Women's Work, Tools, and Expertise: Hide Tanning and the Archaeological Record

by

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Abstract

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Hide tanning is a technological innovation that spans tens of thousands of years. Without it, humans would not have been able to expand into harsh and unforgiving environments. Despite the importance and time depth of this act, hide tanning remains an often-overlooked aspect of the archaeological record. Some of this neglect can be attributed to the fact that the products of hide tanning rarely preserve in archaeological settings. What is more commonly encountered are the tools used to facilitate the transformation of an animal skin into a fully usable hide. However, the tools are but a small portion of the knowledge system that comprises this task, and at times even these tools are the subjects of confusion (as is the case with tabular bifaces).

By drawing upon multiple lines of evidence, including the high fidelity record of the Promontory Caves, hide requirements for tipi rings, use wear analyses, and the expert knowledge of community members, it is possible to acquire a much greater understanding of how the act of working hides shaped the lives of women; and how they in turn, shaped the archaeological record.

Preface

This thesis is an original work by Aileen Reilly. The research project, of which this thesis is part, received research ethics approval from the University of Alberta Research Ethics Board, "The Archaeology of Aboriginal Hide Processing in Western North America," Pro00032412, August 2, 2012.

Dedication

For my family.

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I would like to thank my supervisor Dr. Jack Ives for all of his guidance, patience, and advice throughout my Master's and Undergraduate after-degree program. I am glad that I changed my entire schedule around to take Dr. Ives' Alberta Archaeology course and then the field school. It's amazing how that decision led to all of this. I would also like to thank Dr. Ruth Gruhn, Dr. Leslie Main Johnson, and Dr. Andie Palmer who served on my defense committee and, through their advice and insight, have assisted me in bettering my thesis.

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As I read this over I realize that I am so lucky to have been surrounded by such wonderful people. I cannot in a few paragraphs express the depth of my gratitude. Thank you all for believing in me. I hope that our paths, wherever they lead, will cross again.

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Introduction

My journey into studying hide processing began when I was shown a picture of a rather unremarkable stone tool that was, at the time, called a *chi-tho*. This tool, generally thought to be involved in the final stages of hide processing, has been the subject of some confusion because the term *chi-tho* has been used as a catch-all phrase used to describe flat, edge-modified stones. My intention was to study the tools associated with hide tanning and this particular type of tool in detail. I thought that by understanding the tools used, that I would understand hide tanning. In the summer of 2012, I had the opportunity to travel to Watson Lake, Yukon; and learn from Kaska Elders how to tan moose hide. It was here that I learned that the tools were but a small fraction of the story of hide processing, a story that ultimately is more about people than objects.

The ability to transform animal skin into wearable hide is a skill that was critical to the successful expansion of people into harsh and unforgiving environments (Thompson 2013). Recent studies have shown that Neanderthals were making specialized tools for tanning hides, 40,000 years ago (Soressi et al. 2013). These ancient tools bear striking resemblances in both morphology and wear patterns to similar tools used in more modern times (Soressi et al. 2013:14186). The time depth of this technique is nothing short of amazing, spanning tens of thousands of years and; remarkably, it is still practiced to this day, in very much the same ways as it would have many years ago.

Alongside the practical uses of hide tanning in North America, traditional Aboriginal hide tanning is also a form of art and a critical aspect of the story of

First Nations women. The act of tanning, by its very nature, is an act of transformation. Through handling and working the hide, with respect and skill, the tanner assures that the spirit of the animal is honored appropriately (Baillargeon 2010). These attitudes are carried on into the way finished garments are created and cared for (Thompson 2013:4,18). Strong social and cultural values are, and were, attached to well tanned hides and well made garments (Thompson 2013:4). A woman's expertise in tanning and sewing were highly regarded and some women would be known for their ability to expertly tan hides (Thompson 2013:5).

Today, the nature of tanning has changed so that both men and women tan hides, but historically it was the responsibility of women (Baillargeon 2010; Frink and Weedman 2005; Thompson 2013). As such, tanning is a gendered activity that allocates activities, tools, spatial locations, and other rights and responsibilities onto either women or men (Baillargeon 2010; Frink and Weedman 2005). Frink and Weedman (2005) propose that the stages of hide tanning are conducted in a specific spatial realm with a specific and often gendered tool kit. Presumably, this tool kit is comprised of implements and techniques that comprise the archaeological record.

The side of life in the past that is most often seen by the public is the male half (Albers 1983:2). Women are often depicted as inferior; and rarely visible as individuals, even when ethnographers have increasingly described women as skillful toolmakers and contributors to the household economy (Weedman-Arthur 2010:228). Women's activities have been thought of as labour, not production;

and viewed as unspectacular, unskilled, dull, and laborious, reinforcing the stereotypes of women and women's technology as unskilled and expedient (Frink and Weedman 2005:5; Weedman-Arthur 2010:229). Archaeologically, women's activities are largely ignored; perhaps this neglect can be attributed to the fact that the products of women's work do not often preserve and when they do, they tend to appear rather crude and simple (i.e., scrapers vs. projectile points) (Sundstrom 2008:168). There has been a tendency with archaeological interpretations to project the "crudeness" and simplicity of an artifact onto the makers themselves (Binford 1978:2). However, simple tools comprise much of the archaeological record at sites. Eyman (1968) proposed that simple tools may be the most significant objects at a site because they were essential for the activities very basic to the lives of the people who left them behind. As we will see, this view certainly seems to be the case with hide processing tools.

Blanket statements like "hide processing occurred" are common when reading archaeological interpretations for sites. But what does that statement mean? What are the processes involved? What are the tools? In researching the answers to these questions, how will this study give us a better understanding of the archaeological record? These questions are the driving force behind this body of work.

Due to their organic nature, the products of hide tanning rarely preserve. There are some exceptional cases such as the Promontory Caves in Utah, in which the finished products of hide tanning can be observed in the form of moccasins, mittens, and the scraps of hide left behind from the hide tanning process (Steward

1937; Ives 2010, 2014). Situations like this are exceedingly rare, and much more frequently the tools that facilitate the transformation are what preserve. Such tools include: fleshing tools, beamers, dehairing tools, scrapers, and softening tools.

Hide softening stones have for better or for worse come to be known as *chi-thos*. This is a term that has been applied haphazardly to describe a whole suite of implements, and requires revision. This study provides a definition and identification guideline for such objects.

Hide processing implements including hide softening stones were used in the aforementioned Promontory caves in Utah. In addition to the entirety of hide working implements, the caves have yielded many hundreds of moccasins, mittens, and other leather objects upon which they were used. The remarkable preservation of the caves reveals patterns in the seasonality of sites, population dynamics, migration patterns, aesthetics, and labour requirements of the people who once occupied them.

In addition to clothing, hides played a significant role in the lives of people in the form of residential structures, specifically, the tipi (Laubin 1971). The presence of tipis on the landscape is witnessed in the form of stone circles, or tipi rings (Kehoe 1957; Finnigan 1982; Laubin 1957; Quigg 1978, 1986). It is possible to estimate how many hides were required for tipis, based on the size of the stone ring left behind. These types of calculations can offer insights into the labour requirements for tipi construction and maintenance.

Hide processing is an important aspect of the archaeological record, and its potential is only beginning to be realized. This study helps shed light on this topic, and brings forth new perspectives on how hide tanning can inform our understanding of the past.

THESIS OVERVIEW

Chapter 1- Theoretical Framework and Methodology

The principles of ethnoarchaeology guide this study. Ethnoarchaeology offers unique opportunities to observe, interact with, and ask questions of and about processes. Essentially, activities and processes observed today can serve as proxies for activities and processes in the past. This method assumes continuity between the past and the present, and is not without its criticisms. The concerns with employing this theoretical framework are discussed, and it is argued that hide processing is one such activity that has the time and space continuity that can benefit from this type of study.

Chapter 2- Kaska Hide Tanning: An Ethnoarchaeological Perspective

In August of 2012, an ethnoarchaeological research project commenced in Watson Lake, Yukon. The goals were to document and observe the tools and techniques used by Kaska Elders when tanning moose hide. Over the course of approximately three weeks, a moose skin was transformed into an almost fully tanned hide. The process of hide tanning is documented, including detailed discussion of the tools used to facilitate this transformation. These observations provide insights into the processes that lead to hide tanning activities being reflected at archaeological sites, and can assist in interpretations and reconstructions of site use.

Chapter 3 - Chi-thos, Cobble Spalls, and Tabular Bifaces: Unraveling An Archaeological Conundrum

Softening is a critical step in creating the high quality product that is brain-tanned leather. One of the ways that softening is achieved is by using a stone tool that has come to be known as a *chi-tho*. Unfortunately, this term has been used indiscriminately in the archaeological literature to describe a number of stone implements, including cobble spalls that likely served a different function. Statistical analysis reveals that these implements can be distinguished from one another. It is proposed that the techno-morphological term, tabular biface, be adopted when discussing these implements found in archaeological contexts. A definition and criteria for identification of tabular bifaces are established, clarifying some of the confusion that exists with respect to this implement.

Chapter 4- Hide Processing in a High Fidelity Record: The Promontory Connection

The Promontory Caves in Utah are the site of a remarkable window into the past. The location of the caves has fostered an environment that is perfect for the preservation of organic material, a rarity for archaeological sites. Within the Cave 1 artifact assemblage, the entire process of hide working is represented, from the removal of the flesh to the finishing of garments. In addition to the stone by-products of hide tanning that are typically found at archaeological sites, the Promontory Caves also house the products of hide tanning in the form of moccasins, mittens, and scraps of hide. Using the moccasins lengths and quantities, it is possible to establish estimates for the hide requirements of the Promontory moccasin assemblage. It is estimated that a range from 24 to 59 bison hides would have been necessary to fulfill the hide requirements of the known Promontory moccasins. These numbers offer insight into the amount of work that would have been necessary to meet the needs of the occupants of the caves.

Chapter 5- Tipi Rings and Hide Processing: A Case Study from the Besant Phase

Stone circles are common occurrences on the Plains landscape. Thought to be representative of tipi structures, the archaeological potential of such features has long been debated. It has been observed that during the Besant Phase (ca 2,100 to 1,500 BP), tipi rings increase in diameter. This increase would result in a corresponding increase in the number of hides required to make tipis. In 1982, Finnigan attempted to quantify the number of hides required for tipis of known stone circle diameter. Finnigan's (1982) formulas are applied to stone circles that have been dated to the Besant Phase. The number of hides projected range from approximately eleven to upwards of sixty-seven. These values certainly warrant further reflection. This phenomenon is approached in terms of the number of hides required to make tipis of increased diameter, and the effects that this requirement would have on the procurement, transportation, and processing strategies for the hides.

Chapter 1- Theoretical Framework

There are three main theoretical concepts that influence this work. They are analogy, the direct historical approach, and ethnoarchaeology.

ANALOGY

Analogies are more generally inferential arguments that are based on the implied relationships between demonstrably similar entities, and are one of the most widely used tools of archaeological interpretation (Ascher 1971; Binford 1967; Clark and Kurashina 1981; Nicholas and Kramer 2001). Behaviors and processes observed today can serve as proxies for behaviors and processes of the past. However, Hodder (1986) cautions that while similarities do exist between the past and the present, they may not be reflective of actual similarities. The challenge then, for the archaeologist, is to determine when the use of analogy is appropriate. Analogies cannot be tested; instead we can strengthen or weaken them by using both theory and data (Hodder 1982:9). As the number of similarities between objects or situations being compared increases, so does the strength of the analogy (Hodder 1982:16). In situations in which similarities exist between past and present environments, technology, and cultural groups, it is possible to draw comparisons between the past and the present.

Arguably, analogies are most relevant in situations in which the present society has a direct connection to the people that occupied the area in question (Hodder 1982:18; Johnson 2010:63). This line of reasoning forms the foundation of the tradition in North American archaeology known as the Direct Historical Approach (Johnson 2010:65).

DIRECT HISTORICAL APPROACH

The Direct Historical Approach uses historical or ethnographic information about living cultures to interpret archaeological finds relating to earlier, historically undocumented stages of the same culture (or historically related cultures) (Trigger 201:510). Using this methodology, the archaeologist works backwards from the known, through the less known, to the unknown (White 1976:106).

ETHNOARCHAEOLOGY

Ethnoarchaeology, a subdiscipline of anthropology, is the ethnographic study of living cultures from an archaeological perspective (Nicholas and Kramer 2001). According to Nicholas and Kramer (2001:2), it is "neither a theory nor a method, but rather a research strategy comprised of a number of approaches to understanding the relationships between material culture and culture as a whole, both in a living context and as it enters the archaeological record."

Ethnographers often do not ask the specific questions about material culture that can be useful to the archaeologist with respect to recreating the ways of life in the past (Albright 1984). By incorporating ethnoarchaeological studies of material culture into archaeological interpretations, it is possible to get a much richer understanding of life in the past, and how the archaeological record comes to be.

Lewis Binford was interested in establishing the "spatial, temporal, and formal correlates of specific forms of human behavior" (Trigger 2010:414). He produced a number of studies attempting to use modern ethnographic accounts of hunter-gatherers in order to understand the formation processes of much older sites (Binford 1978). Even though ethnoarchaeologists collect data that are useful for generalizations of human behaviour, Binford (1978) argued that systematic cross-cultural studies are necessary in order to truly draw generalizations between material culture and human behaviour (Trigger 2010:406).

Ethnoarchaeological studies are most reliable when used in specific contexts in which the society being studied is historically continuous with the culture that is being interpreted archaeologically (Albright 1984; Clark and Kurashina 1981; Hanks and Pokotylo 1989; Hodder 1982, 1986; Janes 1983; Meskell 2012). The more recent the period an archaeological site represents, the more likely it is that actions observed in the ethnographic present may accurately depict what was happening in the archaeological past (Clark and Kurashina 1981:304).

The drive to make archaeology more scientific has contributed to the uncertain role of ethnoarchaeology as an interpretive method. However, hide processing is one such aspect of the archaeological record that can benefit from an ethnoarchaeological study, because the tools and techniques display continuity throughout time and space (Baillargeon 2010; Frink and Weedman 2010; Clark and Kurashina 1981). While the materials used may change, the main shape and function of various hide tools is maintained through time (Klokkernes 2010:146).

There is a common misconception that in order to be able to use ethnographic evidence to interpret archaeological sites, we must be dealing with a group of people that is in "pristine" condition (Clark and Kurashina 1981:303). It has been argued that the very presence of an archaeologist or person conducting research changes the natural dynamic and order of societies and activities (Hodder 1982:30). The very notion of "pristine societies" is problematic because living communities are in a process of constant change with respect to the materials that they utilize (Ascher 1971:270). Klokkernes (2010) reminds us that 'tradition" is contemporary and dynamic, continuously being revised and updated. At any given time, materials can fall into disuse and new materials can begin to be utilized (Ascher 1971; Schiffer 1987).

There are few opportunities to observe stone tool manufacture and use today (Albright 1984; Baillargeon 2011; Brandisauskas 2010; Clark and Kurashina 1981; Hanks and Pokotylo 1981; Janes 1983). The Dene traditionalists in Watson Lake, Yukon, are amongst a diminishing group of people who continue to manufacture and use stone tools within a hide processing context. The work of Albright (1984) with the Tahltan people, Brandisauskas (2010) with hide tanners in Siberia, Clark and Kurashina (1981) with hide tanners in Ethiopia, Janes (1983) with the Mackenzie Basin Dene, and Hanks and Pokotylo (1981) with Dene groups in the Canadian North each serve as examples as to how ethnography and ethnoarchaeology can be used to inform the archaeological record.

NOTES ON THE ETHNOARCHAEOLOGICAL PROCESS

This body of work attempts to understand hide processing and its archaeological correlates by drawing upon a number of lines of evidence, including the archaeological literature surrounding hide working implements, ethnographic accounts of hide processing, ethnoarchaeological observations of hide tanning amongst Kaska women, and rudimentary use-wear analysis of hide working implements.

Ethnoarchaeological fieldwork commenced in August of 2012 and concluded in September 2012. This time was spent in active participant observation and in conducting informal interviews with Elders and community members in Watson Lake, Yukon. Kaska Elders Mida Donnessey and Alice Brodhagen, as well as Linda McDonald, taught us traditional methods of tanning moose hides.

To prepare for this fieldwork, Dr. Leslie Main Johnson, of Athabasca University, discussed the possibility of developing a hide processing workshop with contacts within the Watson Lake community. It was very important that the project be of interest as well as beneficial for the community. It was determined that the making of a film, documenting the tanning process, would be most useful; and would serve as an educational tool for the youth attending the local school. Human ethics approval was applied for through the University of Alberta, and was granted under number Pro00032412. The work was conducted under research permit number 12-55 S&E, under the Scientists and Explorers Act as outlined by the Yukon Government and with the permission of the Liard First Nation.

We explained to potential participants that we wanted to set up a workshop in which we could film, observe, learn, and potentially participate in the hide tanning process. Both video and still shots were taken of these activities. Formal interviews were not conducted during the tanning, as we felt that it would be most beneficial to ask questions of the process as they came up. It was our intent that the tanning occur in as much of a natural setting as was possible. All participants were informed of our goals to preserve the knowledge for future generations; and they had full control over what was shared, taught, and discussed.

The participants of this study remain identifiable, as it is important to recognize the knowledge holders and to give due credit. This study is a mechanism through which *their* knowledge and expertise can be shared and celebrated. As you read further, please keep this fact in mind. These experiences are most directly visible in Chapter 2, though they have shaped my understanding of hide tanning and influenced my interpretations of the following chapters.

Chapter 2- Kaska Hide Tanning: An Ethnoarchaeological Perspective

In August of 2012, I had the opportunity to travel to Watson Lake, Yukon, and learn from Kaska Elders about the process of tanning moose hide. The goals of this fieldwork were to witness and document the steps taken by Kaska women when tanning hides, and to produce a film to be used by the local school. What I came to understand was that the steps, tools, and even the hide itself were imbued with meaning far greater than just the transformation of an animal skin into a usable hide. A single tanned hide represents knowledge of generations of women, it represents survival and innovation, and it represents the love and dedication that a woman had for her family. Hide tanning is but one chapter in the story of First Nations women, a group that is often overlooked in the archaeological literature (Frink and 2005; Weedman-Arthur 2010). This absence in the literature may be attributed to the fact that the products of hide tanning rarely preserve in archaeological contexts (Baillargeon 2010; Frink and Weedman 2005; Weedman-Arthur 2010). Instead, what we encounter more often are some of the implements that make the transformation from skin to usable hide possible.

Hide tanning is not an art form relegated to the past; the techniques and tools that were used continue today, albeit in decreasing numbers. There are fewer and fewer opportunities to witness the process of traditional hide tanning, and I was extremely fortunate to have been able to do so.

There are a number of implements that are used when tanning hides (Figure 2-1). As I frequently refer to them, I will follow Baillargeon's (2010) example and provide descriptions and images of the tools that I observed, and used, during the field season. These can serve as a reference for the discussion of how Kaska Elder, Mida Donnessey, tanned a moose hide in August of 2012.

DESCRIPTION OF TOOLS USED FOR HIDE TANNING

Figure 2-1: Entire tool kit used by Mida Donnessey to tan moose hide. Front row from left to right: 3 stone skin softeners, metal scraper, split bone beamer, bone flesher, metal scraper, knife, file, 2 knives. Top: two hafted stone skin softeners and one wringing stick

Scraper/ *Īghol*: This term refers to the metal scraper that is used to remove the hair from the hide as well as to scrape the flesh side of the hide after soaking and wringing (Figure 2-2). These scrapers are metal segments, usually iron, that have been pounded flat, then bent in opposite directions on opposing ends, which are alternated during use. The handle is wrapped in either cloth or leather to prevent blisters and damage to the hand.

Figure 2-2: A selection of hide processing tools. Iron scrapers can be seen in the far left and far right of the image. Photograph credit: L.Main Johnson 2012

Beamer/ *Kuje'I*: Beamers are used in conjunction with a beaming pole to remove the hair from the hide. A beaming pole is constructed from a felled tree approximately 40 cm in diameter that has been stripped of all bark and rubbed smooth. It is placed into a brace, with one end on the ground and the other at approximately waist height of the tanner. The hide is then draped over the beaming pole in preparation for hair removal, which is achieved by holding the beamer in both hands and running the sharp edge over the hair. The beamer that was observed during fieldwork (Figure 2-3) was constructed from a split rib bone. I was informed that a split "leg bone," preferably that of a bear, would also be suitable for the task. This type of tool was not used on the moose hide that we were working on, but it was a tool that Mida would use to remove hair from caribou hides.

Figure 2-3: Split rib bone beamer used to remove hair from a hide

Flesher/ *Tahgodi*: This tool, as its name suggests, is used to remove the flesh from a hide. The working edge can be either toothed or flat, and they are typically made from the metatarsal or tibia of a moose. The one used at the time of fieldwork was of the flat variety (Figure 2-4). To use this tool, you hit the hide with considerable force, until the flesh and membranes start to pull away.

Figure 2-4: Examples of bone fleshers with a flat working edge

Stone Scraper/ *Tsētél*: This is a tool that is used to soften hides (Figure 2-5). Often constructed from a tabular stone, it is bifacially worked along one or more margins by removing flakes from both the dorsal and ventral (top and bottom) faces, typically resulting in a characteristic D-shape. The stone scraper is usually inserted into a wooden haft; and is worked over the hide, stretching and scraping, until the hide takes on a soft and somewhat "fluffy" texture.

Figure 2-5: Modified stone that was to be used as a hafted stone skin softener.

Knife/Fleshing Knife/*Bes/Azàs bes:* Alongside the *flesher/ Tahgodi,* a modern hunting knife was used to remove the flesh from the hide (Figure 2-1).

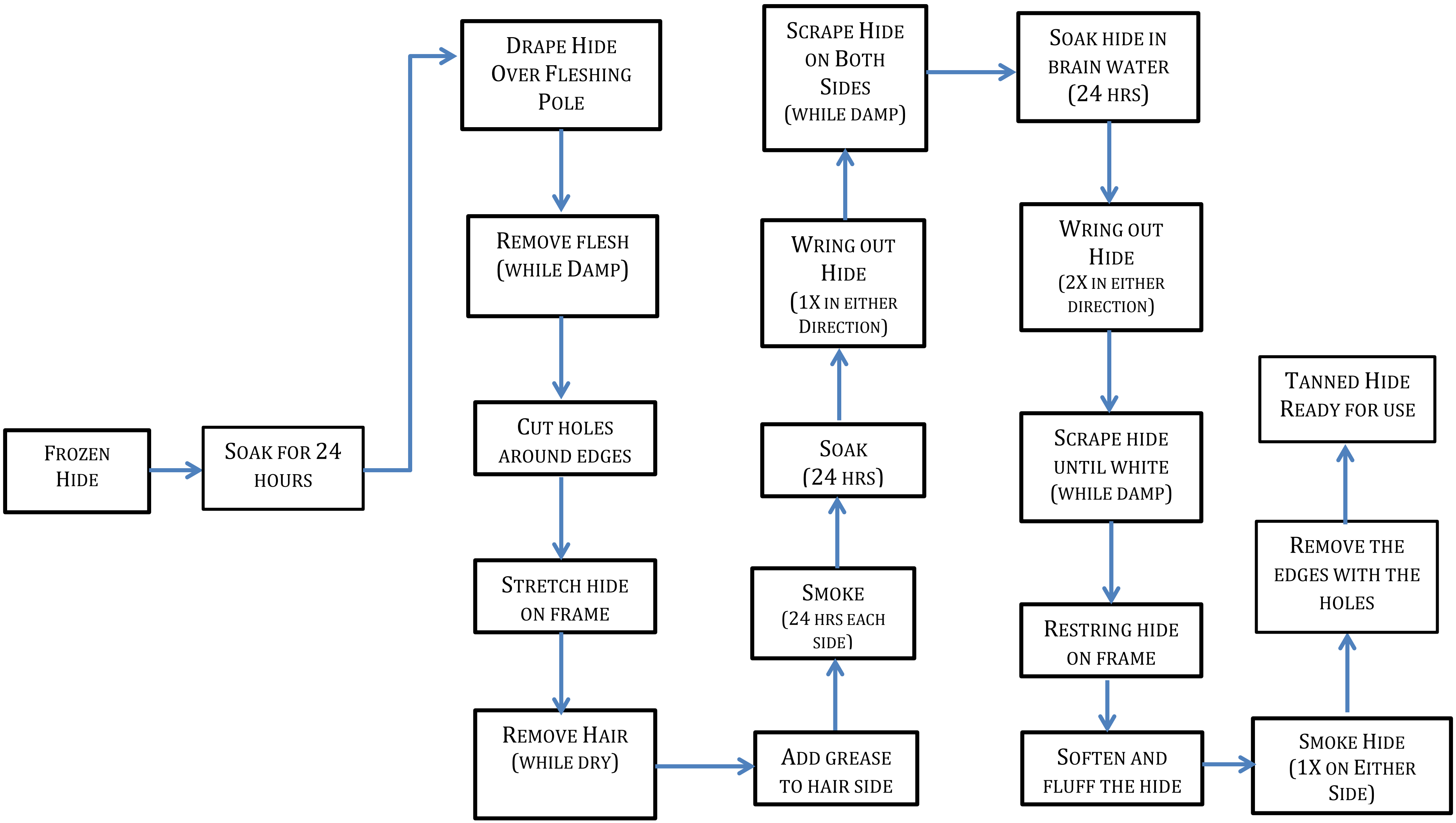

Figure 2-6: Flow Diagram of the main steps taken by Mida Donnessey to tan a moose hide in August of 2012

FIELD WORK 2012

Our three weeks spent in the field began on August 15, 2012, and ended on September 5, 2012. Time and weather were limiting factors, and we were unable to finish tanning the hide through to the softening stages. Despite not finishing, we were able to gather information on the entire process and supplement the hands on experience with interviews.

The hide that we were working on was that of a bull moose that had been acquired two to three weeks prior to our arrival and had subsequently been frozen (Figure 2-7). Before we could begin tanning, the hide had to be thawed and soaked for 24 hours to make it elastic again. As thawing began, we found that the hide was covered in rocks and gravel, leading Mida to conclude that the moose had been skinned near the river's edge without first placing tree branches down (Figure 2-8). We learned that this process allows for the hide to remain clean during skinning. Rocks left on the surface of a skin can impede the process of fleshing and dehairing because the tools become dull much faster.

Figure 2-7: The moose hide that was tanned during August of 2012, after soaking and prior to tanning.

Figure 2-8: Branches that were placed at Frances Lake to keep a hide clean while skinning

While the hide was soaking and thawing, we constructed a frame/ *azás dechené* from four wooden poles of equal lengths. The type of wood used was not specified, but it was necessary that the poles be sufficiently strong to support the hide as well as the force and weight of the person or persons doing the tanning. In order to know how wide the frame had to be, we stretched the hide and measured its extent using string. The poles were then lashed together to create a square frame, which, was secured to an existing fence (Figure 2-9).

Figure 2-9: Construction of the wooden frame

After approximately 24 hours, the hide was sufficiently thawed and the process of removing the flesh, or fleshing, could begin. The hide was draped over a fleshing post, hair side down (Figure 2-10). This fleshing post/ *mak'eh ke'ejehi* was constructed out of a small felled tree approximately one meter tall. The bark had been stripped from one end of the tree, blunted and rounded so that there were no sharp edges that could pierce the hide, while the opposite end was cut at an angle and pounded into the ground.

Figure 2-10: Showing a fleshing post with and without a hide draped over it

To remove the flesh, Mida used, and uses, a modern hunting knife. With her free hand, she pulled the hide taut; and with smooth, upward motions she removed the flesh, concentrating her efforts to the area around the edges while slicing holes at regular intervals, approximately 60 mm apart (Figure 2-11). These holes serve the later function of stringing the hide onto the frame, and in the stages of wringing water out of the hide post-soaking.

Figure 2-11: Mida removing the flesh from the hide and cutting holes around the edges

In addition to showing us how the knife is used, Mida also demonstrated the proper technique for using a traditional bone flesher. The flesher is firmly gripped with the flat working edge towards the hide and the ventral surface of the tool facing the user. With the free hand, the hide is pulled taut; and it is hit repeatedly until the flesh and membranes begin to pull away (Figure 2-12). Considerable force must be used in order to remove both the flesh and the membranous tissue. According to Mida, bone fleshers were very durable; and could last for a considerable amount of time. She went on to explain that their durability lasted not only from hide to hide, but from generation to generation. This being said, time and general wear and tear do break down these tools; and when they do,

Figure 2-12: The bone flesher being used to remove the flesh

it was customary for them to be left in what Mida referred to as a “good place,” not just casually tossed aside or left behind.

