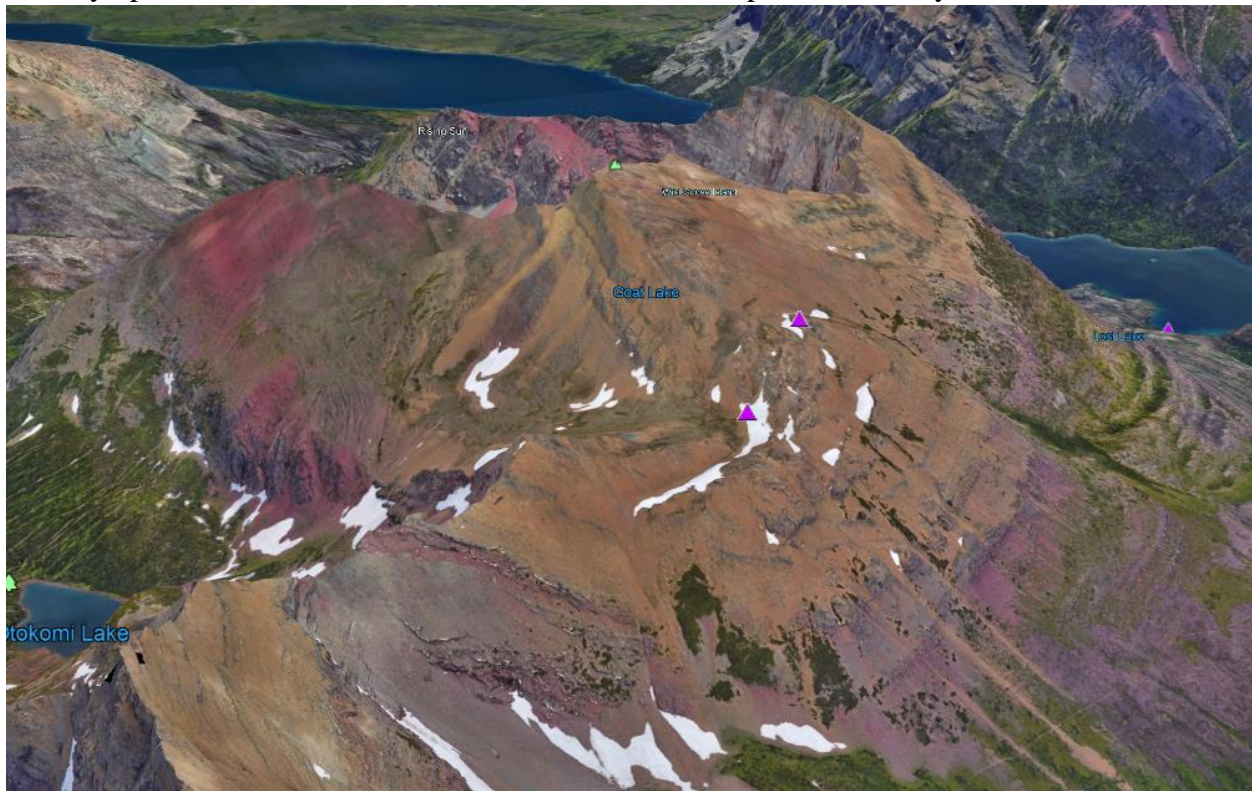


Figure 10: Location of bison faunal remains eroding out of ice patches on Goat Mountain. Note that the two ice patches with faunal remains are reasonably distant.

Mountain itself is a somewhat popular summit to attain, with no exposure and incredible views all the way to the plains and St. Mary Lake below. One can gain this summit from the Otokomi drainage as well. While lacking in exposure, the climb remains strenuous and requires a modicum of route-finding ability from either the Otokomi or Baring Creek drainage. Climbers must navigate a broken band of cliffs about three-quarters of the way up which harbor permanent ice patches: the remains of former glaciers that have since receded in size but retain some characteristics of glaciers in that they contain low-density ice. Unlike glaciers, the ice in a snow patch no longer ‘flows,’ meaning that any objects in the ice stay in the same location until they are exposed to the melted surface.