Once the flesh was removed from the edges and the holes were cut, the hide was strung up on the frame using rope, so that the remaining flesh could be removed effectively. When the hide is strung up, it can be difficult to scrape the upper portion. To solve this problem, Mida created a makeshift step out of a smooth wooden pole. Approximately one third of the way up the frame, this pole was inserted through the ropes for stability. She explained that up to three women could put their feet on this pole and sit on the taut hide. But we learned quickly that without a strong frame, the extra weight could cause it to break; which is exactly what happened to us, as depicted in Figure 2-13. The frame failure was caused by rotted wood, and it set us back by the better portion of a day to rebuild the frame and string up the hide again.

Figure 2-13: The hide after the frame had broken

It should be noted that it is critical that the hide remain damp while removing the flesh. If it is too windy or hot, the hide dries out quickly and the fleshing cannot continue. An attempt was made to flesh the hide on a particularly hot and sunny day, and the flesh essentially baked and hardened in approximately one hour (Figure 2-14). This did not ruin the hide, but it did increase the time required for the tanning process.

Figure 2-14: Left: the hide being strung up onto the frame. Right: the hide after the flesh had baked onto the hide. All of the dark spots must be removed.

Removing the flesh would typically take a woman, at most, one day of work. We took considerably longer, due to the fact that the flesh had baked onto the hide. Scraping the hardened flesh proved to be impossible; so the frame with the hide, still strung up on it, was turned over so that we could begin the process of removing the hair (Figure 2-15).

Figure 2-15: The removal of the hair from the hide

It is important that the hide be dry to facilitate the easy removal of the hair with the metal scraper (Figure 2-2). The scraper is held with one hand and the other placed near the working edge (Figure 2-16). This hand position adds control and pressure to the tool; and assists with the removal of the hair, which is achieved in long, vertical strokes that generally follow the grain. The scraper must be kept very sharp to achieve effective hair removal. Mida resharperned her scrapers at regular intervals, approximately every fifteen strokes. The resharpening was achieved using a metal file; but Mida added that in the "old days" or if you did not have file handy, you could use a rock to sharpen your tools. Once the hair has been removed, it is then necessary to remove any of the membrane remaining, and scrape until the hide is white.

Throughout the discussion thus far, I have been referring to the skin as a hide, which may be a misnomer. It was after it had been scraped to the white colour that Mida started referring to the skin as a hide/*Azás*. The dehairing took place over one and half days. The culmination of the steps taken to this point resulted in a hide that, when dry, was extremely light, weighing no more than one kilogram, making it very easy to transport.

Figure 2-16: Removing the hair with a metal scraper.

What follows is the first of two smokings, which require rotten wood/ *Denitsu* (Figure 2-17). When burned, rotten wood produces a smoky smolder that is ideal for this stage of the process. Spruce is the preferred wood, because the result is a golden brown colour that is highly sought after. Alice Brodhagen told us that Jack Pine was to be avoided because it would result in a hide that was a dark brown/ black colour that was not considered desirable.

Figure 2-17: Mida harvesting *Denitsu* to be used for smoking the hide. Photograph credit: L. Main Johnson.

Prior to smoking, grease needs to be added to the surface of the hair side of the hide. Raw bacon was applied to the surface but; traditionally, the grease and fat from a moose or bear would have been used. After the bacon fat had been applied, we tied the hide around a tipi frame and lit a small fire in the center (Figure 2-18). The fire had to be watched while the hide was smoking, in order to ensure that the smolder was sustained and so that the hide did not burn. During the time that was used to smoke the hide, we sharpened tools, spoke of the weather and animals that we had seen, and cleaned the area that we had been working in.

Figure 2-18: Hide smoking on a tipi frame. In the lower right hand, a store of *Denitsu* can be seen.

During the smoking stage, we had the opportunity to move to the Liard Aboriginal Women's (LAWS) Camp at Frances Lake, where we continued the tanning process. There was a smoke house on site, and it was here that we continued the smoking process. The hide was laid flat in the rafters, and again a fire was lit underneath. We used rotten poplar in lieu of spruce for the smoking, because rotten spruce was not available at this location. The smoking took place over two full days, one day per side. In addition to observing these two techniques for smoking, we were informed of a third technique by which the hide is sewn into a "bag" and strung over a smudge pit that is dug into the ground. It appeared that the resources available to, and the personal preference of, the tanner influenced the method of smoking used.

After the smoking, the hide must be soaked for one full day and night. We were able to take advantage of our location and soaked it in Frances Lake (Figure 2-19). The hide was secured to the shore and it was tossed out into the water, and rocks were thrown on top to submerge it.

Figure 2-19: The hide soaking in Frances Lake

Following soaking, the water must be wrung out of the hide. The wringing is accomplished using a wringing stick/ *mèh agàdzi* and pole. To construct a wringing pole, a small tree is chopped down, leaving approximately one meter sticking out of the ground. The upper portion is shaped to a point; and is stripped of any splinters of wood or bark, because, just as with beaming and fleshing poles, these can do irreversible damage to the hide. The wringing stick is also approximately one meter long, and is stripped of bark and rubbed smooth.

One end of the hide is threaded onto the wringing post, using the holes that were previously cut around the edges (Figure 2-20). The other end is threaded onto the wringing stick. The hide is then twisted; and the water is squeezed out (Figure 2-21), until it is a twisted ball (Figure 2-22). This process is very strenuous and physically taxing on the woman involved; and is a true testament of the strength of the women who performed, and continue to perform, this activity. In addition to being physically demanding, we were informed that this action could also be extremely dangerous. As the hide is twisted, there is stored energy that can release violently like a spring; so it is important that both the stick and the post be sufficiently strong to withstand the tension of the twisted up hide. We were repeatedly told of women who had been seriously injured, some fatally, whilst wringing out a wet hide. Our own inexperience dictated that we should not attempt this stage ourselves, and as result Mida completed the task herself.

Figure 2-20: The hide being threaded onto the wringing stick.

Figure 2-21: Mida wringing the water out of the hide.

Figure 2-22: The hide once the water had been wrung out.

Following the wringing, and while still damp, the hide is scraped again. This time a frame was not used, but rather the hide was draped over a horizontal pole that has been strung up between two trees (Figure 2-23). The scraping is performed in a vertical motion that is perpendicular to the strokes that were made to remove the hair. It was not specified as to whether the direction of the scraping has a specific function for the finished product, but it did appear to be a deliberate action. Like the previous stages, this is a weather dependent activity; if it is too hot or too windy, the hide dries out quickly.

Figure 2-23: Hide after it has been wrung out, and is ready to be scraped

With the scraping done, the hide has to be re-soaked in a mixture of partially rotten brain and warm water. The brain that is used is usually that of the animal from which the hide has been acquired, but we forgot to bring the brain of the moose that we were tanning and had to use that of another that had been shot while we were in camp. To extract the brain, a hatchet was used to quite literally smash it apart. A galvanized steel tub was filled with warm

Figure 2-24: Mida scraping the hide after wringing the water out of the hide

water, and the hide was submerged in it. The brain was added directly to the water along with some dish detergent (a modern addition to the process). The hide was left to rest, submerged in the water, for an entire day. We covered the tub with spruce boughs to protect the contents from animals and debris. With the soaking complete, the hide must be wrung out for a second time, twice in either direction, a process taking little over an hour to complete. Following the second wringing, the hide must be scraped again in the manner described above (Figure 2-24).

Once the hide has been scraped, and all of the membranes have been removed, the hide is left to dry. Following the drying, it is stretched taut back onto the frame and softened using a hafted stone softener/*Tsētél (also referred to as a stone scraper).* The tsētél is held with both hands, one hand on the end of the haft and the other close to the hafted stone, which is then rubbed over the surface in sweeping motions. Both surfaces of the tool are functional, so the tool itself is rotated during use. Unfortunately, we were not able to witness it in action; and had to supplement our hands-on experience with descriptions of its functionality.

Figure 2-25: Mida modifying the edge of her stone on the beach

While we did not get to witness the tsētél being used, we were very fortunate to be shown the construction of a tsētél. Stones were collected along the edges of the Liard River. They appeared to follow a specific template. Mida chose stones that were flat and roughly 130-150 mm at their widest/longest. The one that was ultimately selected for softening the moose hide was a laminar stone of unknown material, approximately 130 mm long, 80 mm across, with an edge thickness of 25 mm.

Figure 2-26: Top: Mida's *tsētél*. Bottom: *Tsētél* made during the field season

Once a stone had been singled out for the task, Mida struck the edge against an anvil-stone right on the beach (Figure 2-25). The resulting edge was rough, uneven and irregular, though not sharp. The manipulation of the stone was restricted to the margin that was to be used, leaving the dorsal and ventral (top and bottom) surfaces almost entirely cortex (Figure 2-26). At this point the stone is ready to be hafted into a wooden handle.

Mida constructed her handle out of a felled green birch approximately 25-50 mm thick and one meter long. The pole is peeled, thinned, and sanded until the desired shape is achieved; the length and thickness of the handle is customized for the individual. One end of the pole is split approximately 100 mm down, and the stone is inserted into this split with the modified edge facing out. The stone and haft are bound with cloth or leather, and they are left to dry (Figure 2-27). As the green wood handle dries, it shrinks, tightening around the stone and securing it in place.

Figure 2-27: Top: Mida's hafted *tsētél* . Bottom: Hafted *tsētél* made in August 2012.

These tools, while expediently made, have a considerably long use life; and were highly curated. Like the bone fleshers, *tsētél* could be passed down from mother to daughter. Mida told us that a woman would have, in her lifetime, about two or three *tsētél*, of which one or two would be her favourite. This number could vary because over time they may become lost or broken. Also like the bone fleshers, once these tools were viewed as no longer functional, they would be left in a good place, a place of meaning. Mida even suggested that in some cases a woman might be buried with some of her tools, including her *tsētél*. A woman's tools were very important. It was suggested that they were a reflection of their owner, and they were well taken care of. Tools would not be left behind; they would be carried with their owner as she moved around the landscape.

It was evident, after the time spent in Watson Lake, that hide tanning was an extremely important aspect in the lives of Kaska women; and would have been even more so in the past when it was the source of clothing, blankets, moose skin boats, snowshoes (in the form of babiche), and shelter. Given its significance, it is unfortunate that in the archaeological literature, hide processing has taken a back seat to discussions of activities such as hunting that have been widely accepted as performed by men (Frink and Weedman 2005; Janes 1983; Kehoe 1960; Weedman-Arthur 2010). Based on the principles of ethnographic analogy, I offer some specific examples of how the tanning process described above is recognizable within the archaeological record.

CONSIDERATIONS FOR THE ARCHAEOLOGY OF TRADITIONAL HIDE TANNING

"The best time to tan hides is spring": this advice was something that was first expressed to us by Alice Brodhagen and then again by Mida Donnessey. Hunting is often discussed in reference to food procurement, but the need for hides would have also been a motivating factor for the hunt (Brink 2008:225). Not unexpectedly, the season in which an animal is killed has an impact on both the quality of the meat as well as the hide (Brink 2008:223). On the Plains, spring hunts were the most lucrative for obtaining hides for tipi covers, as animals have shed most of their winter coats by this time and the hide itself is thinner (Kehoe 1960:45). Interestingly, it is autumn kills that are the most lucrative for hunting bison in terms of fat stores; but these hides are generally considered unsuitable for making tipi covers (Brink 2008:224). Winter garments, such as mittens, moccasins, and blankets, are usually constructed out of hides with the thick fur turned inside (Thompson 2010:11). This knowledge certainly poses interesting questions surrounding the motivations driving the hunt; and I would suggest that archaeologists should consider the possibility that hide procurement was not just a by-product of a food procurement strategy, but, in some cases, likely was the motivation for a hunt. There are accounts of Koyukon hunters travelling great distances to acquire moose, the distances were so great (and the animals so large) that only the hide and a little meat could be brought back home (Nelson 1983:165). The season in which an animal was acquired could tell us something about the potential uses of that animal.

Once the hide has been removed, often that green, or fresh, hide has to be transported to a place in which the processing can begin (Brink 2010:223). Green hides of large mammals can pose significant challenges for transportation, especially when we are considering pre-equestrian times. If we consider this aspect of the tanning process further, we must reflect on the modes of transportation that were available to people living in the past. Transportation of green hides would have been accomplished on foot, and facilitated by the use of dogs and travois. According to Henderson (1994) it is reasonable to think that a Plains dog could have carried upwards of 27 kg (60 lbs) over long distances.

For context, a conservative estimate of the weight of the moose hide that we were working on, when fresh and wet, puts it at no less than 23 kg (50 lbs). Knowing this, it seems likely that some of the tanning process would take place relatively quickly after the hunt and probably close by. If the hunt has taken place in the warmer months, for practical reasons, the flesh will have to be removed from the hide soon after to prevent spoiling. As we witnessed during our fieldwork, once the flesh is removed, the hide can be left to dry at no detriment to the finished product. Dry hide weighs significantly less, on the order of 2-5 kg depending on the amount and thickness of the hair that remains. It is much easier to transport a dry hide than a green one; additionally, a dry hide can be stored for long periods of time until the tanner is ready to work on it. Mida had no less than five dry hides in her smoke house that she was working on.

In the archaeological record, the act of flesh removal is not well represented; rather, the tools used to remove the flesh are what preserve. Fleshers are found in archaeological contexts including, but certainly not limited to, the Rat Indian Creek Site, Yukon (LeBlanc 1984), and the Promontory Caves, Utah (Ives 2013, 2014; Steward 1937). My experiences with Kaska Elders in the Yukon suggests that women would carry these tools with them as they moved around the landscape, and wouldn't simply just leave them behind after using them. Knowing this practice, the presence of fleshers at a site does not necessarily mean that the act of fleshing occurred there, as Mida told me it could have been a location that the owner deemed a good place to "retire" the tool.

As we learned from Mida and Alice, fleshers were among the tools that were handed down through generations, suggesting that there is more value attached to these implements than being purely functional. Marquis (1973) captured this sentiment when he interviewed a Shoshoni woman and asked her about the flesher that she kept with her:

"This hide scraper I have is made from the horn of an elk my husband killed, just after we were married. He cut off the smaller prongs and polished this main shaft. The Indian men of the old times commonly made this kind of present to their young wives. Besides using them in tanning, the women made marks on them to keep tracks of the ages of their children…. throughout 72 years it has always been a part of my most precious pack. There were times when I had not much else. I was carrying it in my hands when my husband was killed on upper Powder River. It was tied to my saddle while we were in flight from Oklahoma. It was in my little pack when we broke out from the Fort Robinson Prison. It has never been lost. Different white people have offered me money for it. I am very poor, but such money does not tempt me. When I die, this gift from my husband will be buried with me" [Marquis 1973:25-26].

Given the knowledge that these tools are curated and can be functional for significant periods of time, we would not expect to find them in great numbers. When they are recovered, they would likely be in a broken state. This observation certainly holds true for the fleshers recovered from the Rat Indian Creek Site (LeBlanc 1984) and those that were found in Cave 1, Promontory Point, Utah (Steward 1937). It is possible that through radiocarbon dating we might be able to quantify intergenerational transfer of implements. As is the case today with Mida, bone fleshers are not the sole tool used during fleshing; and it is very likely that other implements, such as knives, were used in the past as well.

As previously mentioned, during our time in the Yukon, the fleshing was facilitated by the use of a fleshing post. Such structures were also documented by Harp (2005:67) during his 1948 expedition along the Alaska Highway. At recently abandoned camps, he observed trimmed spruce poles with a shaped top, along with tools used for tanning hides, butchering meat, and fishing. While these objects would be prone to decomposition, there may be some instances in which evidence of the use of such posts exists. One site in particular stands out as good possible example of this: the Mini Moon Site (Hughes 1991) located in Montana. Hughes (1991:39) observed the remains of a "vertical posthole of unknown function" located between a sandstone slab and a hearth. In close proximity to the feature were two scrapers and a knife. I suggest, given the evidence at hand, that this posthole may be the remains of a fleshing post.

It should be noted that not all hides are fleshed using a fleshing post. Some are fleshed by stringing the hide up on a frame, or by staking the hide out on the ground (Baillargeon 2010; Brink 2010; Janes 1983; Kehoe 1960; McConnell 2010). It would be exceedingly rare for us to find evidence of either of these methods within the archaeological record. However, in some exceptional cases, such as the Promontory Caves in Utah, we have evidence in the form of the very stakes used to tie down the hide (Steward 1937). At the Ross Glen Site, there is evidence of post molds in close to circular patterns that have been interpreted as areas in which hides had been staked out (Quigg 1986:32-33).

While the evidence of fleshing might be somewhat obscure, I would argue that dehairing, in the form of exhausted stone endscrapers, is the most readily recognizable stage of the tanning process within the archaeological record. In accounts of hide tanning in Ethiopia, obsidian endscrapers need to be re-sharpened every fifteen to twenty strokes, causing them to become reduced and discarded at a relatively quick rate (Clark and Kurashina 1981:312). Re-sharpening reduces the size of the endscraper by approximately five to six centimeters over the course of its use life, suggesting that those found in the archaeological record would have been significantly larger when first constructed (Clark and Kurashina 1981:312). Replicative experiments performed by Brink (1978:110) found that chert endscrapers were effective for thousands of strokes before requiring re-sharpening, and that this durability was attributed to the fact that you do not need a very sharp edge to effectively remove hair. This observation is contrasted by the situation that was observed during the time spent with Mida, in which the metal scrapers used to remove the hair from the hide were kept very sharp, with re-sharpening the implements at regular intervals of approximately fifteen strokes.

Clark and Kurashina (1981:306) observed (during their time amongst tanners in Ethiopia) that two obsidian scrapers were exhausted and subsequently discarded during the cleaning of one cow hide. If we use this number of two scrapers per hide as a rough estimate for the minimum number of stone end scrapers required to tan one hide, then at sites where we find such implements, we may be able to begin to estimate how many hides were being tanned. We do need to keep in mind that the scrapers that Clark and Kurashina (1981) were observing were obsidian, and that different materials likely wear differently. Experimental archaeology using end scrapers of different materials would be useful in obtaining a better estimate of how many scrapers would have been used to tan a single hide. The reader should also take note that the number of scrapers utilized would also vary with the species of animal that was being processed. Further to this observation, we need to consider size and scale of excavations. Sites that have had extensive excavation would likely yield more material than sites in which smaller scale excavations have occurred, so that the proportion of a total assemblage has to be taken into account. We also have to be cautious in attributing hide-processing functions to all endscrapers, when in fact they may have been used for other actions as well.

While this method is not without flaws, for argument's sake, if we use this average of two stone scrapers per bison hide and look at some sites where scrapers have been found, we begin to get a more complete picture of the volume of work that women at these sites would have been doing. For the purpose of this brief discussion, I will look at four sites in which endscrapers have been found, and hide processing has been suspected of occurring. One of the sites is located in southern Alberta (the Ross Glen Site, DlOp-2); as well there is the Rat Indian Creek Site (MjVg-1), located in the Yukon, the Stelzer site that is found in North Dakota, and Promontory Cave 1, Utah.

Table 2-1: Number of stone endscrapers recovered at sites with estimates of the number of bison hides processed.

Site	Location	Number of endscrapers recovered	Number of bison hides represented
Ross Glenn	Southern Alberta	11	5.5
Rat Indian Creek	Yukon	102	51
Cave 1, Promontory	Promontory Point, Utah	6	3
Stelzer	North Dakota	481	240.5

Ross Glenn Site (DlOp-2): This site is a stone circle site in Southeastern Alberta that is comprised of eighteen stone rings that were nearly completely buried. Quigg (1986:2) postulated that the site was representative of two Besant age hunting groups that occupied the site simultaneously in the fall to undertake a kill operation. A total of twenty-nine lithic artifacts were recovered from the site. Of these, eleven were stone endscrapers, all of which were manufactured using non-local lithics. All of the scrapers recovered from the site were presumed to be exhausted, and exhibited polish along their working edges. Quigg (1986:22) interpreted these scrapers as having been used to scrape hides. If we return our attention to Table 2-1, according to the discard rates that Clark and Kurashina (1982) observed, it is reasonable to suggest that these discarded scrapers could represent somewhere on the order of 5.5 hides.

Rat Indian Creek Site (MjVg-1): Located at the confluence of Rat Indian Creek and the Porcupine River, the Rat Indian Creek site spans 2000 years of occupation as evidenced by the stratigraphic sequence (LeBlanc 1984:406). Comprised of eight layers, seven of which contained cultural materials, the site offers an insight into the change and continuity of technology over time. Interesting for this discussion is the distribution of scrapers between the levels. Level 1 yielded 1 scraper; level 5 had a total of 86; level 6 yielded 6 and level 6A also yielded 6 scrapers. If we start thinking of these numbers in terms of hide production, we see a change in the number of hides being processed over time, ranging from approximately three hides to approximately 46. These numbers are expected to increase if the full extent of the site had been excavated.

Cave 1, Promontory Caves (42BOS-1): Situated in the mountains of Promontory Point, Utah, the material culture of Cave 1 is thought to represent a quasi-continuous occupation that spanned 30-40 years (Ives 2014). Using Steward's (1937) *Ancient Caves of Great Salt Lake* and the Natural History Museum of Utah's OMAR catalogue of artifacts recovered during Steward's excavation, nine scrapers were identified. During the excavations between 2010-2013, an additional seven scrapers were collected. These scrapers could represent 8 tanned bison hides. Hallson (personal communication 2014) was able to estimate the number of scrapers that could potentially be represented in Cave 1, arriving at somewhere between 285-571 scrapers. This number could potentially represent somewhere between 142 and 286 bison hides being processed. The hide requirements of this population will be discussed more fully in Chapter 4.

Stelzer Site (39DW242): Located along the right bank of the Missouri River in the Oahe Reservoir Area of Dewey County, South Dakota, the Stelzer site is thought to represent a large scale occupation that is related to the existence of burial mounds located to the north and south of the site (Neuman 1975:3,29).

This large scale excavation uncovered a number of implements related to hide processing, including three bone fleshers and seven awls (Neuman 1975:27); but what really stands out is the sheer number of endscrapers recovered from the site, 481 in total. Yet, seeing that only 0.5% of the site was excavated, the actual number could be as high as 30,000 (Graham 2014). This site could represent the processing of upwards of 15,000 hides. This number is staggering and is certainly telling us something about the activities that were occurring at the site, and very likely, about the number of women who were present. This aspect of the Stelzer site is returned to in Chapter 5, when I discuss hide tanning during the Besant Phase.

The intention of this discussion of endscrapers has been to stimulate some thought about the volume of work that they could represent. Experimental archaeology on the discard rates of endscrapers of different material would certainly help to refine these arguments. As previously mentioned, endscrapers appear to be the most readily identified aspect of hide tanning within the archaeological record. If we begin to think of them in terms of the amount of work that each represents, we can certainly achieve a more thorough understanding of archaeological sites. It should also be noted that Mida used the split bone beamer for the purpose of removing hair, so that endscrapers are not the only implements that represent this activity.

I have discussed the dehairing of the hide at length but the process does not end here. Following fleshing and dehairing, many cultural groups would smoke the hide (Brink 2010; Janes 1983; Thompson 2010). There have been a number of studies discussing the archaeological signatures of hide smoking (e.g., Binford 1967; Hanks and Pokotylo 1989). Binford (1967), using the principles of ethnographic analogy, was able to show convincingly that smudge pits used for hide smoking could be identified in the archaeological record. Following that example, Hanks and Pokotylo (1989:143), through their work with the Mackenzie Basin Dene, were able to establish that sunken pit hearths were constructed for the purpose of smoking hides. Replicative studies of hide smoking features found that there were identifiable patterns in the creation and use of such features in archaeological contexts.

Ives (1986:200) identified an archaeological occurrence of a smudge pit, interpreted as used for hide smoking, at the Satsi site (HkPb-1), Eaglesnest Lake, Birch Mountains. The sunken pit was circular in shape and had a fill dominated by charcoal, charred twigs, and charred spruce cones. The morphology of this feature resembled Chicoltin hide smoking features, and the presence of four end scrapers found in close proximity to the feature further supported the suggestion that it was indeed a smudge pit used for hide smoking.

Following Mida's method for hide tanning, the next stage would be to soak the hide. Not surprisingly, I would not expect to find evidence of this action within the archaeological record. The previous steps are, for the most part, repeated following the soaking. This sequence then leads us to the second soaking, which would have been accomplished with the addition of partially rotten animal brain. It is very unlikely that there would be direct archaeological signatures of the act of soaking a hide in the brain/water mixture. Indirectly we may find evidence of animal skulls being treated so as to remove the brain from the brain case. The brain that we used was extracted by quite literally smashing the skull apart using an axe. This action caused fragments of skull to be strewn about the area where the brain had been extracted. Whether this was the typical way of removing the brain or not was unknown; but if the technique of smashing apart the skull were a common practice, we would expect to find highly fragmented pieces of skull at the site where the brain extraction was occurring.

At other sites, such as the Promontory caves, we find the skulls of animals being punched open through their frontal regions, leaving the skull mostly intact (Figure 2-28) Of course, it might not be possible to distinguish brain extraction for the purposes of tanning hides from those being extracted as a food source or for other purposes. I would argue that the context in which the skull and/or fragments were found would have to be considered when interpreting potential functions.

Figure 2.28: Bison skull with hole cut into the frontal bone. Excavated from Cave 1, Promontory Point, in 2013. Photograph courtesy of J. Ives.

This discussion has led to the final stages of hide tanning: the softening. As discussed above, this stage is accomplished using a stone skin softener, known in Kaska as a *tsētél*. These tools present an interesting case because they have not been the focus of systematic study, and as such there is not a lot of information regarding them.

In terms of the construction of these tools, I would not expect to find evidence of them being made at a campsite. Mida modified the edge of her stone while at the river's edge, and any debitage that would have resulted from this manipulation would not find its way into the archaeological record in a campsite; nor would such debitage be readily recognizable in most contexts, given the raw material most often used (no siliceous lithics). I would expect to find these tools in their completed form. Interestingly this does seem to be the case, and was explicitly illustrated in the report from the Rat Indian Creek site in the Yukon (LeBlanc 1984).

The fact that these expediently made tools hold great sentimental value to the women who make and use them also requires us to rethink what we believe about simple implements. The potential for a long use life of these tools suggests that we would expect to find fewer of them when compared to other hide processing tools, such as stone endscrapers, that would be exhausted more quickly. In addition, we must recall that when one of these tools was no longer viewed as fit to be used, it could be left in a "good place," a place of meaning to the woman who left it there.

Leechman (1948:18) documented the use and manufacture of a hand-held tabular scraper while living amongst the Vanta Kutchin (Gwich'in) of Old Crow, Yukon. He noted that the stone skin scrapers are often constructed from thin slabs of schist. He was able to describe the process of manufacture by which suitable pieces of stone were modified into crescent shapes using an axe head as anvil, against which flaking of the edge took place. He indicated that these tools, like those observed in Watson Lake in 2012, would have had a long use life. As with those observed in 2012, the tools Leechman (1948) observed were worked on both sides and were ready to use in a matter of minutes.

In addition, I was informed that women would not leave their tools at various camps as "site furniture" to be used at a later date. Instead, they would pack up their tools and carry them as they moved around the landscape. Knowing this practice, it would seem unlikely that these tools would intentionally be left behind unless they were no longer seen as usable.

Presumably as the tool is used, its size decreases over time. I would expect to find such tools in the archaeological record that are smaller than the one that we made during our field season. In terms of the modifications to the edge, I would expect that, through use, the edge of the tool would become smooth and rounded. The tool itself can be used with either the dorsal or the ventral surface facing upwards. As a result, one would expect that the wear along the edges would not result in one surface being very worn down with respect to the other.

Interesting to note, Mida did mention that these tools might have been used for other purposes as well. While she did not elaborate on what these purposes might be, it is possible, and in fact quite likely, that we are dealing with a multifunctional tool rather than one that was used for the sole function of softening hides. Once the hide has been softened—a critical step—it is ready to be transformed once again, this time into something that can be used or worn.

Now that we have an understanding of the process of tanning hides and how that knowledge can be used to interpret archaeological sites in new and exciting ways, I would like to take a more detailed look into these stone skin softeners that are so important in creating a quality hide product but are so little understood within the archaeological community.

Chapter 3- Chi-thos, Cobble Spalls, and Tabular Bifaces: Unraveling an Archaeological Conundrum

Softening is a critical step in creating the superior product of traditionally tanned hide. There are a number of methods used to achieve this effect, which can vary between cultural groups, families, and in some cases between members of the same family (Baillargeon 2010; personal observation 2012). Table 3-1 illustrates the methods used to soften hides by a number of First Nations and Inuit groups throughout North America.