In 2012, a group of archaeologists decided to examine a few of these rapidly melting ice patches to search for paleontological, biological, archaeological and faunal materials eroding out



Figure 11: Overview of one of the Goat Mountain ice patches with bison remains melting out. Remains are rather densely scattered throughout this landscape both in the ice and the forefield.

of these ice patches as materials preserved in ice have the potential to add to our knowledge about paleolithic climate, culture, flora and fauna (Kelly and Lee 2017). While most of the ice patches they visited yielded only vegetation samples, one ice patch up on Goat Mountain yielded something surprising: bison bones (Kelly and Lee 2017). When I visited these sites during the summer of 2020, the first thing that struck me was the utter lack of vegetation: this terrain is nothing but cliffs, talus, and snow, with some small alpine plants that would not be enough to sustain any serious grazer. The second thing that struck me was that access to this site is far from simple, with sections of steep climbing through rough terrain required from nearly every approach. Sections of the hike required climbing hand over foot and over loose boulder-fields. It is tough to imagine something the size of bison even navigating the terrain. In fact, about the only reason I have seen put forth that large quadruped such as a bison would have to visit this location would be to escape heat and insects during mid-summer (Lee and Puseman 2017).

Adding to the intrigue of the Goat Mountain Bison was a set of bison teeth found in a second ice patch in the summer of 2020 by a Glacier National Park interpretive ranger. While the original ice patch had a density of bones greater than what would be expected for a single animal, the presence of teeth in an entirely different ice patch in a different area confirms that this was not an isolated occurrence. Bison were travelling up into this remote high alpine area with minimal forage potential at least somewhat regularly.

Unfortunately, no cultural material has been found in these ice patches as of yet. It would be an unlikely location to hunt bison primarily due to the challenge of transporting meat down through these cliffs. Despite the lack of cultural artifacts, several of the bison bone fragments were C-14 dated by the Ice Patch Project archaeologists, revealing a date of 967 ± 15 B.P. for the sample (Kelly and Lee 2017). The bison teeth found in 2020 were collected by myself and park

archaeologist Brent Rowley for further C-14 analysis pending funding. This is a site that should be regularly if not annually monitored during peak melt-off periods in the summer, typically the end of August and early September.

Cut Bank

Cut Bank is far enough removed from the Going to the Sun Road corridor that it remains far quieter in comparison to other areas of the park and sees relatively few disturbances from visitors or park projects. Adding to the remoteness of its location is a complete lack of services other than a trailhead and a small undeveloped campsite. No fires have ravaged Cut Bank recently and the forests and meadows here are some of the most peaceful and lonely in the entire park. I must implore readers to keep this fact to themselves! While quiet today, this drainage was once an important, ancient travel corridor for the region's indigenous peoples across the continental divide, as attested by numerous 1800s era accounts. In fact, it is listed as a trail and pass on the first maps of the region ever made, well before Glacier was ever a tourist or even mining destination (Cartee 1896; Matthes E., Francois and H.L. Baldwin Surveyed in 1900-1902). The drainage is also one of the more archaeologically promising as many sites contain both evidence of significant age and complexity.

Despite a clear record of human occupation and a generally favorable landscape for both bison grazing and bison hunting, no significant evidence of bison hunting has yet been found in this part of Glacier. I believe that this is a result of thick vegetation preventing ground visibility and that there will come a day when a wildfire reveals much more than is currently known. However, there is only one known site in this drainage with bison faunal remains.