Table 3-1: Methods employed by different cultural groups in North America for softening hides

Source	Cultural Affiliation and Location	Skin Softener: Stone	Skin Softener: Not Stone
Albright (1984)	Tahltan, British Columbia	Hafted stone with a chipped edge	Not mentioned
Belitz (1973)	Sioux, South Dakota	Not mentioned	Rubbed back and forth over a braided sinew rope
Coleclough (2010)	Ojibwa	Not mentioned	Pulled back and forth over a rope
Ewers (1958)	Blackfoot, North America	Rough Stone	Hide passed through a rope
Helm & Lurie (1961)	Dogrib, Mackenzie Basin, Northwest Territories	Hafted stone blade	Hafted curved metal blade resembling an ulu
Hilger (1951)	Chippewa, Minnesota	Not Mentioned	Not mentioned
Hilger (1952)	Arapaho, Oklahoma	Sharp stone	Blunt objects or drawn over a rope
Honigmann (1949)	Kaska, Yukon and British Columbia	Hafted stone with a chipped edge	Not Mentioned

Janes (1983)	Mackenzie Basin Dene, Northwest Territories	Flat stones	Hafted saw blade
Leighton (1995)	Woods Cree, Saskatchewan	Not mentioned	Softened using the flesher and/or scapula/and/or metal scraper
O'Brien (2011)	Gwich'in, Alaska	Not Mentioned	Not mentioned
Osgood (1966)	Tanana, South Coast of Alaska	Stone softener	Not Mentioned
Osgood (1970)	Ingalik, Western Alaska	Stone softener	Not Mentioned
Swanton (1969)	Choctaw	Not Mentioned	Rub hide back and forth over a pole
Swanton (1969)	Natchez, Mississippi	Hafted stone softener	Not Mentioned
Young et al. (1991)	Cree, Northern Alberta	"Possibly" use a stone "fluffer"	Rub hide through a hoop

The stone softeners are particularly interesting because we can expect to find them within archaeological contexts. These implements have, for better or for worse, come to be known as *chi-thos* within the archaeological community. Unfortunately, this term has been used indiscriminately to describe a whole suite of simply made implements including, but not limited to, cobble spalls and spall tools.

Eyman (1968) looked in detail at tools that comprised what she called the "American Indian Chopper Industry". She was primarily interested in the *teshoa*, or Shoshonean women's knife, that is frequently constructed from a quartzite spall struck from a cobblestone to be used in the task of butchering (Eyman 1968:5). She discussed how the term *teshoa* was formally objected to in 1965, when it was argued that the term *teshoa* was a corrupted form of the Athapaskan word, *tci-tho*, which was thought to mean any broad-edged tool. It would seem that since this time, the term "*chi-tho*" has been used as a catch-all term to discuss any flat, rounded, simply made implement, in spite of the fact that Eyman (1968) was able to show that this was not the case. Potter (2005:500) cuts to the core of the confusion when he discusses Cook's (1969) use of the term for the *chi-tho* "proper," but also for spall scrapers. The *chi-tho* proper had an oval or D-shaped form with bi-marginal flaking on all edges, while the spall scraper was a cortical flake struck from a river cobble and then superficially retouched.

It is clear that this term has been applied to implements of different raw materials, different functions, and with different morphologies. The simpleness of these types of tools has made them of little interest to collectors and archaeologists alike; and has attracted very little analytical interest, fostering the confusion that surrounds them. The use of the term *chi-tho* as a catch-all term has led some to believe that these implements occur all over North America and in considerable numbers. As we begin to analyze the existing material, however, we find that there are differences between these so called *chi-thos* and other cobble spall implements, based on material, morphology, and use wear.

I look at *chi-thos* from known archaeological and ethnographic contexts and compare these to cobble spalls from the Nick Poohkay Surface Collection (GlQl-4) in terms of material, morphology, and use. I will provide a definition that will assist in the identification of a specific subset of these artifacts that should be called tabular bifaces. This definition will aid in distinguishing tabular bifaces from cobble spalls in the archaeological record, particularly since cobble spalls seem more often to serve cutting purposes.

CHI-THO, TSĒTÉL, OR TABULAR BIFACE?

The term "*chi-tho*" first appeared in the academic literature when Froelich Rainey wrote:

"The skin scrapers are of a type still used by Indians in central Alaska. One of the native women at Gulkana obligingly made several for us in the following manner: a flat oval pebble selected from the beach was struck so that a thin, discoidal flake was detached; the edge of the flake was then battered against another stone to produce a blunt, retouched edge. In the upper Tanana dialect these tools are called tci-tho" (Rainey 1939:360).

Since this time, the term has been used interchangeably to describe retouched tabular implements as well as retouched and non-retouched cobble and boulder spalls (LeBlanc 1984; Workman 1978). The simple and expedient nature of these stone tools has certainly played a role in the lack of knowledge surrounding them, with detailed analysis of simple implements almost absent in archaeological literature (but see Eyman 1968). This is an unfortunate situation considering that an important aspect of the past is lost if simply made tools are not recognized—especially when they comprise a significant proportion of the material record at sites (Eyman 1968:1). Hide softeners present an interesting case because despite persisting through time and space, they have not been the focus of a concentrated archaeological study. This neglect of common tool types is not an uncommon theme in archaeology, with endscrapers at Paleoindian sites being largely ignored in favor of fluted points and bifaces, despite the fact that scrapers may comprise the majority of formed artifacts recovered at some sites (Loebel 2013).

The adoption of the term *chi-tho* by archaeologists is problematic from a linguistic perspective. Different communities have their own terms for similar implements, and using the term *chi-tho* becomes meaningless for many cultural groups. It has been said that *chi-tho* is *the* Athapaskan term for these skin softeners (Shinkwin 1979; Eyman 1968), but this interpretation is not entirely accurate. During fieldwork in August of 2012, it quickly became apparent that the term *chi-tho* was unfamiliar to the Elders from whom we were learning.

Table 3-2: Examples of the terminology used in different Dene languages for hide softening implements

Source	Language	Term Used for Hide Softening Implement
Personal Observation (2012)	Kaska	*tsētél*
Helm and Lurie (1961)	Tlicho	*kwete*
Rainey (1939)	Upper Tanana	*tci-tho*
Leechman (1954)	Gwich'in	*tci-de-do*
Janes (1983)	Slavey	*tthete*

In Table 3-2, there are five examples of different terms used to describe the same or similar implements. It is possible that the initial lexeme in each term are cognates with the meaning 'stone' (C. Snoek and M. Stang, personal communication 2015); though it needs to be acknowledged that the sources of the terminology in Table 3-2 are dated and these transcriptions may not be reliable (C. Snoek personal communication 2015). While the terms may be deep cognates, it is possible that they may not be mutually intelligible, so while it is correct that *chi-tho* is *an* Athapaskan term for these implements, it is not *the* term, immediately recognizable to members of various Dene communities. The adoption of one cultural term over others is an issue that can lead to much confusion when talking with communities, *including* the archaeological community.

To make the terminological usage more precise for archaeological studies, and to eliminate the ambiguity with respect to spall tools, I propose that we consistently follow LeBlanc (1984) and Workman's (1978) example in referring to these bifacially retouched tabular implements using the techno-morphological term of "tabular biface" rather than *chi-tho*. This is not to say that the terminology of the community is not valued or is less important. It is strongly recommended that while working in communities, it would be in our best interest to learn the terminology that is relevant to the people with whom we are working. That said, the techno-morphological term tabular biface is a neutral one, better suited to the broad regional comparisons archaeologists typically make.

ARCHAEOLOGICAL AND ETHNOGRAPHIC OCCURRENCES OF TABULAR BIFACES

The terminological ambiguity surrounding these implements makes finding discussion of them in archaeological literature difficult. What follows is a description of a number of archaeological sites and ethnographic contexts in which tabular bifaces have been found. These sites were chosen based on the reliability of the identification of the tabular bifaces as being used for hide softening.

ARCHAEOLOGICAL OCCURRENCES

Rat Indian Creek Site (MjVg-1): This site is located in the Yukon, and was excavated and reported by LeBlanc (1984). Comprising seven cultural horizons, this site ranges in age from 3000 years ago to the early or mid-1800s, based on radiocarbon dates and diagnostic artifacts. Oral histories indicate that the ancestors of the Vunta Gwich'in historically occupied the area, with Rat Indian Creek one location in an annual cycle of activities associated with the acquisition of caribou, a primary resource. The site yielded an extensive lithic assemblage across all artifact producing levels, including 21 complete tabular bifaces, 31 broken specimens, and 50 edge fragments (LeBlanc 1984:276).

The Rat Indian Creek site tabular bifaces are primarily made from sandstone and siltstone, but quartzite and slate also occur (LeBlanc 1984: 276). The location of the dominant raw material source for the tabular bifaces is unknown and there are no objects that could be considered core nuclei for them. This absence would suggest that the tabular bifaces were brought to the site in their finished form, or as blanks (LeBlanc 1984:277).

All of the tabular bifaces at the Rat Indian Creek site exhibited polish along the working edge. Some exhibited polish on one or both of the dorsal and ventral surfaces; this distribution was interpreted as evidence of where the tool had been hafted or repeatedly held, and is consistent with ethnographic accounts of how the tool would have been used (Albright 1984; Baillargeon 2010; Hanks and Pokotylo 1989; Janes 1984; LeBlanc 1984:277).

Klo-Kut Site (MjVl-1): This is a seasonally occupied major village site located in the middle Porcupine region of the Yukon Territory. In historic times, it was occupied by the Vunta Kutchin, a group of Athapaskan-speaking people who were from one of nine Kutchin-speaking tribes (Morlan 1973:1). Morlan (1973:260) identified a number of *tci-de-tho* (tabular bifaces), many of which are constructed from distinctly layered stone (although there are a number that have microcrystalline structures with fracturing along planar inclusions). These were described as hide scrapers by Kutchin-speaking people, and they were still being used in the 1970s (Morlan 1973:260).

Tr'ochëk Heritage Site (LaVk-10): The Tr'ochëk Heritage site (LaVk-10) in the Yukon lies within the traditional territory of the Tr'ondëk Hwëch'in, a Hän speaking group belonging to the Athapaskan language family. At Tr'ochëk, a tabular schist, D-shaped moose skin scraper was collected from a depth of 45-48 cm below the surface (Hammer 2001:22). Hammer (2001) noted that this scraper is remarkably similar to one recovered from a Hän occupation located along the Klondike River during the 1860s-1890s.

Dixthada Site, Alaska: Shinkwin (1979) worked with the material from the Dixthada site, which was formerly occupied by the Upper Tanana Athapaskans. This site was comprised of nine house pits with midden and storage pits. Twenty-one tabular bifaces and three boulder spalls were recovered from the site.

Dakah De'nin, Alaska: Dakah De'nin is an Ahtna village site located along the Copper River, consisting of nine house pits and various cache pits, also excavated by Shinkwin (1979). Dating of the site is problematic, but tree ring dates indicate that house pit 2 dates from 1816-1822 and a second house from 1836 or 1838. Of the many artifact types represented at the site, the largest number of artifacts that can be grouped into a single class are the boulder spall scrapers. Twenty-three boulder spalls were recovered from two house pits. These spall scrapers were unmodified, but local Ahtna people immediately identified them as scraping implements. In this specific case, cobble spalls were consistently being used for hide-working purposes, rather than cutting functions. The multifunctional nature of many of the hide processing tools is a matter that I address further on.

<u>Taltheilei Tradition of the Northwest Territories</u>: *Chi-thos* (tabular bifaces) comprise a significant portion of Gordon's (1996) volume, *People of Sunlight, People of Starlight: Barrenland Archaeology in the Northwest Territories of Canada*, in which the Taltheilei tradition of the Northwest Territories, from the earliest instances through to historic times, is identified and defined. The Taltheilei Tradition reflects a barrenland caribou-focused lifestyle, with treeline intercept locations and overwintering locations well inside the Boreal Forest (in northern Saskatchewan and Manitoba) (Gordon 1996). This study is comprised of data from 1002 sites from both the tundra and the forests of the Northwest Territories and northern prairie provinces. The tabular bifaces in Gordon's study are predominately sandstone discs, but other fissile materials and quartzite also occur (Gordon 1996:37).

Sites from the early Taltheilei phase have been radiocarbon dated to 1,800-2,450 years ago. The majority of what Gordon (1996) calls *chi-thos* (what I refer to as tabular bifaces) from this time are bifacially worked. The Middle phase of the Taltheilei tradition dates to 1,300-1,800 years ago. Tabular bifaces of this time are very similar to those of the preceding phase. Gordon suggested that forest and tundra tabular bifaces could be differentiated with respect to the overall size and wear. He found that forest implements were smaller than tundra ones, and that they also exhibited more wear. The Late Phase of the Taltheilei tradition (200-1,300 years ago) also has morphologically similar tabular bifaces. These implements are primarily constructed of sandstone, however, with the majority bifacially worked. Tabular bifaces persist throughout the entire Taltheilei tradition, and Gordon notes that they continued to be used into historic times.

Tabular bifaces are not a new artifact type with the Taltheilei tradition, as Gordon discusses. They occur in sites that pre-date Taltheilei, with the oldest coming from Northern Plano sites that date to 7-8,000 years ago in the Barren lands. Whether Northern Plano people brought the tabular biface with them from the Plains, or it was a result of interaction with northern people, is unclear.

Cave 1, Promontory Point, Utah (42BO1): There are archaeological occurrences of tabular bifaces in the Promontory Caves of Utah, located a great distance from the Dene north. There are two known tabular bifaces from the assemblages of Cave 1, Promontory Point, and one from Cave 5. Steward (1937) did not identify them as such, but the morphology is consistent with tabular bifaces. In the case of one of them, the pattern of use is consistent with an implement used to scrape a dry soft substrate such as a hide (Keeley 1980; Loebel 2013; Odell 2010). The tabular biface from Cave 5 is constructed from a fine-grained schist that has been bifacially modified around almost the entire perimeter (Figure 3-1 h).

ETHNOGRAPHIC OCCURRENCES

Gulkana, Alaska: Rainey (1939), while working with Tanana people, observed the manufacture of a stone tool implement called a "*tci-tho*," that was described as a tool for hide working. The implement was constructed from a discoidal flake that was struck from a river cobble and subsequently edge battered and modified.

Lac la Martre, Northwest Territories: Helm and Lurie (1961:8) made a detailed study of the subsistence economy of the Tlicho people, an Athapaskan-speaking group. When a suede-like finish is desired for a hide, the dry hide is softened using a *kwete* (Helm and Lurie 1961:92). They described an implement that looked superficially like an Inuit *ulu* or woman's knife, and was used in a hand-held fashion. The implements were constructed out of hammered scrap iron, but are similar in morphology to stone tabular bifaces.

Willow Lake, Northwest Territories: Janes' (1983) ethnoarchaeological study with the Mackenzie Dene documented the process of hide processing. The people with whom he was working are Slavey, a group of Athapaskan-speaking people. He observed women using handheld metal scrapers, semi-circular in shape, to soften hides. While not stone, the general morphology and function of this implement is similar to the stone tabular bifaces discussed in this study. It was indicated that the stone implements like these could have long use-lives, and be curated for remarkably long periods of four to 30 years (Janes 1983:100)

Old Crow, Yukon: Leechman (1954) documented the use and manufacture of a hand-held tabular scraper while living amongst the Vunta Kutchin (Gwich'in), members of the Athapaskan language family, of Old Crow, Yukon. He noted that the stone skin scrapers were constructed from thin slabs of schist that were shaped and used by women. These implements were constructed by modifying one edge by tapping it against an axe head until the artifact assumed a crescent shape, the whole process taking only minutes to complete. The straight edge of the tool would be covered with a leather pad to protect the hand as it was used to scrape animal skins. Leechman (1954) noted that these implements were good for a long time, but some of the rocks break easily.

Buckinghorse River, British Columbia: Harp (2005) found two semi-lunar shale-like stones that local informants described as stone skin scrapers at Buckinghorse River in Northern British Columbia. A local woman, Sophia Watts, showed Harp (2005:86-87) how to make a skin scraper from a thin slab of slaty stone. She rapped the edge of the stone vertically against any convenient anvil boulder until the stone was semi-lunar in shape, with a sinuous edge that was not too sharp.

Upper Stikine River area of Northern British Columbia: Albright (1984) worked with the Tahltan people to establish a model of traditional subsistence patterns. The Tahltan are an Athapaskan-speaking group of people who occupy the Stikine Plateau region of northern British Columbia. She discusses the use of a hafted stone tool that has a dulled working edge. The stone is described as being often made from a coarse-grained basalt. These "dressing stones" are described as having a long life span, with two or three hides being dressed before the tool requires resharpening.

Watson Lake, Yukon: During the field season of 2012, I had the opportunity to learn from Kaska women (an Athapaskan-speaking group) and witness a stone hide softener (*tsētél*) being constructed. For more discussion of the construction of the hide softening stones and their use observed in Watson Lake, please refer to Chapter 2 (pages 14-51).

An inquiry into occurrences of "*chi-thos*" in the province of Alberta yielded only ten documented implements. Of these ten, only two bore characteristics consistent with tabular bifaces; the remainder are more accurately identified as cobble spalls and modified cobble spalls. At this point in time, it is impossible to say whether the lack of these implements in Alberta is an issue with identification or their actual absence. A similar inquiry into the number of cobble spalls in the province of Alberta yielded many hundreds of examples The occurrences of tabular bifaces in the Promontory Caves of Utah is intriguing from a migration perspective, as it is thought that the occupants of the Cave represent a proto-Apachean population with roots in the Dene north (Billinger and Ives 2013; Steward 1937; Ives 2014).

Figure 3-1 is a sample of tabular bifaces from archaeological and ethnographic contexts in western North America. There is remarkable similarity in both the morphology and the modification with those from the Canadian Subarctic (a-d, f-g, i) and those from Utah (e, h).

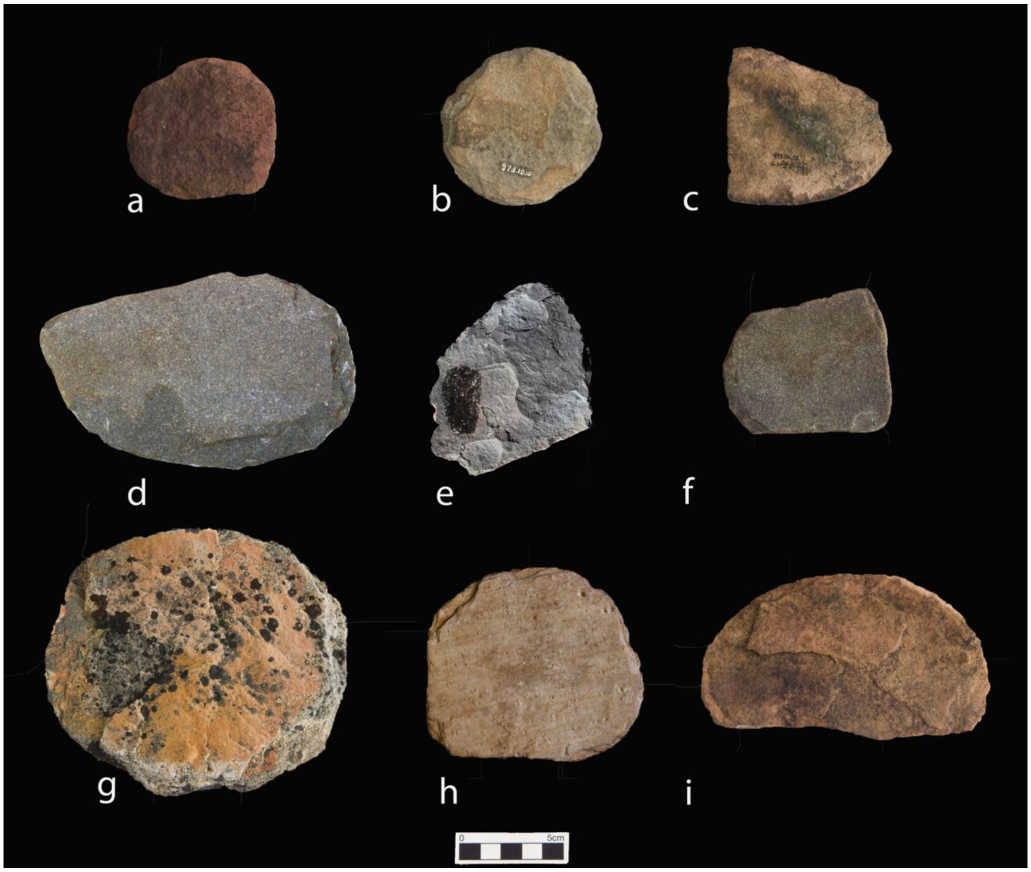

Figure 3-1: Sample of tabular bifaces from archaeological and ethnographic contexts. a) Artifact 993.76, Wekweti Northwest Territories (NWT). b) Artifact 973.10.10, Mesa Lake NWT. c) Artifact 993.76 Wekweti NWT. d) Watson Lake, Yukon. e) Artifact FS126.1 Promontory Point Cave 1, Utah. f) Artifact 992.6 Wekweti NWT. g) Artifact 987.76.236 Tlogotsho Plateau NWT. h) Promontory Point Cave 5, Utah. i) Artifact 993.76, Wekweti NWT. (Images a-c, f-i, courtesy of the Prince of Wales Heritage Center (PWHC), NWT photograph credit Susan Irving. Image d, photograph by the author, images e, h, photograph courtesy of J. Ives.

Tabular bifaces can be used in either a hafted (Figure 3-2) or a hand held fashion (Figure 3-3) (Pokotylo and Hanks 1989; Janes 1983; Albright 1984; personal observation, 2012). As can be seen in Figures 3-2 and 3-3, regardless of whether the implement is hafted or hand held, the modification and morphology of the stone is consistent.

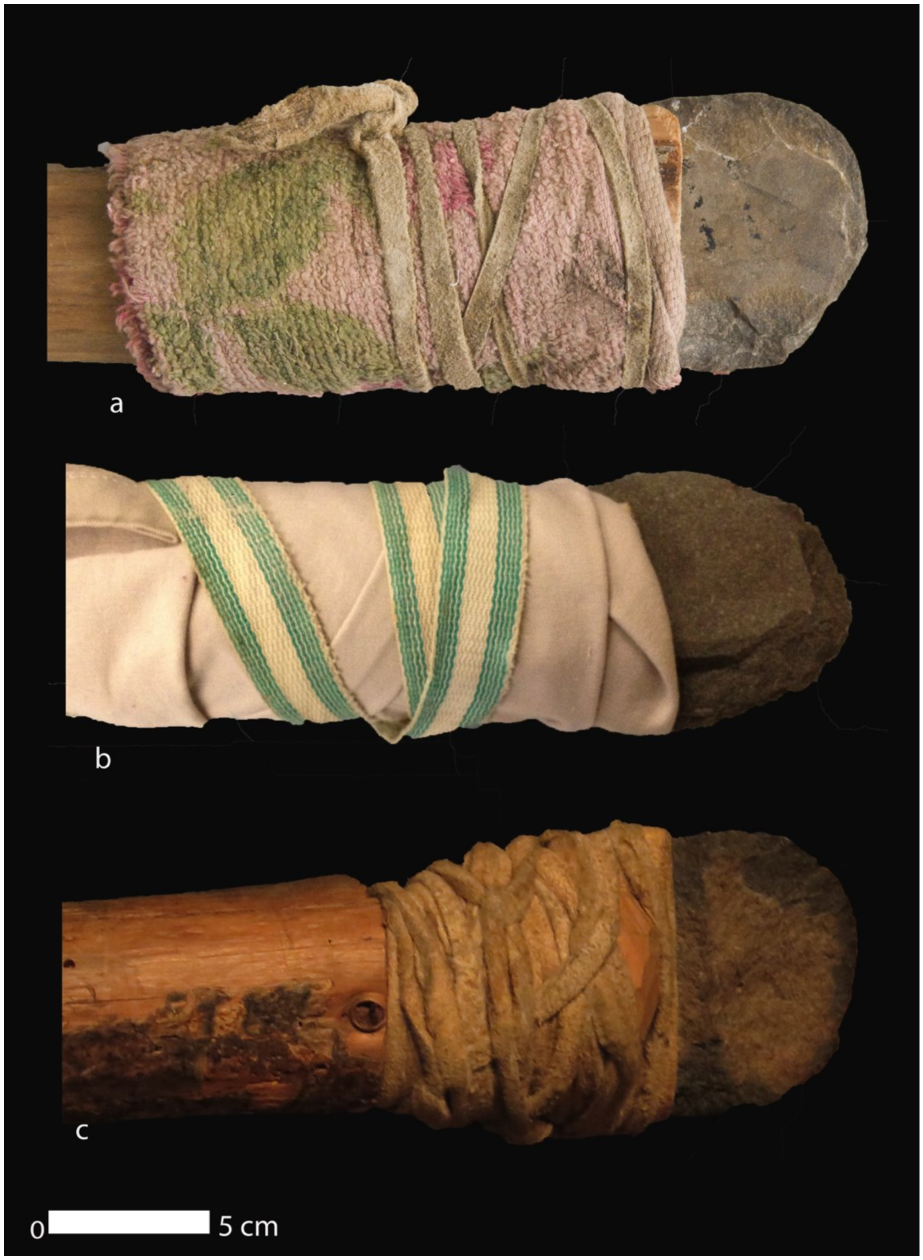

Figure 3-2: Examples of hafted tabular bifaces. a) Artifact 984.23.1 from the North West Territories. Image courtesy of the PWHC, photograph S. Irving. b) Tabular scraper constructed in Watson Lake, Yukon, 2012. Photograph by the author. c) Tsilhqot'in tabular scraper, Royal British Columbia Museum; photograph by J.Ives.

Figure 3-3: Hand-held tabular biface. a) Artifact 2007.1.1 from Behchoko, NWT. Image courtesy of the PWHC; photograph credit S.Irving. b) Artifact 979.10.8, Behchoko, NWT. Image courtesy of PWHC; photograph credit S. Irving.

COMPARING TABULAR SCRAPERS WITH COBBLE SPALLS

These tabular bifaces can be compared with cobble spalls from the Poohkay surface collection (GlQl-4). As we have already seen, cobble spalls have often incorrectly been identified as *chi-thos* (Eyman 1968, LeBlanc 1984; Workman 1979). The Poohkay collection can provide assistance with discriminating between these two types of implements. This collection is from the Eaglesham area of northwestern Alberta's Peace River country. It is comprised of a very large assemblage of artifacts that were collected over a five decade period by an avocational archaeologist (Mr. Nick Poohkay). The fields from which the collection was made are part of a geological context that reflects the floor of the Glacial Lake Peace; consequently, virtually all of the lithic material is demonstrably artifactual in nature, representing a period of time that extends from the fluted point era through to later Paleoindian times and on to the Late Prehistoric Period (see Ives 2006; Ives et al. 2013). While it is impossible to derive ages for most of the materials from the Poohkay collection, it does represent a cross section of cobble spall manufacture and use over a broad time period that can be useful for comparative purposes. A sample of the cobble spalls from this collection can be seen in Figure 3-4.