The upper elevations of the Cut Bank drainage contain three lakes known collectively as the Morning Glory Lakes: Katoya, Pitamakan, and a third lake which is alternately called Lake of the Seven Winds, Seven Winds of the Lake, Solomons Bowl, West Lake, North Star Lake, and even Jonas Bowl (Holterman 2006).” Today, most maps refer to the lake as ‘Lake of the Seven Winds’ which does not appear in Holterman’s place name research at all. While “Solomons Bowl” name does appear in Holterman, he defers to the name “Jonas Bowl,” in reference to a Stoney Indian Chief (Holterman 2006). Whatever its name, it is at this third lake that archaeologists found a bison molar and vertebrae fragment alongside a light lithic scatter and a grey chert scraper (Reeves et al. 2003). In 2020 I visited the site and was unable to locate any faunal or cultural material in the dense vegetation (although the lake itself is sublime). It is still possible that there are buried and undiscovered deposits here as it is nearby several significant archaeological sites and a former travel corridor with confirmed prehistoric usage (Reeves et al. 2003; Thompson 2015; McClintock 1910). This site is near enough to the continental divide to be within eyesight and is one of the highest elevation bison faunal locations in the park. It is certainly the highest site containing bison faunal material to also be associated with cultural material.

Two Medicine

The most southern of the major east-side drainages in Glacier National Park is Two Medicine, which in many respects is similar to Many Glacier in its general layout. Both drainages have upper and mid-elevation lakes which drain into now dammed river systems. As a result, much of the archaeological assemblages which pertain to bison are very similar, featuring fire-cracked rock concentrations, diffuse lithic scatters, and green argillite choppers. This

indicates that both drainages would have been used in a similar fashion and likely concurrently by Native Americans. One notable feature of Two Medicine that is not present in Many Glacier is the existence of a substantial ‘basecamp’ style archaeological site at the foot of Pray Lake. This site is now mostly encompassed by the present-day campground where finding new artifacts is a regular occurrence. Unfortunately, the popularity of this location means that the archaeological site has been and continues to be heavily impacted. This does not change the fact that the Two Medicine area and in particular areas near its valley lakes would once have been an important location for many generations of Native Americans.

24GL823

While there are several sites outside the park boundary in Two Medicine that are perhaps more exemplary, site 24GL823 contains several relevant artifacts alongside bison faunal remains. The context for this site is very similar to those along Sherburne reservoir in Many Glacier. The site consists of fire-cracked rock scattered throughout in no consistent or concentrated fashion, which hints at the possibility of hearth features but does not prove their existence. Recording of the site also located several unspecified bison bones, and a coarse green argillite chopper. The chopper is very similar to those found in similar contexts in Many Glacier supporting the theory that these were tools used for harvesting meat from bison.

Recap and Analysis

The ultimate goal of this project was to create a geodatabase from archival records of bison presence in Glacier National Park. The direct result of this research was the creation of a geodatabase containing 69 entries, a significant number of which I was able to visit in person.

My hopes for this effort were to learn something about where bison may once have frequented prior to their disappearance in the 19th century. Furthermore, I hoped that this geodatabase might provide some insight into how humans might have hunted them in these mountains specifically. While the lack of any systemic surface or subsurface fieldwork within the park boundaries focused specifically on bison hinders any substantive analysis, there are a few key takeaways worth mentioning.

The first notable takeaway is that all bison remains in Glacier National Park have been found on the east side of the continental divide. This isn't surprising for a number of reasons related to the geography and climate of Glacier. The most obvious explanation for this is that Glacier's east-side drainages are contiguous with the plains, the primary habitat for bison. Bison would have had no major obstacles to entering the park from the plains and seasonally utilizing the interior east-side valleys. However, one would expect to find some evidence of Bison on the west-side of the park, even if less frequently. In other places along the Rocky Mountain Front bison can and did cross the continental divide, and evidence from Glacier National Park itself showcases that bison were not opposed to high elevations (McDonald 1981). Recall that the bison faunal remains found at Lake of the Seven Winds is within sight of a major continental divide pass used by humans for thousands of years. So why don't we find more evidence of bison on the west-side? One reason may be a result of the radically different vegetation that characterizes Glacier's west-side. Vegetation on the west-side of the park is far more wooded and wet than the east-side. Consider the difference between the Lake McDonald drainage and St. Mary. Lake McDonald is characterized by dense timber and notably old-growth cedar, which is

only found in dense wet forests³². St. Mary on the other hand is characterized by wide-open grasslands and significantly fewer valley-bottom trees. This has a two-fold effect on why bison remains have not been found on the west-side. First, the vegetation is simply not the type that support bison: it is heavily wooded and generally much wetter. This not only would have discouraged bison from utilizing the west-side, it has the added factor of obscuring surface and subsurface deposits in contemporary times: adding in the factor of a survey bias favoring the east-side of the divide. This latter fact is responsible for the related trend that many archaeological sites in Glacier exist on the east-side of the park.