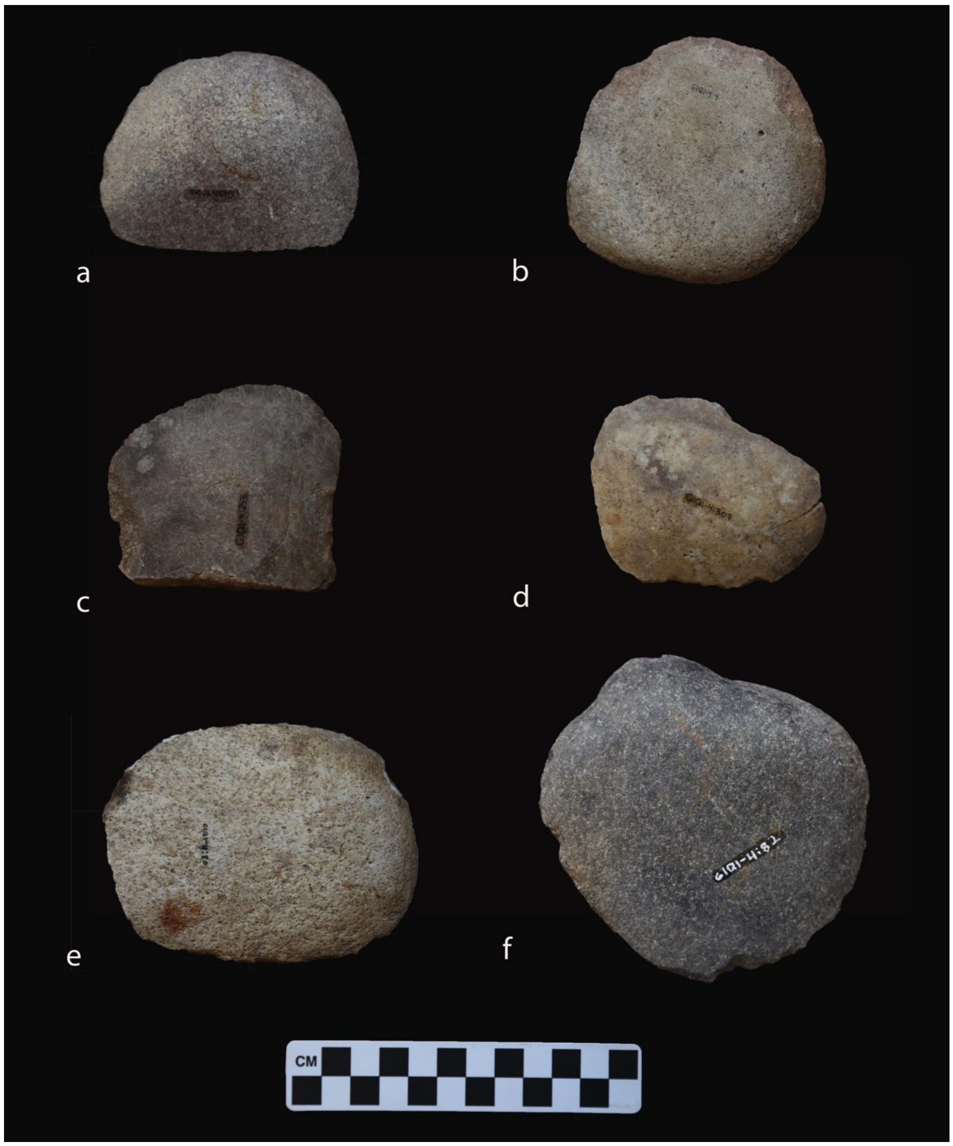

Figure 3-4: Sample of cobble spalls from the Poohkay Surface Collection (GlQl-4).

The tabular bifaces in Figure 3-1 are demonstrably different from the cobble spalls in Figure 3-4. I will now discuss these two artifact types in terms of material types, modification, and patterns of use.

MATERIAL TYPE

Tabular bifaces are commonly constructed out of coarse-grained, fissile materials. Schists, gneisses, mud and siltstones, slates, shales, and sandstones dominate among examples of tabular bifaces; but other materials such as quartzite spalls can be shaped into tabular bifaces (Gordon 1996; LeBlanc 1984; Morlan 1973; Shinkwin 1979) The material used in Watson Lake, during the field season, was a fine-grained tabular material, similar to a siltstone.

Cobble spalls, as defined by LeBlanc (1984) and Morlan (1973), are primarily constructed from water-worn quartzite cobbles. Thirty-seven cobble spalls were identified within the Poohkay Surface Collection (GlQl-4). All but two of the cobble spalls are quartzite, with one being an argillite and the other of unknown material. LeBlanc (1984) and Morlan (1973) reported similar materials for the cobble spalls recovered from their sites.

MODIFICATION AND PATTERNS OF USE

There is fluidity between tools and the function that they perform. Many of the implements used for hide working are multifunctional, including cobble spalls and tabular bifaces. A brief review of hide processing tools and the functions they can be used for is found in Table 3-3.

Table 3-3: Typical hide processing tools found at archaeological sites, and the functions that they perform (Baillargeon 2010; personal observation, 2012)

Stage of Hide Processing	Biface	Cobble/Boulder Spall Tool	Bone Flesher	Split Bone Beamer	Stone Endscraper	Tabular Biface
Butchering	X	X				X
Flesh Removal	X	X	X			X
Hair Removal		X		X	X	X
Hide Softening		X				X

Given that cobble spalls and tabular bifaces have overlap with respect to the tasks that they can be used for, developing criteria for distinguishing them from one another is a useful exercise. More so than material type, the modification and patterns of use are more reliable indicators of function. Both Morlan (1973) and LeBlanc (1984) describe cobble spalls as large cortical flakes that are struck off of quartzite river-worn cobbles. These can be shaped or unshaped, and the resulting edge is usually thin and sharp (Morlan 1973:254). The *teshoa* of Eyman's (1968) study revealed that these implements were likely discarded after their first use without any resharpening and generally without signs of wear (Eyman 1968:12-13). Similar results were observed when the cobble spalls from GlQl-4 were analyzed under the microscope, with none of them showing obvious signs of use. The distal edges of all but one of the thirty-seven cobble spalls are unmodified. The exception, GlQl-4:4, can be seen in Figure 3-5. This modified cobble spall did not show obvious signs of use when examined under the microscope, with the modified edge still feeling sharp to the touch. The function of this implement is unknown, though it does bear characteristics similar to the hide softening stones.

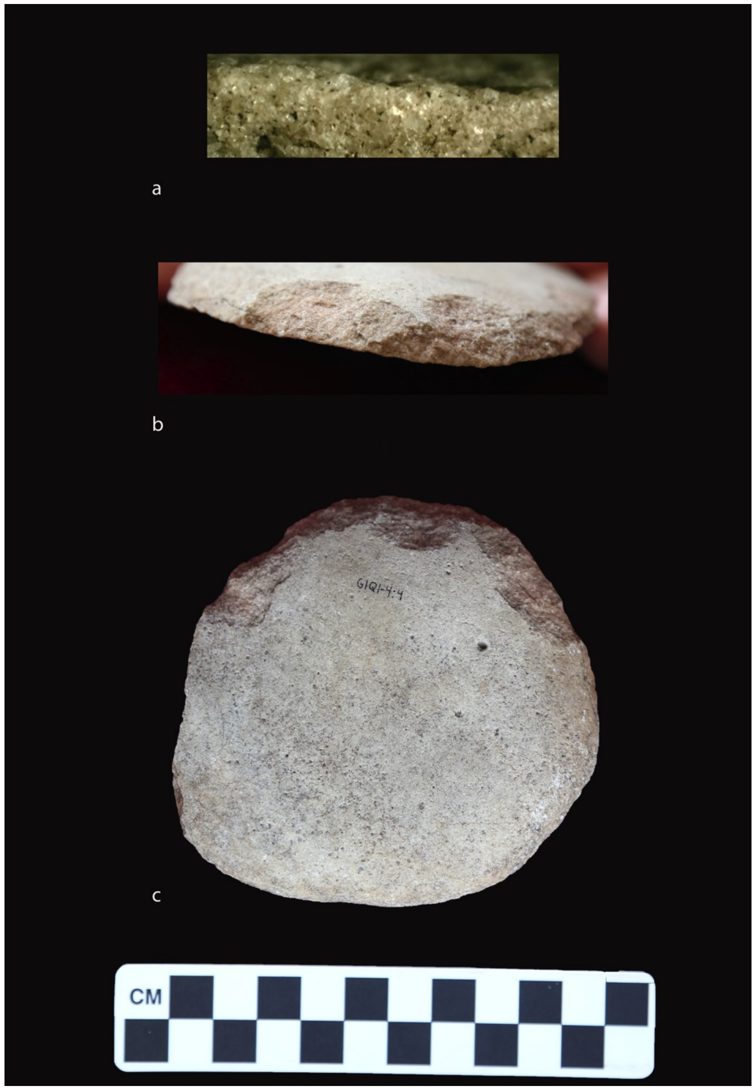

Figure 3-5: a) Close up of the working edge of GlQl-4:4 at a magnification 55X. b) Modification of the edge of the spall. c) Dorsal surface of GlQl-4:4, Modification to the distal margin. Photographs by the author.

The modified edges of tabular bifaces are characteristically bifacially worked, often with pronounced polish and rounding from frequent re-use, though this wear may or may not be present. The modification of the working edge assists with the recognition and differentiation between tabular bifaces and cobble spalls. Figure 3-6 shows a comparison of the general morphology of an unmodified cobble spall and a tabular biface that was made to soften hides. The edges of these implements are distinct from one another, a distinguishing characteristic. The tabular biface (Figure 3-6 right) does not show rounding or polish because it was (at the time the photograph was taken) never used, although it was to be used by the traditional skills workshop at the local school.

Figure 3-6: Left, a cobble spall (GlQl4-251) from the Poohkay collection. Note the sharp and thin working edge. Right, a tabular biface constructed in Watson Lake. Note the bifacially modified edge. Photographs by the author.

If a tabular biface has been repeatedly used for softening hides over a long period of time, it is predicted that the edge will be modified in observable ways. Figure 3-7 (d) shows the modification that is visible on a tabular scraper (42BO1:126.1) from Promontory Cave 1, and compares that to the microscopic images of the edges of cobble spalls from GlQl-4 (Figure 3-7, a-c). The working edge of the Cave 1 tabular scraper has pronounced rounding, polish, and striations that run perpendicular to the edge. This pattern of use is consistent with what would be expected for a tool that had been used repeatedly on a dry, soft substrate (Campbell 2013; Hayden 1979; Keeley 1980; Loebel 2013:323). The edges of cobble spalls from the GlQl-4 (Figure 3-7 a-c) remain sharp, and there is no evidence of rounding or polish.

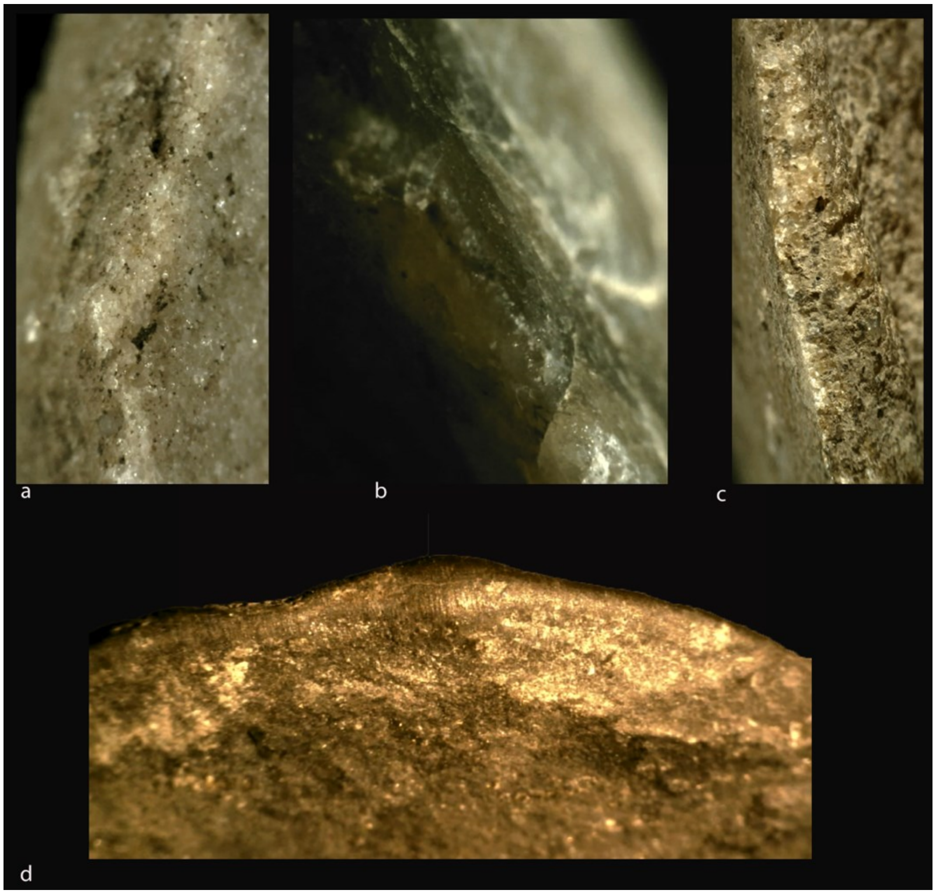

Figure 3-7: Images (a-c) show the working edges of cobble spalls from the Poohkay Surface collection. All were photographed at a magnification 55X. Image (d) is the working edge of tabular scraper from Promontory Cave 1 (FS126.1) Image was photographed at a magnification of 55X. All photographs by the author.

It should be noted that the absence of wear patterns on both cobble spalls and tabular bifaces does not mean that they were never used. Implements that have been used very briefly may not show signs of use. It is also possible that tools were created but never used, as was the case during my time in Watson Lake, Yukon, when a tabular biface was constructed but was ultimately deemed unfit and was discarded.

The method by which these tools are used for hide softening indicates that there would be a practical limitation for the dimensions of the stone selected. Because predominantly different raw materials are selected and modified to make tabular scrapers that have attested uses as hide softening implements, it is reasonable to suspect that there could be metric difference between tabular scrapers and cobble spall implements. Following this logic, dimensions of cobble spalls and tabular bifaces were selected for further analysis.

ANALYSIS: METRIC DISCRIMINATION OF TABULAR BIFACES FROM COBBLE SPALLS

Tabular bifaces found in both archaeological and ethnographic contexts were re-examined, and measurements of length and width were recorded. The majority of the data were obtained from photographs and measurements from published archaeological reports. Length was measured from the working edge to the opposite margin; to be clear, this length measurement does *not* simply reflect the longest dimension of the artifact, but rather, length from the proximal hafted or held edge of the artifact to the distal, working edge of the artifact. Width was the perpendicular axis to the length. Since tabular scrapers and cobble spall tools are often mistaken for one another, dimensions from identified tabular bifaces were compared to those of the cobble spall implements found in the Poohkay surface collection (GlQl-4) and those at the Rat Indian Creek site (MjVg-1). A total of 91 tabular bifaces and 45 cobble spalls comprise this analysis. All statistical analyses were conducted using the SPSS 22 program.

The samples are normally distributed, with 95% of the data falling roughly within two standard deviations of the mean (Table 3-3). This distribution allows for the use of an independent samples t-test to determine if tabular bifaces and cobble spalls are statistically significant from one another (Drennan 1996). The results show that the differences between tabular bifaces and cobble spalls are statistically highly significant for both length and width (P<0.001).

Table 3-4: Group Statistics for Length and Width of Tabular Bifaces and Cobble Spalls

Descriptive Statistics					
	Type	N	Mean	Std. Deviation	Std. Error Mean
Length (mm)	tabular biface	91	103.5913	24.11228	2.52765
	cobble spall	45	224.6531	140.3365	20.92013
Width (mm)	tabular biface	91	77.0913	20.77592	2.17791
	cobble spall	45	93.9256	22.3529	3.33217

A scatter plot of length versus width reveals that tabular bifaces exhibit greater variation in width, but are fairly uniform with respect to length (Figure 3-8). Conversely, when we look at cobble spalls, they exhibit a positive correlation between the two variables: as length increases, so does width. Linear regression makes the different relationships between these variables in different object classes very apparent. There is some overlap amongst the narrowest of the objects: the small tabular bifaces and small cobble spalls are fairly similar, but the larger ones are not.

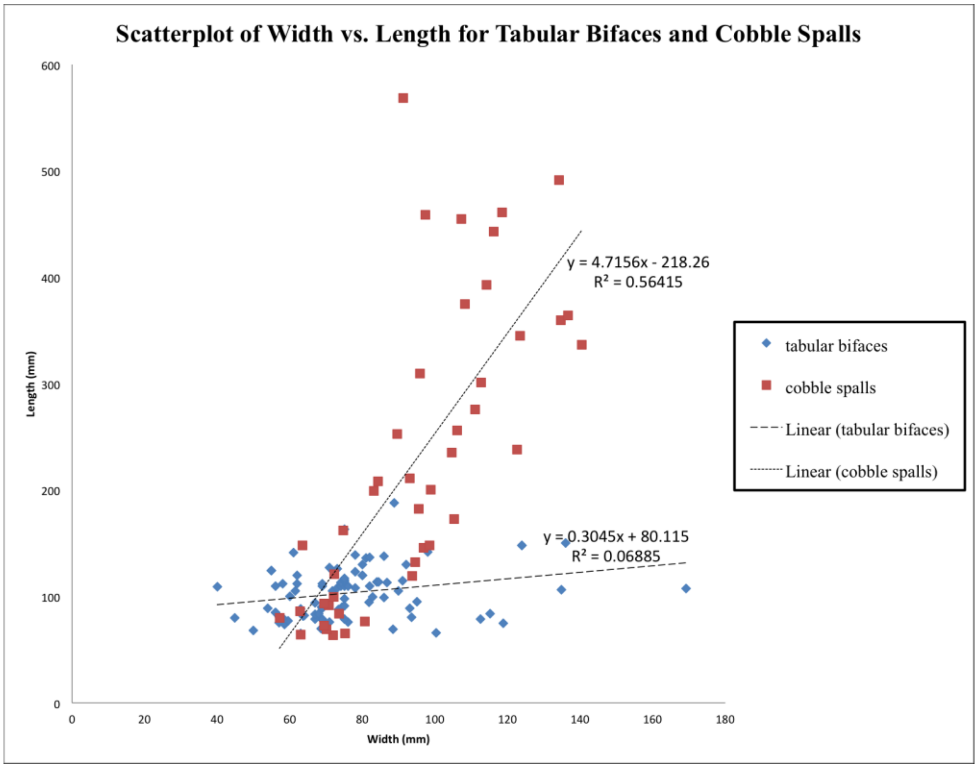

Figure 3-8: Scatterplot showing the relationship between length and width for tabular bifaces and cobble spalls.

Discriminant function analysis (DFA) is used to generate functions that can be used to assign an individual into one group or another based on the available information (Giles and Elliot, 2005). With this study, the two groups are tabular bifaces and cobble spalls. The sectioning point is the value that separates the categories into which we are trying to classify items (Drennan 1996). A value above this point will be a cobble spall; below it will be a tabular biface. The final equations are adjusted so that the sectioning point is zero. Therefore, positive values will be cobble spalls and negative values will be tabular bifaces.

The data were input into the SPSS 22 program, and the resultant discriminant function equation for length is:

$$D = .012(length) - 1.735$$

Sectioning Point: 0.247

The corrected equation is:

$$D = 0.12(length) - 1.982$$

A further way of interpreting discriminant analysis results is to describe each group in terms of its profile using centroids. Group centroids are the means of the discriminant function scores, and for this sample they can be seen in Table 3-5 below.

Table 3-5: Functions at Group Centroids

Type	**Function**
	1
Tabular Biface	-0.484
Cobble Spall	0.978

Unstandardized canonical discriminant functions evaluated at group means

Accuracy of the DFA for length can be seen in Table 3-6. The original category tells us the percentage of the sample that is correctly classified by the equation above. The cross-validated category simulates application to samples not in the database. The process involves leaving one sample out of the dataset and then calculating the discriminant function using all the other samples. The excluded sample is then classified with the new function. This procedure is done once for every sample, and the accuracy of all iterations is summed (Giles and Elliot 2005; B. Osipiov, personal communication, 2014).

Table 3-6: Discriminant Function Analysis Classification Results[a,b] for Tabular Bifaces and Cobble Spalls Based on Length

			Predicted Group Membership		
		Type	**Tabular biface**	**Cobble spall**	**Total**
Original	Count	tabular biface	90	1	91
		cobble spall	20	25	45
	%	tabular biface	98.9	1.1	100
		cobble spall	44.4	55.6	100
Cross-validated	Count	tabular biface	90	1	91
		cobble spall	20	25	45
	%	tabular biface	98.9	1.1	100
		cobble spall	44.4	55.6	100

a. 84.6% of original grouped cases correctly classified.
b. 84.6% of cross-validated grouped cases correctly classified.

Table 3-6 is the resulting classification table for length, showing that 84.6% of original cases are correctly classified. This result means that of the total sample of 136 individual specimens of tabular bifaces and cobble spalls, 115 (90 of the tabular bifaces and 25 of the cobble spalls) of these were accurately classified into their correct artifact type with respect to length, resulting in 84.6% accuracy of the DFA. Cross validation yields the same percentage for correctly classified objects. Tabular bifaces are more accurately classified than cobble spalls, with respect to length. It is possible that this outcome is an artifact of the sample size (there are more tabular bifaces than cobble spalls).

The same analysis was performed for width. The discriminant function equation for width is:

$$.047(width) - 3.880$$

Sectioning Point: -3.880

The adjusted equation so that the sectioning point is zero is:

$$0.047(width) - 4.148$$

Table 3-7 is the resulting classification table for width. It shows that 71.3% of the original sample is correctly classified by this function. This result means that of the total sample of 136 individual specimens of tabular bifaces and cobble spalls, 97 (70 of the tabular bifaces and 27 of the cobble spalls) were accurately classified into their correct artifact type with respect to width resulting in 71.3% accuracy of the DFA. The same percentage is obtained when we cross-validate the groups. What can be seen here is that width appears to better classify cobble spalls, though there is a reduction in the accuracy with which tabular bifaces are discriminated correctly.

Table 3-7: Discriminant Function Analysis Classification Results[a,b] for Tabular Bifaces and Cobble Spalls Based on Width

			Predicted Group Membership		
		Type	**Tabular Biface**	**Cobble Spall**	**Total**
Original	Count	tabular biface	70	21	91
		cobble spall	18	27	45
	%	tabular biface	76.9	23.1	100
		cobble spall	40	60	100
Cross Validated	Count	tabular biface	70	21	91
		cobble spall	18	27	45
	%	tabular biface	76.9	23.1	100
		cobble spall	40	60	100

a. 71.3% of original grouped cases correctly classified
b. 71.3% of cross-validated grouped cases correctly classified

The results of both the length and width discriminant functions imply that tabular bifaces are distinguished from cobble spalls more in terms of length than width, findings that are consistent with the scatter plot analysis above.

DISCUSSION

The tabular bifaces in the sample come from a number of archaeological and ethnographic contexts, the majority occurring in Northern Canada. Regardless of where they originate, they exhibit uniformity with respect to length, suggesting that there is a selection process that favours stones of a certain size, along with the shaping of stones to achieve a desired shape and size. The statistical assessments support this observation. Tabular bifaces exhibit uniformity with respect to length, with the average for this sample being 103.3 mm long. Width does not affect length of tabular bifaces: as width increases the length remains effectively the same. Cobble spalls exhibit the opposite trend: as width increases, so does length (Figure 3-9). Because cobble spalls are cortical flakes driven from a cobble, these results are not surprising, as they are likely to result from the conchoidal fracture dynamics necessary to actually detach a flake from the tough quartzite rind of a cobble. The larger the cobble, the larger the resulting spall will be.

It is predicted that tabular bifaces that have been used for softening hides would have characteristic and identifiable use-wear patterns, involving pronounced polish, rounding, and in some cases linear features (Hayden 1977; Keeley 1980; Loebel 2013). Artifact 42BO1:FS 126.1 (refer to Figure 3-5 d), is an example of a very pronounced pattern of use. Based on this use-wear it is reasonable to say that this artifact is a tabular biface that was used on a soft substrate such as an animal hide. It likely was used on a hide that was dry, as Loebel illustrated in his Figure 13.2 (2013:320). All of the tabular bifaces from the Rat Indian Creek site, most from the Klo-kut site, and the majority from the Taltheilei collections exhibit visible polish and rounding, supporting the statement that a tabular biface used to work hides often exhibits these characteristics.

There is, however, a grey area because there could be tabular bifaces that were infrequently used to soften hides, or those that were constructed and discarded or lost shortly after construction. In these cases, the implements would not show these patterns of use. There is also the possibility that tabular bifaces were, or could be, multifunctional. Artifact 42BO1:FS 791.1 from Promontory Cave 1 is a tabular biface with linear features that run parallel to the working edge, a pattern of wear that is more consistent with what would be expected from a knife or a tool that is used for cutting meat or removing flesh from a hide (Hayden 1977; Keeley 1980; refer to Figure 3-10).

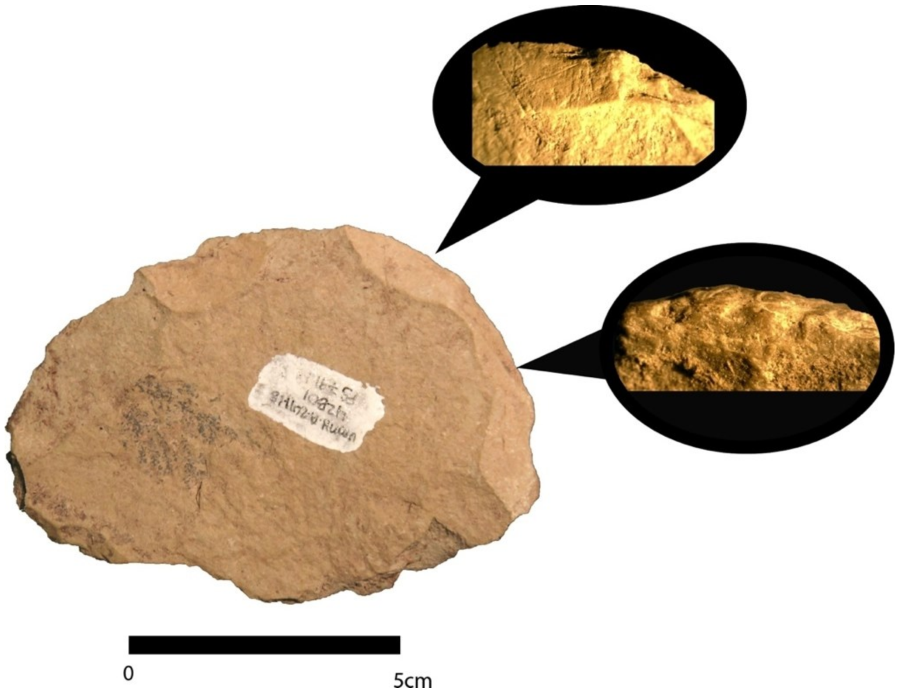

Figure 3-9: Tabular biface (42B01:FS791.1) from Promontory Cave 1 with use wear marks suggestive of a cutting function.

While there is a tendency for us to think of knives as being long and linear, there is a long tradition in the Canadian Arctic and Subarctic as well as the larger circum-Beringian world for women's knives (such as the *ulu*) to be ovoid or circular in shape (Klokkernes 2010; Osgood 1970). Artifacts with general morphologies primarily intended for hide softening might nevertheless see occasional use for other purposes.

FOR FUTURE CONSIDERATION

Unfortunately the thickness of these implements was not taken into consideration with this study, and I would recommend that future study take specific focus on this attribute. Thickness, or conversely thinness, may be an indicator of tabular scrapers used in a softening function vs. those used for a knife-like function. The sample size should be increased, and the statistical analysis should be rerun to determine if the general trends stay true.

CONCLUSIONS

Generally, tabular bifaces are stone implements, usually constructed from fine-grained fissile material (slates, schists, gneisses, silt or mudstones, and sandstones), although other materials can occur. They are modified into a circular, ovoid, crescentic or D-shapes, although other irregular shapes can occur. They are characteristically bifacially modified along at least one margin. This modification can extend over the entire dorsal and ventral surfaces, but is normally restricted to just the margins.

Tabular bifaces specifically used to soften hides are predicted, under ideal circumstances, to display certain morphological characteristics and distinct patterns of use. Tabular bifaces have a decided tendency to be broader than their proximal-to-distal length. In addition to the properties listed above, tabular bifaces used to soften hides are usually modified by expedient chipping and battering, resulting in a sinuous and blunted edge. This blunted edge is necessary for the task of softening. If evidence of use is present, it should be in the form of rounding and polish along the working edge. In some circumstances, linear features running perpendicular to the distal, working edge will be visible. There may also be evidence of hafting or repeated hand holding in the form of polish on the ventral and dorsal surfaces.

Cobble spalls are large flakes that have been detached from water-worn quartzite cobbles, often with bulbs of percussion still present (LeBlanc 2004:71, 1984:238). They express a more constant relationship between length and width, with both values increasing together as artifact size increases. They are usually completely, or near completely, covered in cortex (rind) on their dorsal surface (LeBlanc 1984:238). They may be modified or unmodified; and their function varies, although cutting tasks seem to predominate.

These criteria allow us to be more consistent in our identification of tabular bifaces as opposed to cobble spall implements in archaeological contexts and within existing collections. Tabular bifaces are an important part of the archaeological record, but unfortunately their simple nature has led to them being overlooked or lumped into catch-all categories. As we have seen with studies like Eyman's (1968) about the *teshoa*, and the ethnoarchaeological work of Albright (1984), Hanks and Pokotylo (1989), Janes (1983) and now this study, simple implements can, and do, have significant meaning to the women who use them. Even more critically, they reflect essential and time-consuming activities concerning traditional hide-preparation activities without which life in the past would have been impossible.

Chapter 4 - Hide Processing in a High Fidelity Record: The Promontory Connection

The setting for this chapter is in a large limestone cave overlooking Great Salt Lake on Promontory Point, Utah (Figure 4-1). The occupants of the cave were bison hunters and adept leather workers. This inference is witnessed by the abundance of faunal material and the byproducts of leatherworking that the exceptional preservation of this context allows. The artifacts of the caves offer a unique and detailed glimpse into the past that is not often available to the archaeologist.

Separated by over 2700 kilometers, and drastically differing landscapes, Canada's North and Utah's caves have more in common than might be expected. The caves are thought to be the location of an Athapaskan (pre-Apachean Dene) presence in the eastern Great Basin created prior to the arrival of Apache and Navajo societies in the American Southwest (Forsyth 1986; Ives 2003, 2014; Simms 2008). Julien Steward suspected the relationship between the Dene North and what is known as the Promontory Phase when he excavated the Promontory Caves in 1930 and 1931 (Steward 1937:84). His hypothesis was, based on his observations, that the Promontory Culture artifacts found within the caves differed significantly from the material culture of the Shoshone, who are the people who most recently occupied the region (Steward 1937:83). The Promontory Phase inhabitants employed a subsistence strategy that relied on the hunting of large game, as indicated by the significant numbers of large animal bones (Johansson 2013; Steward 1937:84). This subsistence strategy is markedly different from the

Shoshone, who were primarily hunter-gatherers who engaged in some big game hunting, but focused on smaller game and seed gathering (Steward 1937:84).

Figure 4-1: View from the inside of Cave 1 looking out over Great Salt Lake. Inset: Looking at Cave 1 and 2 from the Chournos Springs site (Photographs by the author).

The term "Athapaskan" is used to refer to people with related languages living in three, rather far flung, geographic areas (Eiselt 2012; Ives 1990, 2003). The Northern Athapaskans occupy the area from Alaska to the northern Prairie Provinces in Canada. The Pacific Coast Athapaskans were located from Washington through to Northern California, while the Apachean (Southern) Athapaskans lived in the southwestern United States, northern Mexico, and on the southern Plains (Foster 1996; Hale and Harris 1979; Krauss and Golla 1981). Linguists have long proposed that all Athapaskans have their origin in the North, with the greatest linguistic diversity occurring there (suggesting that these different languages had the longest time to diverge in that northern context)

(Foster 1996; Ives 2003; Hale and Harris 1979; Krauss and Golla 1981; Sapir 1916). The Northern Athapaskan people refer to themselves as "Dene" or related, cognate terms (such as Dindjie or Tena), as do the Navajo and other southwestern Apache groups (e.g., Diné, Ndee) (Eiselt 2012:28). The linguistic evidence hints at the fact that these northern people embarked on an incredible journey that spans almost an entire continent.

In recent decades, the linguistic perspective has been strongly affirmed by genetic studies (Malhi et al. 2003, 2008; Monroe et al. 2013; Smith et al. 2000). Various studies of Albumin Naskapi, mtDNA, and y-chromosome data reveal that Dene speakers had their genetic origin in the north; Apachean ancestors departed from a Subarctic Canadian homeland quite recently as a relatively small and cohesive group that apparently grew both through demic expansion and through the incorporation of others from surrounding, more southern societies.

The geographical scope of Apachean migration and the nature of most archaeological records presents significant challenges for finding archaeological evidence of the movement of Dene peoples. If social science literature for migration is any guide, this great migration would have encompassed many years, with scouting parties, return migrations to known areas, loss of individuals and entire groups, and integration of other groups within emerging Apachean cultural identities (e.g., Anthony 1990; Billinger and Ives 2014; Eiselt 2012:29; Ives 2014). This population movement would not have been an endeavor for the faint of heart.

THE LONG JOURNEY SOUTH

Following Sapir (1936), Ives and Rice (2006) suggested that the founding Apachean population likely emerged from the boreal forest at some point running from the Saskatchewan River head-waters or eastward along the Aspen Parkland ecotone, moving onto the Plains east of the Rockies (see also Eiselt 2012:31). They based this premise on the close language relationships between Apachean speakers and Canadian Dene speakers ranging from northern British Columbia to northern Manitoba; and to a lesser degree, upon shared Apachean neologisms for plants, animals, and objects not found in Subarctic settings. A wide distribution of the ancestral speech community should, in theory, result in divergent neologisms (Ives and Rice 2006; Rice 2012:257-258). Contrary to this expectation, Apachean dialects consistently share related terms for unfamiliar plants, animals, and objects that would have first been encountered in the Plains region of Alberta (Eiselt 2012; Ives and Rice 2006; Sapir 1936).

Seeking archaeological evidence for Athapaskan migration is a task fraught with challenges. Athapaskan people are highly pragmatic with respect to material culture, lifestyle, and cosmologies; everywhere in their vast geographic range, they readily adopted the dress, diet, and customs of neighbours with whom they resided (e.g., Kluckhohn and Leighton 1956). This practice makes identifying an "Athapaskan presence" within the archaeological record problematic. While Athapaskan people are flexible and pragmatic with respect to material aspects of their lives, they are highly conservative and resistant to change with respect to their language, making findings from our linguist colleagues an invaluable asset to our archaeological studies (Eiselt 2012:26; Ives and Rice 2006).

At this point we know that Athapaskan people began the trek long ago from the North to the American Southwest, but the question of why remains. What was the motivation? While there have been many explanations proposed, the most intriguing one has come from Derry (1975), Workman (1979), and in recent years Ives (1990, 2003, 2010, 2014), who hypothesized that it was two catastrophic volcanic events, separated by approximately 500 years in the past 2000 years, that triggered the momentous journey. These volcanic events are known from the north lobe and east lobe White River Ash deposits. The eruption connected with the north lobe of the White River ash fall took place at roughly A.D. 300, and may have triggered the southward movement of the Pacific Coast Athapaskans. The more recent White River Ash east lobe (WRAe) was volumetrically larger, and resulted from a second eruption occurring between A.D. 833-850 (as determined by multiple radiocarbon dates on tree rings from a spruce that was killed by the eruption). WRAe registered between A.D. 846 and 848 in the Greenland ice core (Jensen et al. 2014). The WRAe event centered on the Bona-Churchill massif in the Wrangell volcanic field of southeastern Alaska, dispersing an estimated ~50 km^3 of ejecta over a distance of at least 7000 km (Jensen et al. 2014). The ash fall would have had serious consequences for all forms of life in its path, and certainly could have been the impetus for a mass migration.

The migration need not only be motivated by cataclysmic events. The Plains offered a rather attractive lifestyle for adept hunters, which without a doubt, Athapaskan people were. The transition from montane or boreal forest hunters onto the Plains would not have been as difficult a feat as is sometimes thought (Eiselt 2012; Ives 2003). The proto-Apachean migrants would have been familiar with hunting Wood Bison, making a shift to Plains Bison a reasonably straightforward task (Ives 2003). Beyond familiarity with bison, Northern Athapaskan people had a widespread tradition of hunting a variety of large game animals with sophisticated communal hunting strategies, again making such a transition smoother (Ives 2003:269). In addition to hunting opportunities, social factors were likely at work drawing people into the Plains region (Eiselt 2012:34). The opportunities for interregional exchange with Plains horticulturalists and the rich Plains ecosystems allowed the Plains to serve as a "cultural vortex" pulling small groups of Apachean ancestors into the region for bison and trade (Ives 2003).

Ives (1990) believes that as Athapaskan people engaged with and entered into a Plains lifestyle, they transitioned from a local group model of growth to a local group alliance model. Such a group formation strategy would have resulted in an economic model that favoured enhanced borrowing and cooperation with outside groups because marriage partners were sought beyond the immediate co-residential group (i.e, exogamous marriages) (Eiselt 2012:34; Ives 1990, 1998). As Eiselt (2012) points out, such a shift would have implications for gender, encouraging unilocailty around same-sex sibling cores, resulting in either patrilocality or matrilocality. Matrilocal residence is a practice that was shared by all the Southwest Athapaskans and northern Athapaskans historically (Eiselt 2002:37; Ives 1990). In cases of contemporary migrations and immigrations, large social networks facilitate the stability of immigrant enclaves and women were usually at the center of these networks (Eiselt 2012:38). In the case of the proto-Apachean people who were entering into a Plains bison hunting lifestyle, women and women's work would have been critical to the survival and success of the migrating bands and "Athapaskan sites should contain abundant evidence of women's work and craft production (particularly hide processing)" (Eiselt 2012:60).

The journey of these Dene people brings us to that large limestone cave overlooking Great Salt Lake, which Apachean ancestors are suspected of occupying. Moccasins and mittens found within the caves bear striking resemblances to such objects found in the far north, and are very different from the footwear and clothing of the surrounding area (Aikens 1966; Ives 2010, 2014; Steward 1937). In addition, sinew-backed bows, types of hand game pieces, and endscrapers are all suggestive of a Subarctic-Plains-Promontory connection, perhaps indicative of a migratory route from the north into the Promontory region (Aikens 1966). Noticeably absent in the Promontory Cave assemblages, but common at Shoshone sites are; metates, bird or rabbit nets, twined basketry, and grooved hardwood arrows (Steward 1937:85). Steward (1937) found that of more than 2,500 Shoshone traits, only 61 were comparable to the archaeological material recovered from the caves, leading him to conclude that the material culture of the caves was "one of a northern, hunting people and that it existed in northern Utah sufficiently long to acquire southern and local traits."

THE PROMONTORY CAVE EXCAVATIONS

Julian H. Steward first excavated Cave 1 in 1930. Steward excavated trenches at several points throughout the cave. Trenches A and B were the largest, within which Steward identified eight strata. He devoted his main focus "to the upper 2 feet of culture-bearing deposits, to rock crannies, and such other places as test pits indicated to be worth investigating" (Steward 1937:9). In 2011, John W. Ives and Joel C. Janetski returned to Promontory Caves 1 and 2 to conduct small-scale test excavations (Johansson 2013:36), with further excavations in 2013 and 2014. Figure 4-2 shows a map of Cave 1 with excavated areas.

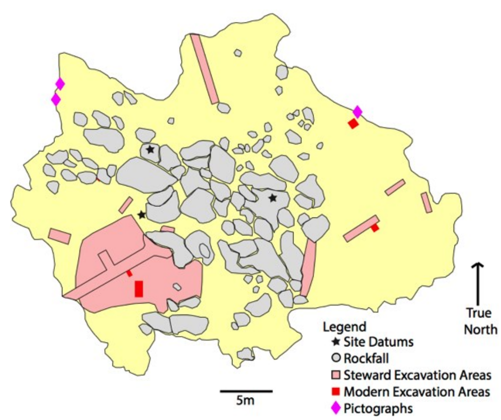

Figure 4-2: Schematic of Promontory Cave 1 showing the excavations areas. Image courtesy of S. Ure, C. Lakevold, and J. Hallson.

For Steward's collections at the Natural History Museum of Utah, there are 48 radiocarbon dates for a variety of perishable artifacts recovered from the Promontory Cave 1 assemblage, with all but one of these dates falling within a narrow interval of 626-828 ^{14}C yr BP (Billinger and Ives 2014; Ives et al. 2014). Ives et al. (2014) "suggest that this late period occupation comprised one or two human generations, centering on the interval running from ca A.D. 1250-1290". Dozens of additional dates from excavated Cave 1 and 2 contexts, yet to be reported, reinforce this narrow time range for the Promontory Culture occupation of the caves (J. Ives, personal communication 2015).

THE PROMONTORY MOCCASINS

One of the most striking aspects of the Promontory artifact assemblage is the moccasins. Their abundance and exceptional preservation aside, there is something particularly evocative about unearthing something that was so intimately connected to an individual. The leather is so well preserved that, aside from the dirt and debris, the moccasins almost look as though they were discarded just days ago (Figure 4-3).

The moccasins are particularly interesting from a migration perspective because they are not typical for the area (Billinger & Ives 2014; Ives 2010, 2014; Steward 1937). Characteristic of the area are hock and Fremont moccasins that are fundamentally different from Promontory moccasins (Ives 2014:153). Hock moccasins are constructed from the lower ungulate limb, typically they are not well tanned, and the stitching is coarse (Aikens 1970; Ives 2014). The style of the Promontory moccasin resembles those from northern peoples such as the Tahltan, Tlingit, and Tsimshian, as well as Subarctic Algonquians (Steward 1937:69). Today these moccasins would be identified as examples of 2(Ab) and 2(Bb) styles in the Bata Shoe Museum (BSM) classification of footwear (Billinger and Ives

2014). The moccasins of the Promontory Caves were primarily constructed out of expertly tanned bison hide with suede-like finish. While there is variability in the quality of the stitching, on average they are very well constructed. In some cases they are finely decorated with porcupine quillwork (Ives 2014:153). The majority of the specimens have been repaired, indicating that they were well worn (Steward 1937:62).

Steward found 250 moccasins during his excavations in 1931, and Dr. J. Ives has since increased this number during the excavations of 2011-2014. These complete moccasins (in combination with fragments and a number of known private collections), put the number of moccasins recovered from the Caves at more than 340 instances (J. Ives, personal communication 2014)

Figure 4-3: One of the moccasins recovered during the 2013 field season. Inset: A close up of the detail of the gusset stitching. Photographs courtesy of J. Ives; modifications by the author.

Working under the hypothesis that the material culture of Cave 1 is representative of a northern Athapaskan-speaking group that entered the American Southwest, literature on Dene moccasins was consulted. What was particularly interesting for the purposes of this study was that Cecile M. Clayton-Gouthro (1994) documented the pattern for constructing a Janvier Band Chipewyan wrapped cuff moccasin complete with measurements (Figure 4-4). The Janvier Band is a territorial grouping of the Chipewyan that occupies the boreal forest and transitional parklands. They are members of the Athapaskan linguistic family, and fall in the Northern Athapaskan branch of the Na-Dene phylum (Clayton-Gouthro 1994:1).

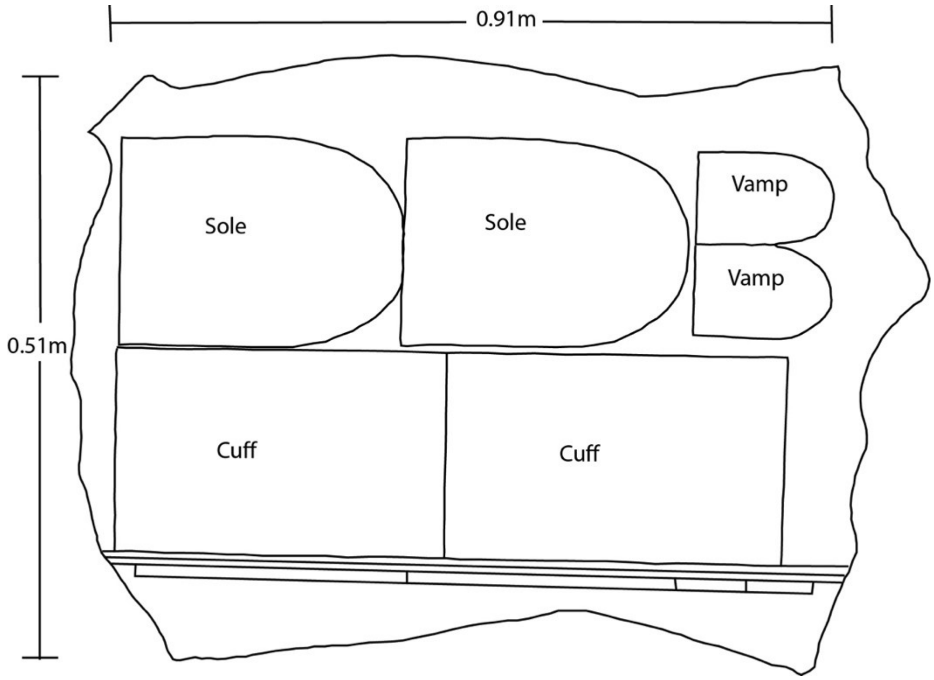

Figure 4-4: Pattern for constructing a Chipewyan wrapped cuff moccasin for a moccasin measuring approximately 27 cm in length. Adapted from Clayton-Gouthro (1994:50)

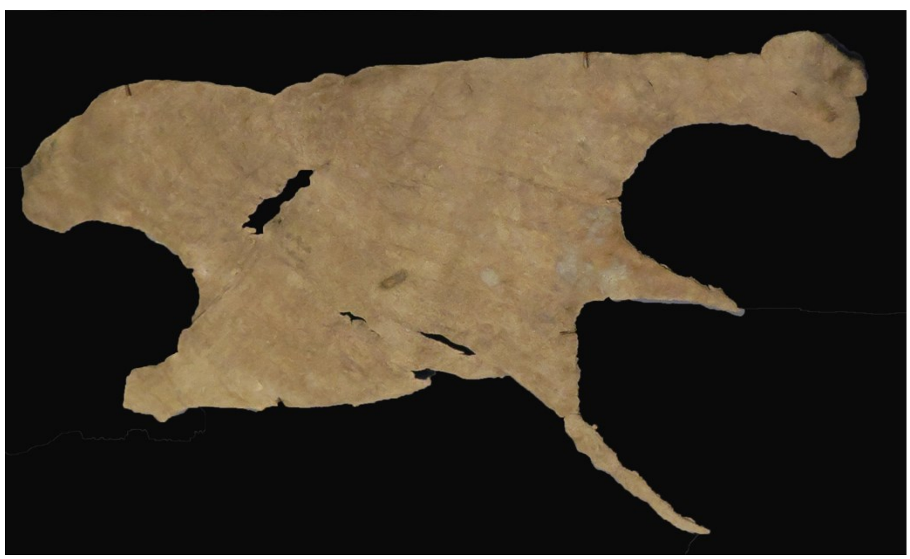

Figure 4-5: A fragment of leather from the Promontory region, measuring 42 cm in length and 16 cm wide, that appears to be a byproduct of the cutting out of a moccasin pattern similar to that of Figure 4.3 (Photograph by J. Ives, courtesy of the Utah Museum of Natural History).

While the moccasin patterns from the Janvier Band and those of Cave 1 may differ slightly, a fragment of leather (Figure 4-5) recovered from Promontory

Cave 1 strongly suggests that this basic pattern can serve as a proxy for the moccasins left in the Promontory Caves. A similar fragment of leather was recovered in the Ross Rock Shelter located in Wyoming (Garling 1964). Knowing the dimensions involved, simple ratios can be applied to determine the amount of hide needed for moccasins found in Cave 1. For example, we know from Clayton-Gouthro's pattern that a pair of moccasins measuring 0.27 m in length requires 0.4641 m^2 of hide. Therefore we can apply a simple ratio, using cross multiplication and division, and determine the amount of hide needed for known moccasin lengths:

$$\frac{0.27\ m}{0.4641 m2} \times \frac{known\ moccasin\ length\ (m)}{unknown\ amount\ of\ hide\ (m2)}$$

The results of the application of these ratios are found in Table 4.1.

Table 4-1: Hide requirements for pairs of moccasins, based on the lengths determined by Billinger and Ives (2014) found in Promontory Cave 1

Length of moccasin (cm)	Hide requirements rounded to the nearest 0.01 m^2	Maximum number of pairs of moccasins	Leather requirements for maximum number of moccasins (m^2)
11.4	0.20	2	0.39
12.7	0.22	3	0.66
14.0	0.24	4	0.96
15.2	0.26	4	1.04
16.5	0.28	4	1.12
17.8	0.31	10	3.06
19.1	0.38	10	3.29
20.3	0.35	25	8.75
21.6	0.37	32	11.84
22.9	0.40	42	16.8
24.1	0.41	34	13.94
25.4	0.44	25	11.0
26.7	0.46	8	3.68
27.9	0.48	1	0.48
29.2	0.50	2	1.00
30.5	0.52	1	0.52

Having determined the amount of leather needed for the average moccasins recovered during the Cave 1 excavations, it was possible to determine the total quantity of leather represented by the moccasins recovered from Cave 1 is 78.53 m^2. Clearly, the discarded moccasins must have been replaced by a similar quantity of newly-fashioned moccasins. The question of whether the moccasins found in the caves were representative of complete pairs or individual moccasins is important in this connection. There are a number of factors that go into determining whether or not two moccasins are a pair; these would include length, stitching, pattern, and of course material type.

While there are certain to be pairs in the entire Promontory moccasin assemblage, there are none that have been positively identified as such in existing collections. Ives (personal communication, 2014) has examined both the 1930-31 and more recent collections, and is not aware of any moccasins that could be identified as a pair. As a result, he believes that the sample is comprised primarily of individual examples that have become separated from their mates by depositional and site formation processes. Accepting the assumption of essentially individual moccasins, the hide requirement calculations further assume that each individual moccasin would be representative of a pair if we had complete recovery from Cave 1. The results of these calculations can be found in Table 4-1. As Billinger and Ives (2014) discuss, this assumption could lead to a "doubling up" of results by counting individual moccasins whereas discarded pairs are expected. Nevertheless, the evidence at hand suggests that the assemblage can be viewed as individual examples, an assumption that will become clearer when we consider just how many moccasins were likely discarded in the entire Promontory Cave assemblage (Billinger and Ives 2014). These values allow us to establish an estimate for the range of hides necessary to produce the moccasins found in Cave 1; and by extension, the quantity of hides that would have been required to replace them. Two of the moccasins used in this analysis came from Cave 2, for which proportional estimates were not made.

The average length for the Promontory moccasins is 21.0 cm (Billinger and Ives 2014). As a comparison, the same calculations were applied for the average size of the moccasins, a procedure which yielded results of 74.5 m^2 for the amount of hide needed. The numbers do not differ greatly from those obtained by breaking down the assemblage into individual size classes. Having determined this, the average of 21.0 cm was used for all subsequent calculations.

The moccasins from Cave 1 are constructed mainly from bison hide (Steward 1937:57). Knowing the area of hide required to make the Promontory moccasins in present day collections, the next task was to determine how many hides the assemblage could represent. In order to determine this number, an average for bison hide size was needed. This average proved to be difficult to determine, as there did not appear to be an "average" size for tanned bison hide, but rather ranges of sizes. Retailers[1] of tanned hides advertise values for small (2.32-3.25 m^2), medium (3.25-4.65 m^2), and large (4.65-6.97 m^2) bison hides. Using these advertised ranges, the average for each size category was selected

[1] www.braintan.com

(2.79 m^2, 5.39 m^2, and 5.89 m^2 for small, medium, and large bison hides respectively). The number of hides required to fulfill the requirements of the moccasins in Cave 1 was calculated from these average values (Table 4-2). These values assume that there is little wasted space in the patterning and cutting of the moccasin elements, and that the total area of the bison hide is usable.

Table 4-2: Number of hides required to manufacture the moccasins from Cave 1, based on the average moccasin size of 21 cm.

Hide requirement (m^2)	Small Bison Hide (2.79 m^2)	Medium Bison Hide (5.39 m^2)	Large Bison Hide (5.89 m^2)
74.5	~26.7	~13.8	~12.6

We know both from personal experience with tanning moose hide and from scraps of hide found in the cave that the perimeter around the hide (which has a series of holes for staking it down) would have been cut off after tanning, to facilitate moccasin manufacture (Figure 4-6 and 4-7). The width of these strips of hide recovered from the cave falls around 10 cm. The removal of these strips affects the area of usable hide. I attempted to compensate for this loss of usable area. To determine what affect a strip of hide 10 cm wide removed from the entire perimeter would have on the overall usable area, I used a drafting program (Micro Survey). To do this, I conceptualized the hide as a square. We know this shape is not entirely accurate, thus introducing some error. This calculation nevertheless provides a reasonable estimate for the usable area available from small, medium, and large hides (2.1 m^2, 4.5 m^2, and 5.0 m^2 respectively).

Figure 4-6: A scrap of hide removed from Cave 1 showing the holes where it would have been stretched during the tanning process. Courtesy of the Museum of Peoples and Cultures, Brigham Young University. Photograph credit J. Ives.

Figure 4-7: A scrap of hide in situ shows the hole where it would have been stretched during the tanning process. Photograph credit J. Ives.

The number of hides required to fulfill the moccasin requirements was recalculated using these new values, the results of which can be found in Table 4-3.

Table 4-3: The number of hides required to fulfill the hide requirements of the moccasins found in Cave 1, corrected to account for 10 cm wide strip of hide that would be removed post tanning.

Hide Requirement (m^2)	Small Bison Hide (2.1 m^2)	Medium Bison Hide (4.5 m^2)	Large Bison Hide (5.0 m^2)
74.5	35.4	16.55	14.9

Both Table 4-2 and 4-3 show that there is a range of the number of hides that would be necessary to fulfill the hide requirements of 207 moccasins recovered from the Promontory Caves depending on animal size (Billinger and Ives 2014). The values in Table 4-3 are more accurate because they take into consideration the strip of hide that would be removed post tanning. If we take the hide requirements for the average moccasin length of 21.0 cm and apply it to the known total number of 340 moccasins recovered from the Caves, the calculation yields a value of 122.4 m^2 of hide or a range of 24.5 - 58.3 bison hides.

These numbers correspond quite closely with ethnographic accounts of how many pairs of moccasins could be cut from a single moose hide. Theriault's (2006) personal account, "Moose to Moccasins, the story of Ka Kita Wa Pa No Kwe, states that "One moose makes ten to twelve pairs of moccasins, depending on the size you make" (Theriault 2006:58). This number was elaborated by Helm and Lurie (1961:96) when they observed that, "one moose hide is barely sufficient to meet the moccasin needs of two adults, with a woman requiring about three to four pairs per year and her husband needing at least four pairs per year." Three to four pairs is a recurring number with Clayton-Gouthro (1994:1) writing, "three to four pairs were enough to last the average man through the winter". McClellan (1975:307) also repeated this number, saying "with ordinary wear and tear, a pair of moccasins would last about two months". It should be noted that this number could be significantly larger—as much as four to five pairs per day when tracking (Russell 1898:172). Given the rough terrain of the Promontory Caves and surrounding area, it is quite likely that the occupants would have needed to replace their soft-soled moccasins frequently.

Knowing that an individual would have multiple pairs of moccasins in just one season, it can be expected that the occupants of Cave 1 would have used a number of moccasins that far surpasses the number recovered to date. In research being conducted at the University of Alberta as part of a Masters project, Hallson (J. Hallson, personal communication 2014) has projected that the number of moccasins that could be expected for the entire Cave 1 deposits to fall somewhere between 1668 and 3160 moccasins. These numbers reflect preliminary results based on three-dimensional modeling of the cave and its Promontory Culture deposits, and are subject to change as more precise data about the volume of material in Cave 1 becomes available. That said, it is clear that the total assemblage of moccasins once present in the caves, but then looted, recovered during Steward's and Ives' excavations, or remaining within significant deposits as yet unexcavated must fall somewhere within the range of this large order of magnitude. Table 4-4 shows the hide requirements for the projected number of moccasins as they stand at present.

Table 4-4: The number of bison hides needed to meet the requirements for the total of moccasins projected for Cave 1, using the average length (21.0 cm) for the moccasins

Number of moccasins	Hide Requirements (m^2)	Maximum number of hides	Minimum number of hides
1667.5	600.3	285.9	120.1
3160	1137.6	541.7	227.52

In addition to the moccasins, Steward (1937) noted that there was an abundance of scraps of leather and hide (although the majority of these were too fragmentary to determine their original use) (Steward 1937:50). Many pieces of cordage, rawhide thongs, trimmings with perforated strips, and hair were recovered during Steward's excavations; and continued to be collected during the excavations in 2011-2014 (Figure 4-8).

Figure 4-8: A sample of the scraps of processed hide and cordage from Cave 1. Photograph credit J. Hallson.

While scraps are recovered in considerable numbers, clothing is noticeably absent. There are two pieces of leather and some traces of clothing (possible legging fragments, two mittens, and a possible hat); but other than those, the moccasins are the primary form of clothing found in the cave assemblage (Figure 4-9).

Figure 4-9: Piece of leather with a decorative fringe (42BO1: 11582-12), perhaps part of a legging. Courtesy of the Natural History Museum of Utah. Photograph credit J. Ives.

In this connection, it should be observed that, apart from scavenging a decorated vamp or ankle wrap, a discarded moccasin has essentially no further value, while robes and some other clothing may be repurposed for other uses.

HIDE PROCESSING CONSIDERATIONS

Ives (2014) suggested that the habitable space in Cave 1 would be unlikely to exceed 250-300 m^2. Based on the assumption that each person would require 2-3 m^2 of space, Cave 1 could support no more than 150 persons at a given time (Ives 2014:152). Realistically, with Dene perspectives on group formation, the Promontory Phase habitation of Promontory Point likely resulted from the activities of a moderate-sized local group, or microband, occupying Cave 1 and Cave 2 (Helm 1965, 1968; Ives 1990). Such a group would likely fall somewhere in the range of 30-50 persons between the two caves (Binford 2001; Ives 1990, 1998; Billinger and Ives 2014). If we take these numbers and use Clayton-Gouthro's (1994) average of four pairs per person per winter, we can expect somewhere between 120 and 200 pairs to have been discarded during a winter season by the occupants of the caves (assuming that the average for men, women, and children is equal).