Besides being exclusive to the east-side of the park, bison faunal remains are concentrated at the toe end of alluvial fans and near lakes. This is also not surprising, as these alluvial fans create natural grasslands ideal for grazing. Importantly, these grassy alluvial fans also create ideal 'gathering basins' for driving bison downhill into some form of trap, natural or man-made. Hunters could have easily surrounded bison in these environments without startling the herds, making use the trees which surround them. Once encouraged into a downhill run, these alluvial fans regularly end in valley-bottom lakes or rivers, creating a natural terrain trap which could be improved upon with a corral, a surround, or other means of containing and slowing the bison. It is furthermore no surprise that sites with definitive evidence of bison butchering all exist in these contexts. Future research into bison-hunting in Glacier should absolutely focus on these alluvial fan areas with high potential. It should be remembered that alluvial fans are usually relatively active in terms of soil deposition, which means that cultural and faunal deposits can be

³² In fact, Glacier's cedar-hemlock forests are the eastern-most extent of these trees range in North America, which exist only in temperate woodland and are more regularly found in Washington and Oregon

quite deeply buried. Subsurface work will surely be required to find more evidence of bison and bison-hunting in Glacier.

Moving on from the distribution of bison faunal remains, the aggregate data collected for this project reveals that sites with direct evidence of bison hunting are only a small percentage of the overall sites with bison remains in the park. Inferred but inconclusive evidence of bison hunting at sites is more common. This is also to be expected: finding direct evidence of butchering on bone over the span of time which has past since bison were hunted in the park requires bones to be well preserved. The only instances in which this occurs is during careful excavation, which has only been performed rarely in the park. Bones found on the surface or in washouts are often too degraded to be of any use here. It is my belief that excavation efforts directed at finding more bison faunal remains with evidence of butchering have a high likelihood of success if efforts are directed in likely locations. We should also expect that hunting sites would represent only a small fraction of the overall sites even with a much larger sample size. Bison numbers in the past were enormous and far more likely died naturally than were ever killed by humans.

The above results lead me to conclude that Glacier National Park is ripe for further study on bison. Nearly all the locations where bison have been located are in easy to access locations near trail networks, roads, and other facilities; a result of the fact that most research done in the park has been done for administrative rather than strictly research-oriented purposes. However, should future researchers endeavor to study some of the lesser frequented drainages or venture off trail there is likely a wealth of information yet to be discovered about how bison used the landscape and how they were hunted. Even in areas with previous survey work, the potential for excavations to yield more information on bison hunting is great. Such an endeavor might learn

from this study in a few important ways, such as the increased likelihood of locating bison on the east side of the park at the bottom of large alluvial fans near natural terrain traps. Site 24GL274 in the Belly River seems to me to be the most promising site for excavation, with multiple bison species already located eroding into the river in an obvious terrain trap at the bottom of a large grassland. I believe that the park itself should prioritize visiting this site annually to monitor changes and collect faunal specimens that are eroding into the river. Furthermore, the park should explore options to excavate this site in coordination with the Blackfeet, Kootenai, and other interested tribes.

Chapter 6: From Past to Present

I began this project with a goal to learn more about the bison that once grazed and travelled throughout the mountains of Glacier National Park. I argued that by mapping remaining evidence of bison in Glacier, it would be possible to learn not only more about the bison but the people who hunted and relied upon bison for thousands of years. I also hoped that the presentation of this data in a more narrative form along with a visual map format would facilitate sharing this knowledge with a greater number of people. It is my hope that in some regard I met these goals.