Bayesian analysis of the Promontory Cave radiocarbon dates reveals that the most intense occupation of the Caves took place between A.D. 1250 and 1290 (Ives et al. 2014). It is therefore conceivable that 4800 to 8000 pairs of moccasins (i.e., 9600 to 16,000 individual moccasins) could potentially have been deposited in the caves during this intensive period of occupation. These figures assume the presence of 30-50 persons for each of the 40 years of intensive occupation, a group size which may not be the case. These very large potential numbers may therefore be overestimates.

This is not the case for the projected number of moccasins the cave deposits may once have held, especially given the evident volume of organic deposits and associated artifacts (largely unexcavated Promontory Phase deposits approach *three meters* of thickness toward the front of Cave 1). Despite the large number of moccasins that we can project for the deposits (i.e., roughly 1600-3200 individual moccasins), these are entirely plausible estimates, given everything we know about the cave deposits, and moccasin use and discard. It does not seem realistic to think the cave occupants left without replacing their footwear. If this is the case, then the projected number of moccasins left behind should mirror the number of new moccasins people wore when they left the caves, effectively doubling the numbers of moccasins actually in circulation at the height of the cave occupation. Immense quantities of bison hide would have been required to make the moccasins being discarded, with equally large quantities of bison hide required to replace the discards. These figures are very much in line with the ethnohistoric estimates I discuss below.

Despite the fact that there are very few clothing items recovered from the cave, we can reasonably expect that the Promontory people were processing hides into clothing in addition to moccasins. A particularly interesting artifact is a piece of leather that appears to be what remains from an item of clothing. There are striations in the leather that are suggestive of marks left behind by a toothed flesher such as that found in Cave 1 (Figure 4-10).

Based on Dene attitudes to clothing, we would not expect there to be an abundance of discarded garments (Thompson 2010). Ethnographically, a complete set of clothing for an Athapaskan person would be comprised of:

> "a tailored slip on shirt dress with attached hood and long sleeves for winter. Separate hood and shorter sleeves for summer; tailored trousers with drawstring waist-usually moccasins attached. Mittens with braided harness that fitted around the neck. Skin breechclout was worn for winter underwear" (McFayden 1974:27).

In addition, there were strong social, cultural and spiritual values attached to dressing well. Not only did clothing reflect a man's ability to provide the raw materials, it also reflected the skill and expertise of the woman who created the garments (Thompson 2013). Dene people treated their garments with great care and respect, such that we may anticipate that other items of clothing might not be casually left around—even worn out clothing would be treated carefully (Thompson 2013:18). These northern Dene precepts may shed some light on why we do not find more clothing items in the Cave 1 assemblage.

Figure 4-10: 42BO1-: Piece of leather recovered from Cave 1 by Steward (1937). Inset: Image showing how the marks would have been made on the leather using artifact # 42B01: 10306 as an example. Photographs by J. Ives, modified by the author. Courtesy of Natural History Museum of Utah.

Undoubtedly, the Promontory people would have constructed other articles of hide, including clothing, bedding, and objects such as drum tops, over the course of the occupation. In fact, Tyrrell (1911) documented the use of more than twenty caribou skins per person per year for domestic purposes (excluding tent cloths) during his time with people whom he refers to as the "Northern Indians" (Tyrell 1911:214). Accounts of Gwich'in Elders state that the skin lodges alone required twenty caribou skins (Vuntut Gwitchin First Nation & Smith 2009:81).

According to retailers of tanned caribou hide[2], the average size is 1.39 m^2. This number is considerably smaller than those of bison hides, with the "small" bison hide averaging twice as large as one caribou hide. Assuming an average tanned caribou hide of 1.39 m^2, and 20 hides per person/ per year, we get an approximation of 27.8 m^2 of hide/person/year. Using this average and applying it to the average sizes of tanned bison hide, we get numbers ranging from 5-10 bison hides/person/year for domestic purposes. It should be noted that the climate in Utah is milder than that of the Canadian Subarctic; this difference should have an impact on the types of clothing and potentially the amount of hide required. Nevertheless, this number of 5-10 bison hides certainly seems reasonable within the context of a population relying on animal hides for the majority of clothing and personal items. On an individual level, these numbers do not seem to be that great; but when we start considering populations of different sizes, these numbers become much more significant. Table 4-5 shows estimates for the number bison hides required per year for groups of differing sizes (starting with the individual and moving up to the maximum number of people that Cave 1 might have been able to hold).

[2] www.braintan.com

Table 4-5: Projections for the number of bison needed per person per year for different group sizes, based on Tyrell's (1911) estimate of 20 caribou/person/year.

Number of Individuals	Number of Bison Hides (assuming 5/person)	Number of Bison Hides (assuming 10/person)
1	5	10
7	35	70
14	70	140
21	105	210
50	250	500
150	750	1500

The potential hide requirements of the occupants of the caves are quite substantial. These numbers would vary depending on the size of the animals acquired and the quality of the hides procured, as well as the species utilized. I have calculated the values for just bison hides, but we know that the occupants of the cave were also working with deer and pronghorn. It is also important to understand that these numbers are assuming that all people, regardless of age and size, utilize the same amount of hide. This is undoubtedly not the case; and as a result, these numbers may be somewhat inflated. In addition, these calculations are assuming that animal hide is the primary resource used for domestic purposes. We know from the material culture of the caves that the occupants were also engaged in processing plant material as well as hides (Steward 1937:29). It should not be a stretch for us to think that they may have been utilizing plant fibres for domestic as well as personal adornment purposes. With this consideration in mind, these numbers are offered as a suggestion for what the hide requirements of the occupants of Cave 1 might have been. Having an idea of these numbers allows us to start thinking about Promontory Cave 1 in terms of procurement, transportation, and processing of animal hides.

Using the figures Brink (2004; Wilson 1924) derived in his analysis of Buffalo Bird Woman's account of a small pedestrian party hunting bison by Hidatsa people in the Middle Missouri region, the numbers represented by the moccasins of Cave 1 are feasible. Buffalo Bird Woman's account tells of a twelve-person pedestrian bison hunt that procured 17 bison in a period of approximately one week (Wilson 1924). If we turn to the potential values for total hides utilized per person per year (Table 4-5), this number becomes a much more considerable issue. Given Buffalo Bird Woman's account of procuring 17 bison over the course of one week, the proposed numbers for hides are not insurmountable when we consider the hunting potential over an entire year. For the occupants of Cave 1, the milder climate of the region is expected to have had a corresponding impact on clothing requirements that would lessen the burden on collecting hides. McClintock (1936) found that amongst the Blackfoot, when a tipi cover became no longer usable for shelter, it could be cut and refurbished into wet-weather moccasins (McClintock 1936:94). If previously tanned hides were available in the form of worn-out lodge covers that were no longer needed with the shelter that the caves provided, and lodge covers were being repurposed into moccasins, then this resource could also lessen the burden of hunting animals and collecting hides.

Binford (1978) was able to document the hunting record for a Nunamiut community for the year 1949-50, during which time there were 74 individuals and 84 dogs in the community (Table 4.7).

Table 4-6: Hunting record for the Nunamiut (1949-1950), excluding fish, adapted from Binford (1978:137).

Month	Caribou	Sheep	Bear	Moose
May	71	0	1	0
June	13	0	0	0
July	2	23	6	0
August	22	10	2	1
September	54	11	1	0
October	1	17	1	0
November	84	5	1	0
December	26	1	0	0
January	57	2	0	0
February	46	2	0	0
March	65	3	0	0
April	11	0	0	0
Total	749	119	12	1

While Binford's (1978) numbers are from a Nunamiut group, which is a different cultural group from the population of Cave 1, these numbers show that there is potential for hunting populations to consume large quantities of animal products. Binford (1978) was primarily interested in food processing and consumption, so it is unclear what percentage of these animals would have been used for hides. In addition, by the time of the Binford's (1978) study, the population in question was no longer reliant on animal products as the sole source of food, clothing, or shelter. Looking back to Tyrell's (1911) estimate of twenty caribou hides/person/year, Binford's (1978) study population of 74 individuals would have hide expectations of 1,480 caribou, almost double the documented values for the year 1949-50. Considering the time frame for Binford's study, and the broader range of food and clothing resources available to the Nunamiut population, Tyrell's (1911) estimate remains credible. This observation does, however, suggest that the number of hides required by groups and individuals can vary, so that some caution in predictions is warranted.

The presence of bows, projectile points, and knives does suggest that hunting was an activity that the Cave occupants were actively engaging in. In addition to the technological evidence of hunting, there are large volumes of faunal material in the archaeological assemblage. In her analysis of the faunal material of Cave 1, Johansson (2013) found that the minimum number of individuals (MNI) represented was 43, with 39 being mammals; admittedly a far cry from the projected hide requirements. However, Johansson (2013) was working with the material that was recovered by Steward during excavations of 1930-31 and that recovered in 2011 by Ives and Janetski during test excavations. Steward excavated a number of trenches throughout the Cave, though Trenches A and B were the largest and contained the most cultural material (Steward 1937). The test excavations were confined to a 1 by 2 meter area adjacent to Steward's Trench A. Only 48 percent of the faunal remains that Steward collected can still be accounted for, reducing the sample even further (Johansson 2013:38). It is important to note that Steward did not collect all of the faunal remains that were encountered during the excavation, keeping only a small sample of what was found. Knowing this restricted sampling, it is impossible to accurately project the numbers of what is actually represented by the faunal remains that Steward collected. A relatively small sample from a burned bone feature at the base the

Promontory Cave 1 deposits excavated in 2014 yielded an MNI estimate of 25, (primarily) bison, elk, deer, and antelope (Johansson 2014; Ives et al. 2014). A complete analysis of faunal remains from the excavations in 2013 and 2014 will greatly increase MNI values for even the very small excavated volumes (relative to original cave deposits, either extant, looted, or excavated by Steward). Original MNI values for large mammals for the entire cave were almost certainly very large.

A relatively small sample is not the only explanation for the smaller than expected MNI. As I witnessed during my time in the Yukon, transporting dry, partially tanned hide is much easier than green hide. There is a significant decrease in the weight, and dry hides can be rehydrated to finish tanning at a later date with no detriment to the finished product. Mida had no fewer than ten partially tanned hides in her smoke house that she was waiting to finish. Transporting and caching of dry, partially tanned hides seems a likely activity for the occupants of the caves, when we consider the potential hide processing requirements for the proposed population.

Just to the north, in Idaho, Arkush (2014) investigated late period bison kill and processing campsites along Rock Creek in in Curlew National Grassland. These sites have evidence of Promontory Point interaction, making it likely that the cave occupants spent some of their time in Idaho. Geochemical sourcing of Promontory Cave obsidian artifacts reveals that they derive from two southern Idaho obsidian sources: predominantly Malad, with some Brown's Bench (Arkush 2013; Ives 2014). In addition to the obsidian, Promontory pottery is present at 10-

Oa-275 (Arkush 2013). Trace element composition of a subset of the ceramics from 10-Oa-275 and Promontory Point sites has revealed that some sherds have identical paste and temper geochemistry, further suggesting that Promontory groups travelled to or were in contact with southern Idaho (Neff 2013). The sites in question are less than 100 km apart—well within the seasonal range of hunting parties who might have been living on the Promontory peninsula (Arkush 2013:74). Situated along the Snake River Plain, a region normally better endowed with bison populations, the Rock Creek locality would provide another setting in which to acquire bison hides; from here, they could be partially tanned and transported back to the caves with relative ease.

It is worth noting that during the interval from ca. 1600 and 600 ^{14}C yr B.P., bison were relatively common in Utah. Their numbers dropped appreciably after 600 ^{14}C yr B.P. in the eastern Great Basin, (Arkush 2013; Grayson 2006). Grayson (2006:920) inferred that the area experienced increased summer temperatures, moisture, and the expansion of grass forage during this interval. This optimal environment allowed the bison populations to flourish, a factor that could well have acted as a "pull factor" drawing Apachean ancestors, who were adept bison hunters, into the region.

Knowing that seasonality has an effect on the quality of the hide, looking at the seasons represented by the faunal assemblage may suggest something of the potential uses of hides procured. Johansson (2013:42) determined the season of death for two mule deer crania as being winter. She was also able to determine that there were at least two seasonal occupations in Cave 1: one in the winter, between December to February, and one during the late spring through early fall (Johansson 2012:42). The seasons represented by the faunal assemblages do represent times of the year when the hide of the animals would have distinctly different properties. Hides acquired during the winter with heavy coats would be ideal for the construction of winter garments, mittens, and footwear, whereas, thinner spring and summer hides would be more suitable for the construction of spring and summer garments as well as tipi covers (Brink 2008; Thompson 2010). While we await further refinements in seasonality indicators for the Promontory assemblages, the sheer volume of perishable deposits, along with the broad spectrum of existing indicators, would suggest that the caves may have seen quasi-sedentary use over much of the year, in part supported by hunting using nearby topographic features (Ives personal communication 2014; Ives, Johansson, Graham and Lakevold 2014) This observation would mean that leather in a variety of conditions could have been secured for different clothing and lodging purposes throughout much of the year.

EVIDENCE OF HIDE PROCESSING IN PROMONTORY CAVE 1

The different stages of hide tanning are predicted to affect the archaeological record in different and identifiable ways. Given the presence of moccasins and the scraps of hide in Cave 1, there can be little doubt that some form of hide processing was occurring within the caves. If large numbers of hides were processed within the caves, we should be able to observe this practice in the high fidelity artifact record of the Promontory Caves. Awls, endscrapers, fleshers, tabular bifaces, beaming tools, and knives have been recovered from Cave 1; all of these artifacts have specific functions within the hide tanning process. Of the many hundreds of artifacts that Steward collected in 1930 and 1931, a sample of these was chosen for further consideration because of their affiliation with the hide tanning process. The excavations led by J.W. Ives in recent years have yielded more artifacts associated with hide tanning that have yet to be fully analyzed. A sample of these artifacts recovered, by both Steward and Ives, is described; and I discuss their role in the hide tanning process below. For the purposes of this artifact analysis, it is possible to break the hide working process into five main stages: fleshing, hair removal, soaking, softening, and manufacturing. Soaking is not thought to leave an archaeological trace (see chapter 2); and as a result will not be the focus of subsequent discussion, although it should be noted that the caves are in close proximity to Great Salt Lake. The precise impact that salt water would have on a hide is not known, There are accounts of salt being used in more recent years as a method of preservation, however (www.braintan.com).

FLESHING

Fleshing is the act of removing the flesh and fat residues from the hide. It can be accomplished through the use of bone or stone tools. Within the Cave 1 artifact assemblage there are fleshing implements. Some are very finely made, while others appear to be simple and expedient. Experimental use-wear analyses of bone and stone tools that were used on animal hides suggest that working on fresh and wet hides results in bright and greasy polish with rounding (Keeley 1980:50; Odell 2010:146; Van Gijn 2007:82).

42BO1:FS 226 (Figure 4-11): This implement is constructed from the scapula of a large mammal. Measuring 159.79 mm in length, it has been modified over the entirety of the element. The working edge is 31.46 mm wide, and exhibits both rounding and polish. When observed under the microscope, what Keeley (1980) describes as “shallow linear features” in the polish become visible. These features appear to be oriented in a semi-circular pattern, indicating that the motion of the tool was from left to right. At 30.24 mm from the working edge, there is pronounced polish and rounding with no linear features, suggesting that this area is where the implement would have been held. The use wear on this implement is consistent with what would be expected for a flesher.

Figure 4-11:Artifact 42B01: FS 226, a simple scapula flesher, and how it would have been held, based on the areas of polish. Adapted from photographs courtesy of J. Ives.

42BO1:10306 (Fig 4-12): This is a broken bone implement that measures 118.66 mm in length, 32.1 mm wide, and 6.5 mm thick. It is constructed from a long bone that has been split and heavily shaped and worked. The distal portion has been finely modified into small, individual teeth or serrations that are spaced at regular intervals, and are roughly the same size. These teeth exhibit significant polish and rounding that is visible with the naked eye. It is clear that great skill and care was taken with the construction of this implement. Though the polish is intense, when examined under the microscope, there are no striations present. This observation is consistent with what Van Gijn (2007) observed for implements used on fresh, wet hide. The morphology of this implement is consistent with toothed bone fleshers. Similar implements were documented by O'Brien (2011), and were described as being primarily used on fatty and fur bearing animals. There is further evidence of this implement being used for hide working within the cave, a piece of leather which bears markings at regular intervals consistent with what would be expected as a result of the use of an implement such as this (Figure 4-10).

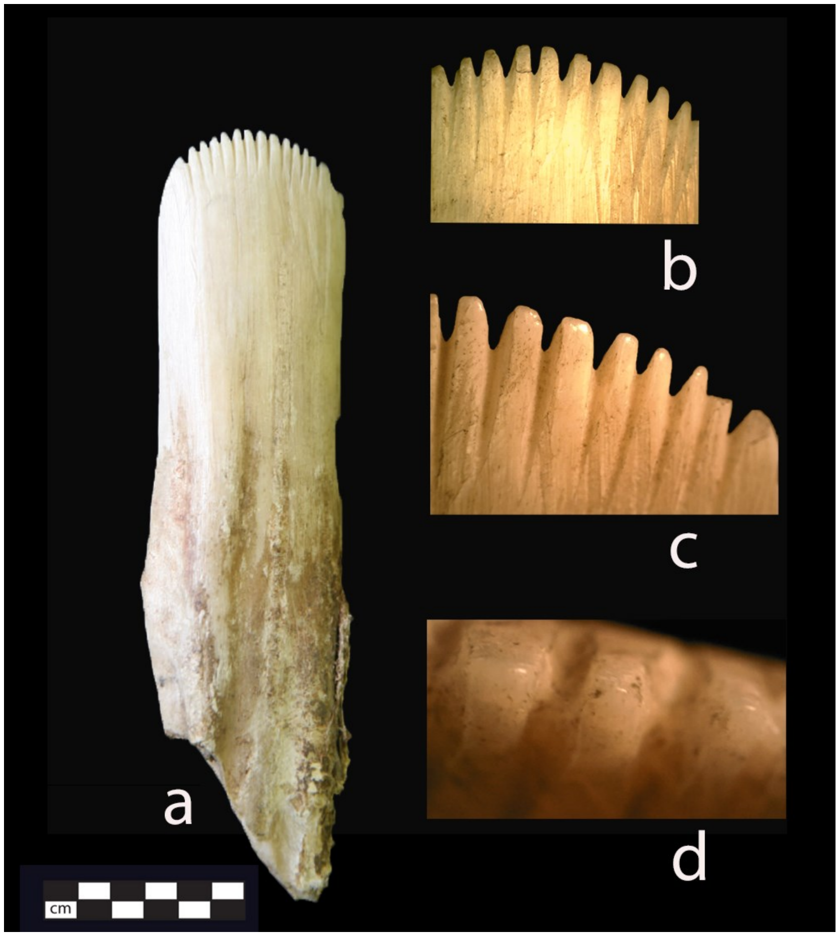

Figure 4-12: Artifact 42BO1:10306. Image (a) the dorsal surface of the implement. Photograph courtesy of J. Ives. Image (b), the close up on the working edge of the artifact observed at a magnification of 70X. Image (c), at a magnification of 90X. Image (d), the pronounced rounding and polish on the serrations as observed at a magnification of 150X. Courtesy of the Natural History Museum of Utah.

42BO1:9535 (Fig 4-13): This bone implement is constructed from the metacarpal of a large mammal with the trabecular bone still attached. It measures 141.92 mm in length, the distal portion has a maximum width of 30.35 mm, and the maximum thickness is 6.14 mm. The working edge is toothed, but not finely, with the spacing between the teeth uneven and irregular. The teeth exhibit pronounced polish and rounding that is visible without the assistance of a microscope. The morphology and evidence of use of this implement is consistent with what is expected with fleshers. Janes (1984) discussed a fleshing implement that was made by an 11-year old girl:

“She made a beaming tool out of one of the ribs and a flesher from what appeared to be a metatarsal. Although the beaming tool was not made from a split metatarsal and the flesher was not made from a tibia, her tools closely resembled the tools made by the adults. The child’s tool differed primarily in their size and quality of workmanship” [Janes 1984:100].

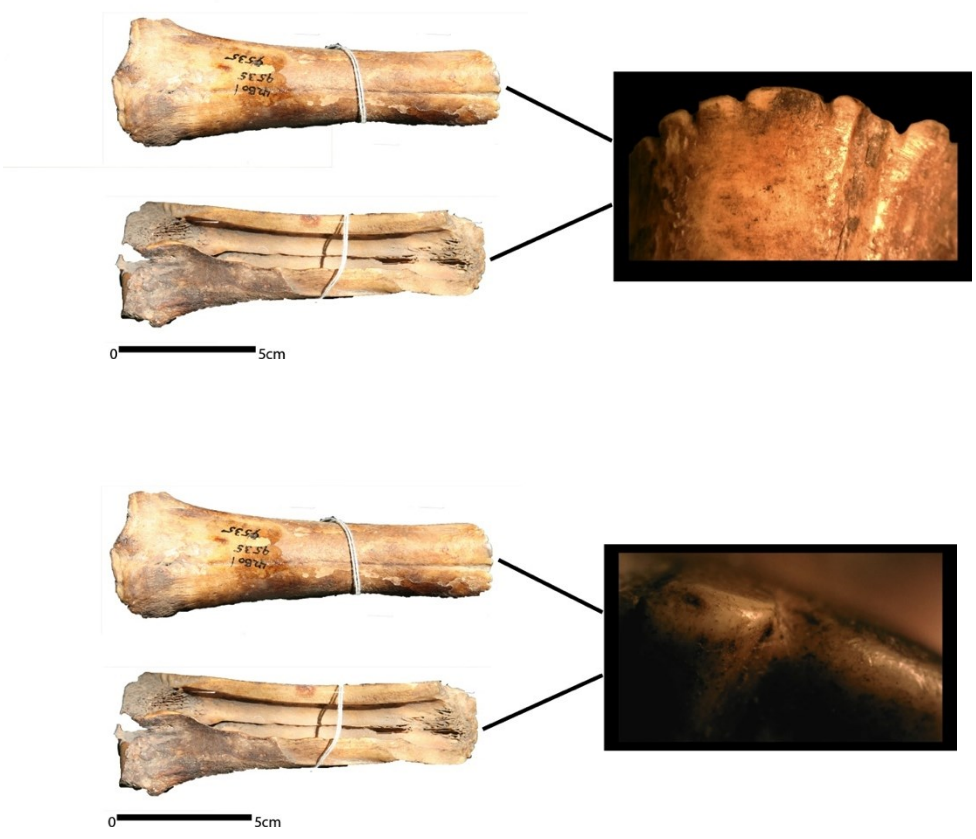

Figure 4-13:Artifact 42BO1:9539 with close up on the working edge. Top: the irregular spacing of the serrations. Bottom: Close up of the serration showing the pronounced polish and rounding, as observed at a magnification of 70X. Courtesy of the Natural History Museum of Utah.

CUTTING IMPLEMENTS

Stone implements such as knives can be used for removing flesh from hides in addition to bone fleshers (personal observation, 2012), though they are more commonly thought of as tools used for butchering. Based on what Steward reported in 1937, he recovered no fewer than nine knives, the majority of which were slate, which he interpreted as being the desired material because of the ease with which it can be manipulated into desired thicknesses. In addition to the slate blades, he also recovered a hafted knife and at least six wooden knife handles. Figure 4-14 shows a sample of the knife blades identified by Steward, and Figure 4-15 is a hafted knife from the assemblage.

Figure 4-14: Knife blades from Cave 1. Photograph courtesy of J. Ives. Courtesy of Natural History Museum of Utah.

Figure 4-15: Hafted knife (artifact 42B01-9697) from the Promontory Cave 1 assemblage. Photograph courtesy of J. Ives. Courtesy of the Natural History Museum of Utah

42BO1:FS 791.1 (Fig 4-16): This is an ovoid shaped, beige slate tabular biface measuring 68.74 mm in length, 97.61 mm wide, and 5.25 mm thick. It has been flaked around the entire periphery of the implement. There is discontinuous polish around the entire margins, including on facets located on both the dorsal and ventral surfaces. The polish that is located along the margins does not exhibit striations, and the margins themselves remain quite sharp. The facets on the dorsal and ventral surface that exhibit polish also exhibit irregular striations. These striations appear to occur randomly, and originate from multiple directions. The markings on the implement are not consistent with skin softening. The relative thinness, position, and irregularity of the striations are all consistent with what Keeley (1980) and Semenov (1974) observed for implements used for cutting functions.

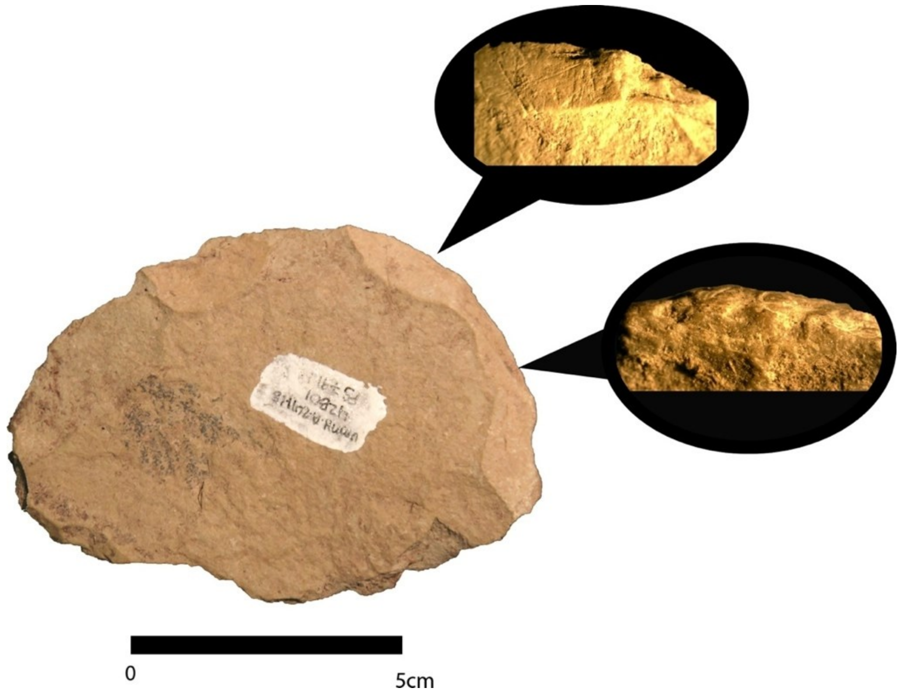

Figure 4-16: Artifact 42BO1:FS 791.1, close up of the use wear marks on the facet and the edge (bottom) at magnifications of 50X. Adapted from a photograph by J. Ives

One fine toothed bone flesher (Figure 4-12), and four other simple bone implements (similar to that in Figure 4-11) associated with flesh removal have been identified to date. As we saw in earlier chapters, fleshing tools can at times be highly curated; and could have significantly long use lives. Consequently, we wouldn't necessarily expect to find many of them in archaeological contexts. The fact that we have seemingly very few is, therefore, not necessarily indicative of a lack of this activity taking place. At the Stelzer site, only three toothed fleshers were recovered; and this was a heavily populated, with abundant endscrapers (Neuman 1975; Graham 2014). Further, I would suspect that, like today, knives would have also been used to remove flesh from hides. Steward found no fewer than nine slate knives, and in the subsequent excavations another six have been identified (Steward 1937; J.Hallson personal communication, 2014). As part of

Hallson's ongoing Master's research, she projected the number of slate knives and fleshers that could be expected to be in Cave 1. She was able to use the number of knives recovered in the excavations of 2012-2014 to determine that we can expect there to be somewhere between 81-162 slate knives in Cave 1, and the number of fleshers to fall within this same range. Large though the totals may be, when broken down over a period of years that are representative of the duration of occupation within the caves these numbers become quite feasible (Ives 2014). When this number is broken down over a period of twenty years, that would be four to eight knives and four to eight fleshers being discarded/lost per year. Extend this interval to fifty years, and the numbers fall somewhere between one and three knives and one and three flesher's discarded/lost per year.

DEHAIRING

Dehairing is the process by which the hair is removed from the hide. As with fleshing, it can be accomplished with both bone and stone tools. Common tools associated with hair removal are stone endscrapers and bone beamers. Extensive use-wear analyses on stone end scrapers were conducted by Brink (1978). He found that rounding and polishing on the edge was the most important kind of use-wear associated with dry hide scraping, the results of which are consistent with subsequent studies on endscrapers (Adams 1988; Hayden 1986; Odell 2010; Schultz 1992; Scriver 2000; Siegel 1984; Silver 1984)

42BO1:10473 (Fig 4-17): This modified scapula of a large mammal measures 151.62 mm in length, 46.77 mm wide, and 29.07 mm thick. The blade of the scapula has been broken and the spine has been left intact. Along the spine there is pronounced polish and rounding (Fig 4-18). The location of the polish is suggestive of the tool being used in a way similar to how one would use a beamer. The hide worker would grip the tool with both hands and draw the beamer downward (O'Brien 2011:94). O'Brien (2011) discusses beamers that were designed for the purpose of removing the outer epidermis at the root of the hair on hides, such as moose and caribou. These beamers were typically made from the cannon bone of a caribou. Such a tool would have been used in conjunction with a beaming log (O'Brien 2011:93).

While this artifact is not made from a cannon bone, both its wear and morphology indicates that it could have been used as a beamer. DeLaguna (2000:310-311) encountered very similar implements during her expedition in the middle and lower Yukon valley in 1935, and concluded that they were used in the hide working process. Further, Morlan (1973) described scapula fragments from the Klo-kut site that were modified by removing the blade and anterior half of the spine, "as if to form a scraping edge" (Morlan 1973:342). This description supports interpretation of these modified scapulae from Cave 1 as being used in the hide working process. Graham (2014) found a similar implement in the faunal collection from the Muhlbach Site, a Besant bison kill site on the Northern Plains; and identified it as consistent with a beamer.

Figure 4-17: Artifact 42BO1:10473. Photograph credit J. Ives, courtesy of the Natural History Museum of Utah.

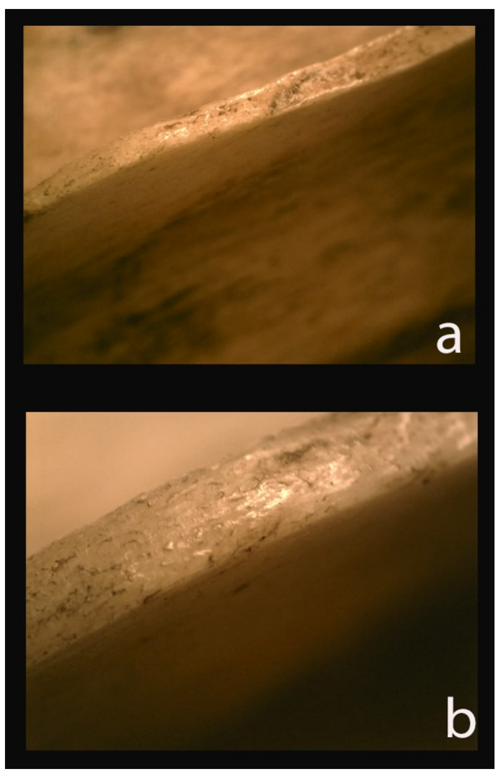

Figure 4-18: Artifact 42BO1:10473 Image (a) the working edge showing the pronounced polish and rounding at a magnification 50X. Image (b), the same working edge as in (a) but at 70X magnification.

42BO1:9641: This is a modified scapula measuring 148.62 mm in length, 72.82 mm wide, and 9.9 mm thick. The edges appear rounded and polished, and there are cut marks on the surface. When observed under the microscope, there are no striations present; and the polish is not too pronounced. This object does not appear to have been heavily used. The morphology is suggestive of its use as a beamer.

42BO-2004B-2-: This large chalcedony implement has a maximum length of 81.0 mm, maximum width of 52.5 mm, and working edge that is 6.90 mm thick (Figure 4-19). It has the basic morphology of an endscraper, but has been bifacially modified along the working edge (although the retouch on the ventral surface is extremely fine), a feature which is uncharacteristic of such implements (Figure 4-20). There is polish along the modified edge that is visible to the naked eye. When under the microscope, it does not yield any evidence of striations. This scraper is particularly interesting because it is much larger than those typically found in archaeological settings, perhaps indicative of how such implements appear before their intense use. The reason behind the bifacially modified edge is unclear.

Figure 4-19: Artifact FS 42 Bo-2004B-2. Photograph credit J.Ives, courtesy of the Natural History Museum of Utah

Figure 4-20: Image depicting the working edge of FS 42 Bo-2004B-2_ at a magnification 100X. Courtesy of Natural History Museum of Utah.

42BO1:11583 (Fig 4-21): This is a hafted end scraper. The haft is constructed out of the rib of a large mammal, and there is a piece of white chert lashed to the end of the haft. The flint is held in place with a rawhide thong. The chert has been broken, but the morphology is consistent with an end scraper. The length of the entire specimen is 111.13 mm.

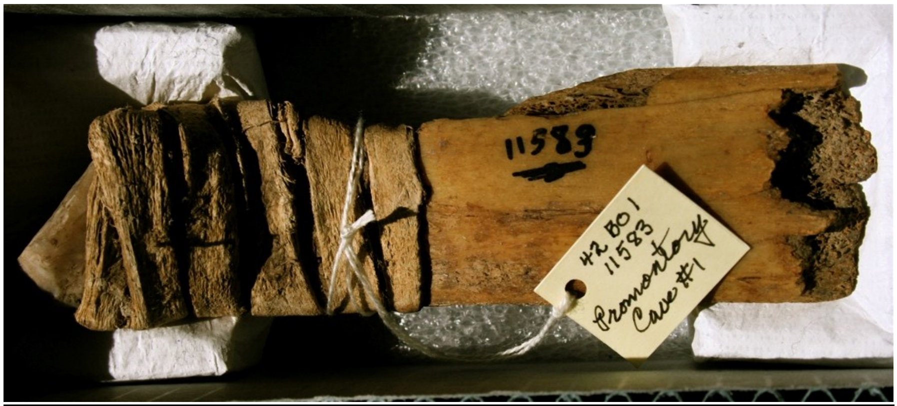

Figure 4-21: Artifact 42BO1:11583. Photograph credit J. Ives

42BO1:FS 372.4: This is a small chert unifacial implement measuring 18.88 mm long, 14.7 mm wide, and 3.34 mm thick on the distal edge. There is flaking over the dorsal surface, concentrated along the distal margin. There is pronounced polish along the distal edge, and it is smooth to the touch. There is a polished arris on the dorsal surface that is very smooth, indicating that this tool was hafted prior to being discarded. The morphology and polish is consistent with an endscraper.

Steward identified nine endscrapers from his excavations; and the recent excavations yielded another six, possibly nine (Steward 1937; J. Hallson personal communication, 2014) (Fig 4-22). Clark and Kurashina (1981:306) had observed that in Africa, hide tanners use on average two endscrapers per cowhide tanned. Using this average, the seventeen endscrapers recovered from Cave 1 would not account for the hide requirements of just the moccasins, let alone any other objects of hide being constructed. It should be noted that while endscrapers are extremely common in the Plains, they are regarded as less common in Great Basin artifact assemblages (Gunnerson 1956; Steward 1937). While Gunnerson (1956) noted that the number of endscrapers in the Cave 1 assemblage was large in comparison to Great Basin sites, it is not when we consider some Plains sites such as Stelzer (South Dakota). Returning to Hallson's ongoing research, projections for the number of endscrapers that we can expect Cave 1 to hold yields numbers of 285-570 scrapers.

It is possible that the leather artifacts being constructed within the caves were fashioned with the hair left on, as would happen with winter garments, blankets, and robes, for example. Many moccasins also retained bison hair turned inward to cushion the interior of the moccasin. If this were commonly the case, it would be expected that fewer implements associated with hair removal would be present. There is evidence to suggest that the Caves were occupied during the winter season (Johansson 2014; Steward 1937). As a result of the seasonality of the occupation, the Cave 1 inhabitants may have been involved in the construction of cold weather garments and objects.

Figure 4-22: A sample of the scrapers recovered from Cave 1. Photograph credit J. Ives.

As has been discussed earlier, endscrapers are not the sole tool used to remove hair. In the Yukon, split bone beamers are often used; and while Steward (1937) did not explicitly identify such tools in the artifact assemblage of Cave 1 (nor have recent excavations uncovered examples), reexamination of the assemblage from 1931 and the more recent additions yielded a number of modified scapulae with features consistent with beaming tools (Figure 4.17). In total, four such implements were observed in 2013 excavated materials; and it is possible that with further examination of existing collections, this number could increase. The modified scapulae all exhibited the same pattern of pronounced polish along one of the cut margins, consistent with repetitive use. Not knowing how long such a tool could be used before it would be discarded makes it difficult to speculate how many hides that these tools could process. Given the generally long use life of bone fleshers, it is reasonable to expect that these tools would also have long use lives. Indirectly, there is an abundance of animal hair in Cave 1, strongly suggesting that considerable dehairing was taking place.

SOFTENING TOOLS

Softening tools are important for achieving the superior product of traditionally tanned hide (i.e., buckskin). As discussed in Chapter 3, there are a number of methods employed by different cultural groups to achieve this effect. Keeley (1980) discussed the importance of striations as a result of use wear analyses that he conducted. Keeley (1980) thought that the orientation of the striations in relation to the working edge could reveal much about the ways in which the tool in question was used. Meat knives and fleshing knives should exhibit polish running parallel to the edge, while those used for scraping would have striations that were perpendicular to the working edge (Keeley 1980:52).

42BO1:FS 126.1 (Fig 4-23 & 4-24): This is an ovoid shaped, dark grey slate tabular biface measuring 83.93 mm in length, 83.2 mm, wide with a thickness of 10.4 mm. The distal or working edge appears to have been battered to achieve a rounded shape. The opposite edge is flat and unmodified, possibly created from a snap fracture. There is continuous polish on the distal portion of the implement that does not extend onto the dorsal or ventral surfaces. Its margin is smooth to the touch, and the polish is visible even without the assistance of a microscope. Upon examination under the microscope, striations in the polish become visible. They are tightly spaced at regular intervals, and are suggestive of repetitive motion in the same direction. The evidence of work is consistent with what Hayden (1979) observed on the edges of what he called “Eskimo skin scrapers,” which appear in morphology to be very similar to tabular bifaces. In addition to Hayden's observations, the use patterns of this artifact are consistent with what Semenov (1964) observed for tools used for skin working. Loebel (2013) found identical marks on implements used to scrape dry hides during experimental studies on scrapers used for hide processing.

Figure 4-23: Artifact 42BO1:FS 126.1 close up of the working edge. The magnification of the inset image is 50X. Adapted from photograph by J. Ives.

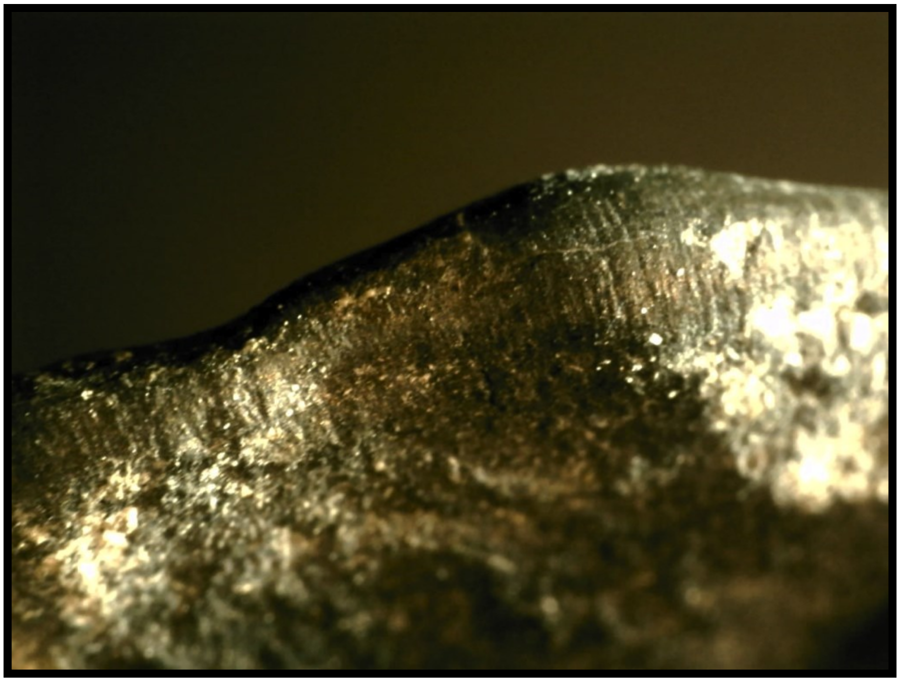

Figure 4-24: Artifact 42BO1: FS 126.1, edge magnified 150X. Note the evenly spaced striations and pronounced rounding of the working edge.

MISCELLANEOUS TOOLS

42BO1:11579 (Fig 4-25): Is a bone tool that has been modified into a rounded tip measuring 127.5 mm in length. The width of the working tip is 27.18 mm, with a thickness of 8.72 mm; and it is very smooth and polished. It is similar in morphology and modification to tools that were used repeatedly over a soft surface, similar to the *lissoirs* used to buff hides (Soressi et al. 2013). The morphology and wear patterns are suggestive of this implement being used for a buffing or burnishing function.

Figure 4-25: Artifact 42BO1:11579 A) the modification of the working edge. B) Close up of the working edge, highlighting the rounding and polish. Magnification 60X. Photography by J. Ives. Courtesy of the Natural History Museum of Utah.

MANUFACTURE

Aside from the finished moccasins and scraps of leather that are found in the cave, the implements associated with sewing and finishing of garments are also present, with a minimum of twelve awls being found in Steward's (1937) assemblage. Porcupine quills (Figure 4-26) have also been identified within the artifact assemblage, as well as scraps of leather with porcupine quill decoration (Figure 4-27). These objects, combined with the large number of moccasins and scraps of hide, suggest that the cave was the site of significant manufacturing of leather products.

Figure 4-26: Porcupine quills recovered from Cave 1. Photograph credit J. Ives.

Figure 4-27: Leather with porcupine quill decoration that was recovered from Cave 1 during the excavations of 2014. Photograph credit J. Ives.

All of the key stages of hide processing are represented within the archaeological assemblage of Cave 1. There can be no doubt that the occupants of Cave 1 and 2, Promontory Point, Utah, were involved in a subsistence strategy that involved the tanning and processing of large mammal hides. The use wear on the implements is consistent with what would be expected for objects used on soft materials such as hide (Brink 1978; Buc 2010; Hayden 1977; Keeley 1980; Odell 2010; Schultz 1992; Semenov 1974; Van Gijn 2007). In addition to the implements associated with hide tanning, there are also the many scraps of hide and hair that are so small that they would not have been usable, suggesting that the occupants were economical with the hide available.

The Cave 1 assemblage is important because there appears to be a high proportion of what would be described as crude or simple implements. This occurrence is particularly interesting because the record of the Promontory Caves preserves everything and as such offers insights into aspects of the archaeological record that would otherwise be lost. What is fascinating from a hide processing perspective is that we have an expectation that tools should be finely formed, when this might not be the case. The situation with tabular scrapers certainly suggests that a tool did not have to be finely made and intricate for it to be functional and to have sentimental value. The assemblage of Promontory Cave 1 and the ethnoarchaeological work with Kaska Elders suggests that so-called "crude" implements may in fact be extremely important, and warrant more focused study.

CONCLUSIONS

The Promontory Caves offer a truly unique opportunity to observe hide processing in a high fidelity archaeological context. The phrase "hide processing was occurring" has much more meaning when it can be combined with the tools used and the objects made—precisely the situation that we have with the Promontory Caves.

With continued studies into the deposition of artifacts and the ways in which space was allocated, it may be possible to get an even better understanding of how women's activities and how women themselves shaped and formed the archaeological record. Although it is impossible to make absolute statements regarding the manufacture of the hide articles in the Promontory Caves, it is likely that the workload was gendered.

While it is through hide working that women are made visible in this archaeological context, their contributions went beyond simply doing these tasks. The products they made were very likely driving interactions with neighboring groups (Eiselt 2012). Eiselt (2012:58) argued that the organization of the proto-Apachean populations arriving in the Great Basin and Southwest centered on groups of related females who formed cooperative units in order to maximize craft output and exchange opportunities. Athapaskan women who were arriving in the south brought with them their expert knowledge on bison hide tanning, and generated social capital from their finished hide products. The activities in the Promontory caves can readily be construed as the beginning of what would later be seen by the Spaniards in the late 1500s when they observed the Apache people engaged in extensive trade of hide products from the Plains into the Pueblos (Eiselt 2012:66). Eiselt (2012) believes the caves to be the foundation for later activities like Jicarilla enclavement, and the highly specialized production of utility ceramic wares for the Rio Grande Pueblos (Eiselt 2012:239). The medium changes from hide products to ceramics; but the process remains the same, with women bridging the interactions.

Gilmore (2005:33) suggested that through the act of producing clothing, women in Plains societies were the agents of ethnic identity, maintenance, and at times the agents of change in the face of contingency. Perhaps the women of the Promontory caves, who were already producing superior hide products, began acquiring the skills to create ceramic wares, and in doing so helped to redefine the identity of their people as they moved farther into the Great Basin and Southwest. Ives (2014) also discusses the idea that the presence of Promontory moccasins does not mean that a purely Dene population resided in the caves. "One would expect that young women from other societies might well have been incorporated in this population" (Ives 2014:159). This seems a likely occurrence, given that at the time that these Great Basin hunters were experiencing great success, the previously horticultural Fremont people were experiencing environmental conditions that were leading to the final decline of the Fremont lifestyle. Some would apparently retract into the Puebloan world, and some very likely joined Promontory Culture hunters (Ives 2014). As reviewed earlier, the genetic evidence clearly indicates that large numbers of women eventually entered Apachean societies. This process was in all likelihood underway in the Promontory caves (Ives personal communication, 2014).

These caves are a valuable source of information not only about how people in the past lived; but also on how women were agents of interaction, identity, and change. Sites such as this are assisting us in breaking down stereotypes of women's passivity in the past, and are showing that women were "active, public, and capable makers of history" (Spencer-Wood 2005:198). The women who lived in Cave 1 are telling us an aspect of their story through the objects that they left behind. With further engagement with the materials from the Promontory Caves, it will be possible to learn more about these women, their skills, and interactions.

Chapter 5 - Tipi Rings and Hide Processing: A Case Study From the Besant Phase

Tipi life is highly romanticized in depictions of First Nations people in art, television, and film. At their most basic level, tipis were constructed to serve the purpose of sheltering the occupants from the elements. They were an innovation made to protect the remarkably hardy people who not only survived, but thrived in harsh and unforgiving landscapes. There can be no doubt that these structures were of great importance to the people who called them home, but how does the ephemeral nature of tipi camps and the tipis manifest themselves on the landscape and in the archaeological record?

For as long as people have traversed the Plains, they have noted the presence of stone circles (Kehoe 1960). These features are variable in size, ranging from five to over forty feet in diameter; and are highly variable in concentration (Kehoe 1960). These stone circles have come to be known as tipi rings, whose function was to hold the hide cover down (Finnigan 1982; Finnigan and Johnson 1984; Otelaar 2003; Wilson 1983). It has been observed that tipi rings from the Besant Phase (ca. 2,100 to 1,500 BP) are larger than in preceding time periods (Brumley and Dau 1988; Vickers 1994). An example of this size increase can be observed at the Ross Glen site, where Besant tipi rings have an average interior diameter of 6.8 m (Quigg 1986), while rings from preceding time periods average 4.6 m in diameter (Brumley and Dau 1988). Brumley and Dau (1988:119) obtained this average of 4.6 m from an assessment of 686 stone circles throughout southern Alberta. These stone circles are thought to be representative of the range of variation seen in sites throughout southern Alberta (Brumley and

Dau 1988:106). The stone circle size-age hypothesis dictates that tipi rings decrease in size the farther back in time we go (Wilson 1983:113). The logic guiding this hypothesis is that after the introduction of the horse, the increased motive power allowed for larger tipis. The fact that during the Besant, a pre-equestrian phase, tipi sizes appear to increase, poses an interesting archaeological question. What are these stones telling us about life during the Besant Phase? This chapter will explore this question by discussing the practical consequences of increased tipi size (i.e. the increased investment in hide procurement, processing, and transportation).

TIPI CONSTRUCTION AND USE

The tipi represents the heart of Plains culture, and remains an enduring architectural form used by many for celebratory and ceremonial occasions (Nabokov and Easton 1989:124; Rosoff 2011:3). Primarily homes, tipis also served a number of other functions, including seclusion areas for menstruating women, medicine lodges, death lodges, vision quest structures, child bearing lodges, and even toys for children (Quigg 1978:48; Rosoff 2011:10). The ceremonial functions of tipis varied from band to band, but detailed discussions of ceremonial functions are beyond the scope of this thesis. For more information on this aspect of tipi life, Rosoff and Kennedy's (2011) beautifully illustrated book *Tipi: Heritage of the Great Plains* is recommended.

Social organization significantly influenced the size of tipi dwellings and living arrangements, while social rules usually governed who lived with whom and where one lived after marriage (Nabokov and Easton 1989:30). Tipis were often erected in circular camps, where at the center was “the woman, the life giver, around her, the family” (Hail 2011:119). As with other aspects of pre-contact Plains life, men and women’s roles in the construction and ownership of the dwellings were sharply defined (Nabokov and Easton 1989:30). Everything relating to the tipi belonged to women’s areas of authority and responsibility (Hansen 2011:40; McClintock 1936:85). Women set up and dismantled camps, acquired timber, and created the covers and liners for the tipis (Hansen 2011:40; Mandelbaum 1979:89; Nabokov and Easton 1989:161). The tipi was a source of pride for the woman who cared for it, and its construction and maintenance was a reflection of her character (Hail 2011:119).

Structural elements were often endowed with spiritual and social meaning (Nabokov and Easton 1989:124). The doors of tipis usually faced the east to greet the rising sun (Rosoff 2011:9). Constructed of locally available material (timber and hide), the tipi was a cultural response to the landscape (Rosoff 2011:3). When bands moved camp, tipis and household items were transported using either dog or horse travois, depending on the time period and what was available (Rosoff 2011:4). This process included the transport of the timber poles that could be extremely scarce on the southern Plains, often then as parts of travois. The tipi structure was framed with a cone of peeled poles covered with a semicircle of tanned and sewn buffalo hide known as the tipi cover (Figure 5-1) (Nabokov and Easton 1989:123; Rosoff 2011:4).

The frame was erected in one of two ways: using a base of either three or four poles (Nabokov and Easton 1989:150). The use of three versus four pole frames varies between tribes. Tribes using the three-pole tipi included the Sioux, Arapaho, Kiowa, Mandan, and the Arikara (Laubin 1971:17). The four-pole base was common amongst the Blackfoot (Otelaar 2003:111). Additional poles were placed into the apex of the main structure. The resulting shape was not a true cone but rather steeper toward the rear of the structure; and egg-like in floor plan (Nabokov and Easton 1989:150). Stakes or rocks were used to hold the cover to the ground, the remnants of which can still be seen on the landscape today as tipi rings (Kehoe 1960; Finnigan 1982; Nabokov and Easton 1989; Otelaar 2003; Quigg 1986; Rosoff 2011).

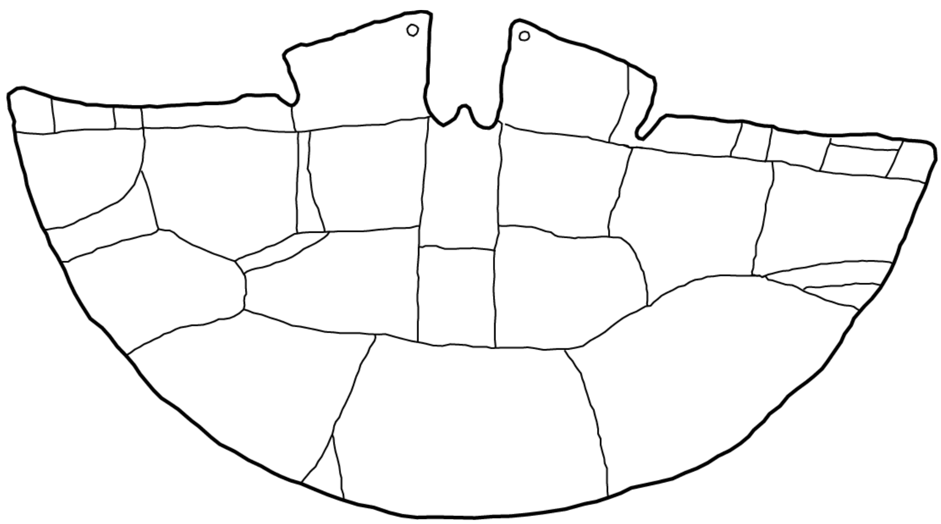

Figure 5-1: Example of a typical tipi cover (adapted from Wissler 1910:107).

Inside the tipi were liners (Figure 5-2), or dew cloths, which were fastened to a line approximately half way up the structure (Nabokov and Easton 1989:156). These served to deflect drafts and help ventilate smoke (Rosoff 2011:7). There are varying accounts of how many bison hides would have been required to make the tipi covers and liners, but it seems as though anywhere from eight (for a relatively small tipi) to eighteen would be a typical range for the number of hides required (Hansen 2011:43; Mandelbaum 1979:88; Nabokov and Easton 1989:154,162).

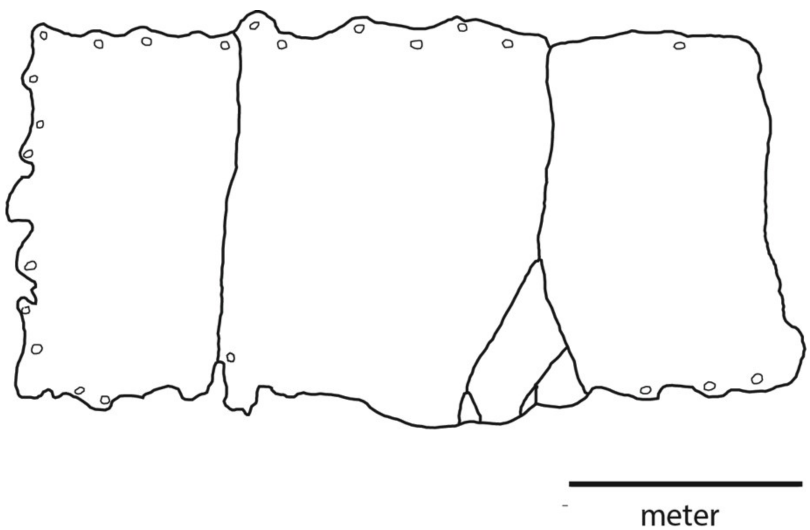

Figure 5-2: A segment of a tipi liner. Scale represents one meter. Adapted from Wissler 1910: 107.

After the introduction of the horse onto the Plains, tipi size markedly increased; and there are accounts of some Blackfoot tipis that were made from thirty-eight bison hides (Nabokov and Easton 1989:162). Nabokov and Easton (1989) do not discuss the size of tipis used for ceremonial functions, and it is possible that the tipi that required thirty-eight hides could have been one such tipi. Rosoff (2011) discusses the double tipi that was used for large gatherings and special occasions. Such structures were constructed using a tall center pole that was set into the ground, around which other poles were laid against it in a semi-circle. The resulting opening would be very large and east facing, and could have held upwards of one hundred people seated around the periphery (Rosoff 2011:12-13).

A tipi cover in constant use typically did not last for more than one year (McClintock 1936:9). When a tipi developed tears and/or holes, the woman who owned it would patch it, until it became necessary to replace (Nabokov and Easton 1989:162). The replacement of a tipi cover would have been a labour-intensive endeavor. In Pawnee accounts, it appears as though the replacement of a tipi cover was a carefully planned and coordinated event. “Constructing the hide cover for a tipi was a major undertaking that had to be planned at least two years in advance in order to accumulate at least eight buffalo hides as well as sinew” (Hansen 2011:43). In Blackfoot culture, after tanning all of the hides, a woman would invite female friends and clan relatives to a feast. Following the feast they would prepare the new cover together (McClintock 1936:92; Nabokov and Easton 1989:162-163). Mandelbaum (1979:88) discussed that an old woman skilled in cutting covers would measure the hides, then cut them into the proper shape. All of the women in the camp were assigned a place to sew. In this manner, the cover could be sewn in the course of one day (McClintock 1936:92). Hail (2011:120) suggests that a woman kept records of the number of buffalo hides she had tanned and decorated, sometimes inscribed as lines or notches in her fleshing tools. Women were rated highly in the tribe for their skills. A woman could have a party and tell of her honors, which consisted of the number of buffalo hides she had tanned and decorated in her lifetime, just as her husband could boast of his war accomplishments (Laubin 1971:85).