In hindsight, this project created far more questions than answers. Even those questions I sought to address at the onset were only answered with hints of anything conclusive. Without doubt, there is much more work to be done. In terms of the raw data, such as the faunal evidence of bison and the cultural artifacts left behind by their hunters, much remains a mystery. Below the surface of Glacier's rocky soils the remains of many more bison, perhaps dating back over 10,000 years, may still exist. There must also be more direct evidence of bison hunting and butchering of bison, such as that discovered near St. Mary Bridge. While tearing up every square inch of soil in search of old bones and artifacts is certainly not what I suggest, I nevertheless believe that there is ample justification for a targeted and systematic subsurface inventory in some high potential locations, such as at site 24GL274 in the Belly River, via cooperative work with Indigenous cultural heritage leaders from the region. Such an endeavor has the possibility to reveal regionally unique ways that people made use of the landscape to hunt bison, adding to the integrated cultural and natural history of Glacier National Park.

Other questions abound. What cultural systems were in place to organize communal bison hunts among the societies of people that hunted them? Oral traditions of the Blackfeet recorded in the 18th century provide some hints to help answer such questions, underscoring the

important of ethnographic work in the future. As seen in chapter four, positions of prestige, songs and dances, buffalo stones and even paint colors all played a role in organizing and facilitating the complex endeavor of a bison hunt. Societies such as the Brave Dog society may have even functioned as a form of police force ensuring cooperation during hunts and equal distribution of the rewards. But ultimately this is only one such cultural system in a fixed time and place. Many more such systems must have existed over time and across the many groups of people who hunted bison over the thousands of years humans have hunted them. Both archival and contemporary ethnographic research into this subject have potential to yield important insights into the unique cultural systems that developed in this part of the world.

Rather than lamenting upon how much we do not know, it is sometimes helpful to reflect upon what we do. For thousands of years bison have followed seasonal rhythms that took them into the mountain along the Rocky Mountain Front and into Glacier National Park. We know this because their faunal remains are found in exposures throughout the park even today. These bison faced a variety of environmental changes over time that shaped their very biology. The bison were so successful at this that they survived a mass extinction period that saw the end of many other mammalian species and ultimately came to inhabit much of North America. We also know that as long as humans have existed in North America they have hunted and at times relied upon the bison for their own existence.

It is my hope that this research has yielded new information about the past and bison as well, albeit confined to a rather small and specific part of the bison's former range. As a direct result of this research, we can begin to understand and visualize where bison once roamed in the park. Even though this information already existed, its compilation in a single, easily shared GIS-based format allows us to visualize where bison have been found, which, in turn, helps

better understand their likely range in the park. Using this information, it should be possible to locate more evidence of bison in the park in locations that do not currently have any known faunal finds.

One thing that I hope this research has highlighted is the cultural nature of bison and in turn for the need to treat bison faunal remains as having cultural significance. Bison were not merely a source of food: they were a crucial component of many plains bison-hunting cultures that when removed caused damage to the whole. Even when faunal remains of bison are not explicitly in context with traditionally cultural archaeological artifacts, their presence is still valuable information for archaeologists and anthropologists who study bison-hunting cultures and is hopefully valuable for contemporary indigenous people as well. While I can understand the State Historic Preservation Office's hesitancy to consider purely faunal remains as archaeological resources, I cannot stress enough the value of keeping record of these faunal remains for their cultural relevance. It is my hope that the geodatabase created for this project is just the beginning of such a collection for Glacier National Park.

Today, most people I speak to about this research are surprised when I tell them that bison once roamed in Glacier National Park. Many of these people are not ignorant of history. In fact, they often know about the Blackfeet and the Kootenai and how they hunted bison and drove them over jumps. Certainly the indigenous people whose traditional territory includes Glacier National Park have not forgotten that bison once lived here not that long ago. Amongst the masses however it seems that bison have ceased to be associated with Glacier National Park. To me, this is a source of some disappointment and sadness, as the bison were once integral to this landscape and the people who lived here. If I succeed in nothing else, I hope that this project might aid in the spread of awareness that yes, bison lived in Glacier. And they could again.

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