<u>ARCHAEOLOGICAL OCCURRENCES OF TIPI RINGS</u>

As mentioned earlier, tipi rings have long been observed on the Plains landscape. Forbis (1970) estimated that there could be 626,000 rings in southern Alberta, although he felt that this number could go as high as one million (Otelaar 2003:106). The oldest tipi rings in Alberta appear to date from the Oxbow Complex, which spans the interval ca. 4,500 to 4,100 BP (Otelaar 2003). Despite their abundance, the archaeological potential of tipi rings has been hotly debated (Burley 1990; Finnigan 1981,1982, 1984; Kehoe 1960; Otelaar 2003; Wilson 1983). Some of the contention can be attributed to the variability in the stone circles themselves, the variability in the composition and number of tipi rings at any given site, and the relatively meager associated archaeological assemblages (Otelaar 2003:105). The nature and use of the stone circles as tipi rings have been questioned (Malouf 1961), but Kehoe (1960:420) demonstrated that ethnographic accounts of these rings suggested use of stones for the holding down of tipi covers. Kehoe (1960) questioned several elderly Blackfoot people about the nature of tipi rings, and took them into the field to locate and identify them. All of the informants to whom Kehoe spoke identified the stone circles as being used by their ancestors to hold down lodge covers (Kehoe 1960:429).

Finnigan in the 1980s revisited the tipi ring as a potentially archaeologically viable feature through a number of studies. In 1982, he published a paper in which he developed criteria for identifying stone circles as tipi rings. His criteria mirrored those proposed by Kehoe (1960), and were as follows:

1. The shape of the stone ring should not deviate significantly from a circle.
2. There should be no interior stone feature that would render the interior of the tipi uninhabitable.
3. The inside diameter should fall between 2.5 meters and 9 meters.
4. The slope of the ground should be less than or equal to five degrees, and the ground surface should be stable and dry (Finnigan 1982:4).

It is thought that tipi ring size is closely related to tipi size, and in turn to the number of people that the tipi was designed to house (Finnigan 1982:69). There are obvious basic proxemics of the human body that limit the minimum size necessary for a given number of people in a given structure (Binford 1983:160). Table 5-1 depicts Kehoe's (1960) proposed correlation of tipi diameter to number of occupants.

Table 5-1: The correlation between time period, tipi floor diameter, and the number of occupants. Adapted from Kehoe (1960:462)

Period	Floor Diameter (m)	Number of Occupants
Pre-horse	~3.04	6-8
1750	>3.04	One family
1830	Average 1.83-3.66	6-10
1870	9.14	Up to 100

It should be obvious that there are a number of issues with the data in Table 5-1, including, but not limited to, approximate number of occupants. Kehoe is not clear as to how he determined either the number of occupants, or how he defined what "one family" should mean. The number of one hundred occupants living within one dwelling seems unlikely, considering that ethnographic accounts generally estimated an average of nine persons per lodge on the Plains (Finnigan 1982:69). It is possible that the 100-person tipi that Kehoe was proposing could have been one for a ceremonial purpose such as those described by Rosoff (2011). As can be seen, Kehoe equates tipi ring size with age, something known as the Size-Age hypothesis (Kehoe 1960; Wilson 1983). He proposed that prior to Plains people acquiring the horse, they were limited in terms of how far and efficiently they could transport large dwellings, preferring to utilize smaller dwellings on the order of 3.04 meters in diameter. With the extra mobility and motive power of the horse, tipi sizes were able to increase correspondingly. Based on this hypothesis, we would expect to see smaller tipi rings with earlier (older) dates and larger tipi rings with much later (younger) dates. This interpretation does seem to be logical, but Kehoe's reasoning did not prove true for larger stretches of prehistoric time: tipi ring sizes increased significantly during the Besant Phase, a time period well before the acquisition of the horse (Finnigan 1984; Wilson 1983).

CONTEXTUALIZING THE BESANT PHASE

Briefly, the Besant Phase dates to ca. 2,000 to 1,000 B.P. In Alberta, it is thought to mark a transitional phase, preceded by the Pelican Lake Phase and followed by the late precontact Avonlea Phase (Peck 2002:282; Vickers 1994). It is named after the characteristic projectile point type, the Besant Side-Notched, which is short and broad with shallow side notches and occasionally with slight basal concavities, larger varieties of which were used with the atlatl or spear thrower (Figure 5-3). The formally identical but smaller Samantha Side-Notched is commonly used to designate the corresponding arrow point, which co-occurs at Besant sites, although it is equally plausible that small Besant points reflect artifacts used by children (Reeves 1983:92; Dawe 1997). The Besant Phase is confined to the Plains areas of Alberta, Saskatchewan, Manitoba, North and South Dakota, and Montana (Reeves 1983:93).

There are a number of significant changes happening during this phase: the introduction of the bow and arrow, ceramics, upright features, bison hunting through communal strategies; and most pertinent to this study, increase in tipi ring size (Graham 2014).

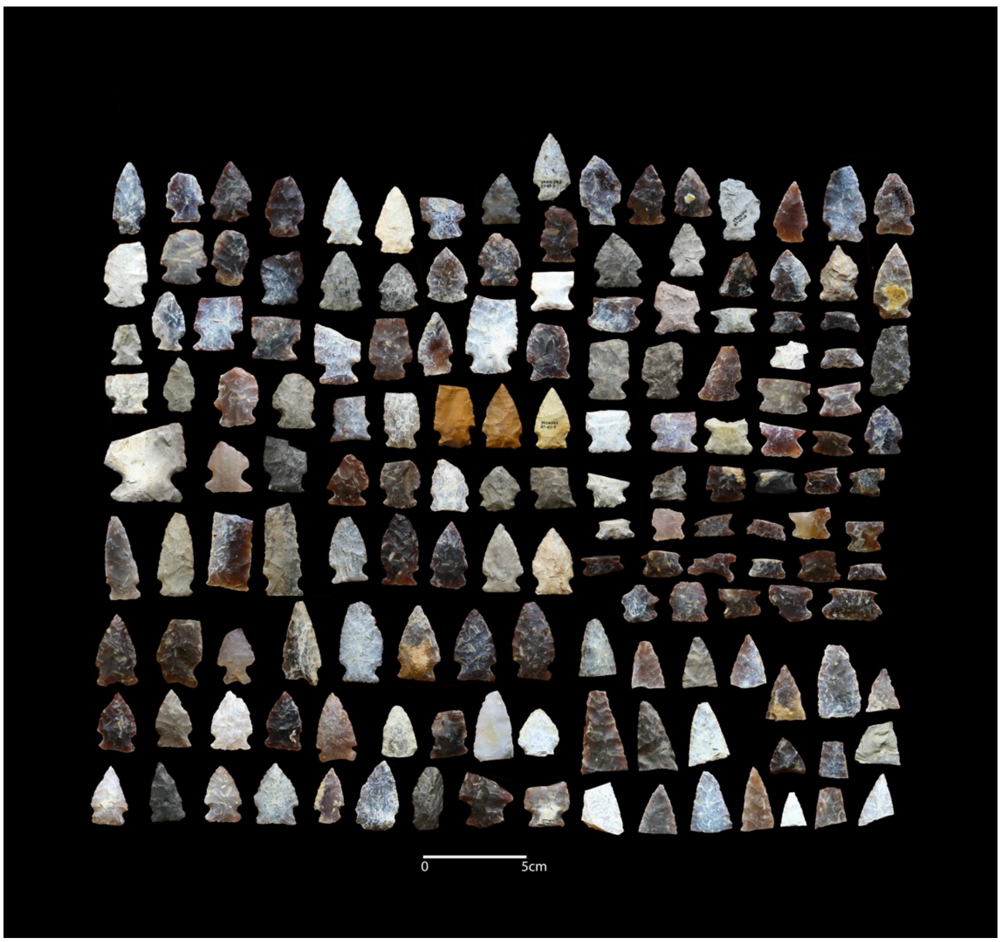

Figure 5-3: The variety of Besant projectile points recovered from the Stelzer site. Image reproduced from Graham (2014).

The utilization of Knife River Flint (KRF) is considered common during the Besant Phase (Peck 2011:282), though the extent to which this tool stone occurs is often overstated. There are, in fact, only eight out of 2500 recorded Besant sites that have high percentages of KRF in the assemblages, making these sites the exception and not the rule (Graham 2014:17). Knife River Flint is a material that is largely found in quarries in North Dakota, but occurs at distances that are in the range of 800-1000 km away (Graham 2014:12). Preference for KRF in the lithic assemblage is a phenomenon observed in what has been called the Sonota Complex in the Dakotas and southern Manitoba.

The Sonota complex was defined by Neuman (1975), based on a series of excavations along the Missouri River valley. He focused on the Stelzer campsite and a series of associated burial mound structures. Within the mounds there was an amalgam of Plains and Hopewell characteristics (Graham 2014). Neuman (1975) suggested that the material culture in North and South Dakota and southern Manitoba represented a phenomenon, distinct from the Besant phase, although he did note that the projectile points were similar to Besant points found elsewhere on the northern Plains. At the Stelzer site there was extensive use of Knife River Flint, conoidal ceramics, and bone upright features. Stelzer is situated near several small, dome-shaped burial mounds with very similar material culture; and very likely provided the campsite locus at which those using the burial mounds lived (Graham 2014; Neuman 1975).

There is much debate over whether or not Sonota is just a regional expression of the Besant Phase or something different (Graham 2014; Peck

2011:283). Many Besant and Sonota sites are identified using projectile point typology. This assignment is problematic, however, as Bubel (2014), Graham (2014) and Hamza (2014) have shown that projectile point variability over a time period spanning 2500-1000 BP sees Pelican Lake, Outlook, Besant, and Sonota point forms co-occurring at sites. Further, the differences observed with respect to projectile points could be due to point reworking rather than different cultural groups (Graham 2014). With this observation in mind, Graham (2014) has opted to refer to a Besant-Sonota continuum.

Some have argued that the presence of high percentages of Knife River Flint in occasional Besant assemblages might reflect groups that had recently travelled to North Dakota, and could indicate the physical movement of people between the Alberta and Saskatchewan Plains and the quarry sites in North Dakota (Peck 2011:282-283). There is also the possibility that Knife River Flint was a component of a trade network that extended into the Hopewellian world, and was part of the Hopewell Interaction Sphere (Graham 2014; Reeves 1983). During this time period, the Hopewellian world expanded beyond the Eastern Woodlands region. This connection is not derived just from the presence of Knife River Flint; but also in occurrences of obsidian from Yellowstone sources in Hopewell sites, as well as prestige items such as marine shell, and copper from regions distant to the core Hopewell area (Graham 2014; Reeves 1983; Syms 1977). It is very likely that exchange in perishable items, specifically hide items, was also an important element of these interactions, as I will discuss later. Some Besant Phase characteristics bear striking resemblances to the Sonota complex, and they do exhibit temporal overlap (Graham 2014; Peck 2011:282, Dyck 1983:113).

As I have mentioned previously, it is thought that tipi rings become larger during this time than they were previously (Brumley and Dau 1988; Quigg 1986; Vickers 1994). This trend has not been satisfactorily explored, and I turn now to the analysis of Besant tipi ring sites.

ANALYSIS OF TIPI RING SITES

It is difficult to attribute stone circles to a single time period for reasons that have been discussed previously. As has also been discussed, there are literally thousands of Besant era sites, so that a comprehensive study is beyond the scope of this thesis. For this analysis, five sites were selected for two primary reasons: first, the sites analyzed have generally been accepted in the literature as Besant era sites with largely contemporaneous tipi rings; and second, (in the cases of Ross Glen, Boyd, and Muddy Creek sites) the extent and number of tipi rings has been clearly delineated. The sites are as follows:

The Elma Thompson Site: The Elma Thompson site is comprised of a Besant phase tipi ring in west central Saskatchewan, excavated by Finnigan and Johnson (1984). The single ring was comprised of 57 rocks, and had a diameter of 4.68 meters (Finnigan and Johnson 1984:28). A tipi with the same basal diameter was estimated to have housed nine people, based on ethnographic literature (Finnigan and Johnson 1984:28). The site was determined to be Besant in age by the presence of Besant projectile points recovered during excavation.

Site 320L270: This site, located in central North Dakota, was analyzed by Fredlund et al. (1985). It was comprised of eleven stone rings with accompanying lithic scatters and buried features. Lithic materials were predominately Knife River Flint, with the source of this lithic material being 100 km to the west of the site (Fredlund et al. 1985:121). The stone rings at the site undoubtedly mark dwellings, and two of the eleven were selected for excavation (Rings 4 and 9). Ring 4 had a diameter of 7.85 meters, and Ring 9 had a diameter of 7 meters. The site was occupied multiple times spanning ca. 1780 to 860 ^{14}C yr B.P. The first occupation was radiocarbon dated within the time span that is generally accepted for Besant on the Plains. Beyond the radiocarbon dates, the lithic assemblage of the site strongly suggests Besant occupation, with the presence of Besant projectile points in association with the tipi rings selected for excavation.

The Boyd Site (EdPn-8): This site is located on the north rim of the valley of the Highwood River in the eastern margin of the Rocky Mountain foothills just 0.4 km south of Longview, Alberta. Stone rings at this site were analyzed and excavated by Wilson (1983) in an attempt to test Kehoe's Size-Age Hypothesis. The site is comprised of three stone circles interpreted as tipi rings falling within the time range considered here, and by the presence of Besant projectile points (Wilson 1983:128,131).

Circle 1 had an inside diameter of 4.75 meters, with two openings present. One faced northwest and the other faced southeast. Excavations yielded flakes indicative of tool resharpening, and one cobble spall. There was one large atlatl dart point midsection recovered which was made of Knife River flint. The point is consistent with Besant Phase and Sonota Complex examples.

Circle 2 was strongly circular, with an inside diameter of 5.5 meters. Similar to Circle 1, there were two openings present, but these faced southeast and northeast. Excavations yielded flakes, a cortical cobble spall, one wedge, a broken ovate biface, and a corner-notched atlatl dart point. The point shape strongly suggests a Pelican Lake affinity; points with this morphology quite often co-occur with Besant and Sonota forms.

Circle 3 has the same diameter as Circle 2, but the radiocarbon dates obtained place it at 2440 +/- 170 ^{14}C yr B.P. This age would precede what is generally accepted for Besant era sites; but as Bubel (2014) has shown with Fincastle (a southern Alberta site dated to 2500 BP with Besant and Sonota characteristics), and as Graham (2014) has also shown, this degree of projectile point variability is characteristic of types co-occurring at sites throughout the 2500-1000 BP time range.

The Muddy Creek Site Complex (48CR324, 325, 1737): This is a site complex consisting of several stone circle sites, a burial mound, and the remnants of a bison corral trap system in east-central Wyoming (Reher 1983, 1987). The abundance of Besant projectile points recovered from the site indicates that people occupied it during the Besant Phase. It is comprised of three villages, the Upper, Main, and South Village. The Upper Village was the location of 32 stone circles (28 in the main area and 4 outliers) (Reher 1987:37). Almost all of the circles fell between 3.5 and 4.5 meters in diameter.

The Main Village and associated Bison Pound were the location of between 60 and 70 stone circles, whose inside diameters ranged from 2-7 meters, with the majority falling within 2-5 meters (Reher 1987:50-51). There were a number of circles in the 4-6 meter range, which Reher (1987) noted as being large for the time period in question. Interestingly, there were two rings that were much larger than the others, measuring 8-9 meters in diameter (Reher 1987:51). The artifact assemblage of the Main Village yielded 47 end scrapers, 89 projectile points, many hundreds of utilized flakes, and other lithics (Reher 1987:64). All but three of the projectile points were of Besant age, with those three being small, corner-notched arrows from the Late Prehistoric.

The South Village consists of at least 46 stone circles. These have diameters that are consistently on the larger side, with over two-thirds of the rings falling between 4-6 meters (Reher 1987:53). Three of the associated rings are unusually large, ranging from 7-8.5 meters in diameter (Reher 1987:54).

The Ross Glen Site (DlOp-2): This is a Besant stone circle site that was located in southeastern Alberta, near Medicine Hat. J. Michael Quigg excavated the site in 1978 and 1981; the site yielded 18 stone circles and associated features (Figure 5-4). Quigg (1986) interpreted the site as representing three occupations. There was a minor event at Rings 16 and 17. Unfortunately there were no diagnostic artifacts recovered in association with either of these rings, a factor which makes determining a date for them impossible; but they were shallowly buried in comparison to the other rings at the site, and thought to be from a later occupation (Quigg 1986:67). There is another minor event at Ring 13 that is thought to represent a much earlier occupation, and a major event represented by all of the other rings.

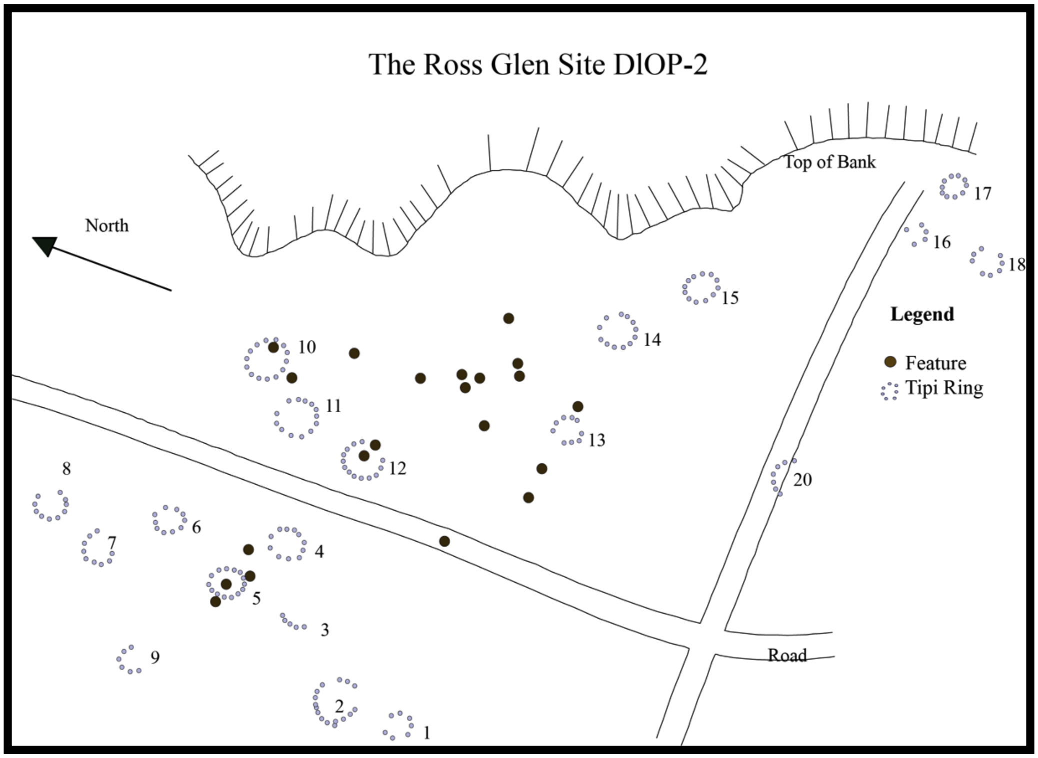

Figure 5-4: The Ross Glen Site (DlOp-2), showing the location of the tipi rings and associated features. Adapted from Quigg (1986:4)

The 1978 excavations yielded six projectile points that were all determined to be Besant atlatl dart points. The subsequent excavations in 1981 indicated that there were other types of projectile points present than just Besant style. Inside Stone Circle 13 there was what appears to be a Bitterroot point and the base of a Hanna point, indicating that this ring is at least 2,000 years older than the others. Nine projectile points from the 1981 excavations were all identified as Besant, suggesting that the primary occupation of the site was Besant in age. In total sixteen end scrapers were recovered from the site, as well as large amounts of Fire Broken Rock (FBR), debitage fragments, and ceramic sherds.

In addition to the stone circles and tools, the site had 23 ancillary features. Hearths, boiling pits, post molds, FBR piles, and refuse piles were all identified at the site. Two of the features, (3 and 12) were interpreted as smudge pits used for smoking hides. These features, combined with the presence of endscrapers, certainly suggest that hide tanning was an activity that was occurring at the Ross Glen site.

TIPI HIDE REQUIREMENT CALCULATIONS

The sites discussed above have a range of tipi ring diameters consistently larger than Kehoe's pre-horse estimate of 3.04 m, and are consistently larger than the average of 4.6 m that Brumley and Dau (1988) calculated. An increase in tipi ring diameter would have to have a corresponding increase in the number of hides needed to create the tipi cover as well as the liner. It would be useful if we could quantify what these requirements would have been. This was a feature that Finnigan (1984) considered carefully. He was able to determine mathematical formulas for calculating the number of hides necessary to make tipi covers and liners with diameters of known size. The formulas developed by Finnigan (1984) are as follows:

The equation for predicting the cover area (CA) of a tipi with a known stone circle diameter is:

$$\text{CA} = \pi(DT + x)^2 \div 2$$

x = 0.15 m (the amount of cover set on the ground)
DT = the diameter of the stone circle

Finnigan determined that the average amount of cover set on the ground was approximately 10-15 cm, and chose to use 0.15 m.

From here it is possible to predict the number of hides required to make a cover, assuming that one-half hide is required for smoke flaps, and that the average area of a hide is 2.7 m^2: $HC = (CA \div 2.7) + \frac{1}{2}$

Finnigan then determined that if the average liner is 1.8m tall, and knowing that the cover pattern is a semi-circle, the number of hides needed to construct the liner is: $HL = \{\left(\frac{\pi DT^2}{2}\right) - \frac{\pi(DT-1.86)^2}{2}\} \div 2.7$

I applied Finnigan's (1984) formulas to individual stone circles from sites that are believed to be from the Besant Phase in an attempt to determine the approximate hide requirements for tipis at these sites (Table 5-2).

Table 5-2: The number of hides required for stone circles found at selected Middle Prehistoric archaeological sites

Site	Time period	Tipi ring diameter (m)	Number of hides for tipi cover	Number of hides for tipi liner	Total number of hides
Elma Thompson Site	Besant	4.68	14.07	8.11	22.18
Boyd Site: Circle 1	Middle Period	4.75	14.46	8.26	22.72
Boyd Site: Circle 2	Middle Period	5.5	19.06	9.89	28.95
Boyd Site: Circle 3	Middle Period	5.5	19.06	9.89	28.95
Coal Creek Site	Besant	5.1	16.5	9.02	25.52
Site 320L270: Ring 4	Besant	7.85	37.71	14.97	52.68
Site 320L270: Ring 9	Besant	7.0	30.23	13.13	43.36
Kehoe's pre-horse estimate	Pre-equestrian	3.04	5.87	4.56	10.43

The results in Table 5-2 show that the number of hides needed to make tipis with the diameters of the stone rings found at each of these sites is large, varying from approximately 22 to 53 bison hides. Using the same calculations on the average pre-horse tipi diameter estimate that Kehoe (1960) proposed, these calculations yield a much lower figure of approximately eleven bison hides. It is increasingly likely, given the volume of the data available, that Brumley and Dau's (1988:119) number of 4.6 m might be a better estimate for a pre-equestrian population. The average number of hides for tipis of this size would fall around 20 hides. The numbers observed during the Besant Phase are significantly larger than this estimate, an observation which should give us pause, considering that the Besant Phase is pre-equestrian. Two sites, the Muddy Creek Site Complex in Wyoming and the Ross Glen Site in Southern Alberta, were chosen for a more detailed analysis of stone circle size and proposed hide requirements. Both sites are interesting from this perspective because they have a larger number of stone circles thought to represent tipi rings of the Besant Phase.

Table 5-3 shows the range in stone circle size for the Upper Village of the Muddy Creek site. All of the 32 stone circles fell between 3.5 and 4.5 meters in diameter, representing a range of approximately 14 to 21 bison hides required to construct the corresponding tipi cover and liner. Considering that there are 32 stone circles, this particular occupation represents approximately 480-672 bison hides in total for the covers and liners of all the tipis represented (assuming that all stone circles represent tipis, and all tipis were constructed from both a cover and a liner). These numbers are quite remarkable when we consider the consequences of this number of hides.

Table 5-3: The number of hides required for the stone circles of known diameters at the Upper Village of the Muddy Creek Site

Tipi ring Diameter (m)	Number of hides for tipi cover	Number of hides for tipi liner	Total number of hides
3.5	8.25	5.56	13.81
4.5	13.07	7.72	20.79

The Muddy Creek site complex does not end with the Upper Village. Table 5-4 shows the range of stone circle diameters and corresponding hide requirements represented at the Main Village. The Main Village consisted of over 70 stone circles (Reher 1987:50). The inside diameters ranged from two to seven meters, with the majority falling between two and five meters (Reher 1987:51). Seeing as the majority of the tipi ring diameters fall between two and five meters, these values were used to determine the range of hides that could be represented by the 70 stone circles. Using these numbers, we find that the number of hides represented by these stone rings would fall somewhere between 420 and 1,786 hides. At this location, two rings were much larger than the others; these measured eight and nine meters in diameter (Reher 1987:50). The numbers of hides required to construct these two tipis specifically would be approximately 55 and 67 hides, respectively.

Table 5-4: The number of hides required for the stone circles at the Main Village of the Muddy Creek Site

Tipi ring Diameter (m)	Number of hides for tipi cover	Number of hides for tipi liner	Total number of hides
2.0	3.18	2.31	5.49
5.0	16.5	9.02	25.52
8.0	39.12	15.29	54.41
9.0	49.18	17.61	66.79

At the South Village there were at least 46 stone circles are represented and of these, two-thirds range from four to six meters in diameter (Reher 1987:53). These numbers were used to determine the range of hides that could be represented by the stone rings at the South village. As with the Main Village, there were a couple of rings that were significantly larger than the others, ranging from 7 to 8.5 meters in diameter (Reher 1987:54). The hide requirements for the tipis represented by the stone circles at the South Village range from approximately 17 to 61 bison hides for single tipis. If we project the range over the entire assemblage of forty-six stone circles, we get a range of approximately 789-1,539 hides in total.

Table 5-5: The number of hides required for the stone circles at the South Village of the Muddy Creek Site

Tipi ring diameter (m)	Number of hides for tipi cover	Number of hides for tipi liner	Total number of hides
4.0	10.5	6.64	17.14
6.0	22.49	10.97	33.46
7.0	30.23	13.13	43.36
8.5	44.01	16.14	60.15

The stone circles represented at the Muddy Creek Site Complex are larger than what would be expected for a pre-equestrian population. This phenomenon is observed at another Besant era campsite, the Ross Glen site in southern Alberta. Table 5-6 shows the hide calculations for the stone circles found at the Ross Glenn site. This site is particularly interesting because the major occupation represents a Besant camp, thought to represent two family or small band isolates living together at the same time (Quigg 1986:50). It was proposed that the site could have been occupied by nearly 100 individuals, based on assumptions of six persons to a lodge (Quigg 1986:51). It is thought that the occupants were sharing the ancillary features, many of which were interpreted as having a role in hide processing activities. Quigg (1986:50) noted that the rings varied in size throughout the site.

Table 5-6: The number of hides required for the tipis represented by the stone circles found at the Ross Glen Site (DlOp-2)

Ring Number	Approximate Diameter (m)	Number of hides for the cover	Number of hides for the liner	Total number of hides
1	5.6	19.7	10.11	29.81
2	7.65	35.88	14.5	50
3	-	-	-	-
4	6.1	23.2	11.2	34.4
5	6.45	25.8	11.9	37.7
6	6.45	25.8	11.9	37.7
7	5.9	21.8	10.76	32.56
8	7.5	34.5	14.2	48.7
9	5.6	19.7	10.11	29.81
10	8.0	39.12	15.29	54.41
11	7.55	34.9	14.3	49.2
12	7.02	33.25	13.3	46.5
13	6.0	22.5	10.9	33.4
14	6.06	22.92	11.1	34.02
15	7.5	34.5	14.2	48.7
16	3.12	6.7	4.74	11
17	3.2	7.02	4.91	11.9
18	5.8	21.1	9.1	30.2

The values for the proposed hide requirements for the tipis represented by the stone circles at the Ross Glen site range from 11 to 54 hides, a similar situation to what is seen at the Muddy Creek Site Complex. Stone Circles 16 and 17 were determined to be from a later occupation. Stone Circle 13 was also believed to be significantly older than the Besant Phase. Albeit smaller than others at the site, this tipi is still large when we compare it to Kehoe's (1960) pre-equestrian estimates.

The Muddy Creek Site Complex and the Ross Glen site show that while there is variability in the sizes of tipis observed during the Besant Phase, tipis from this time period do appear to be consistently larger than what would be expected based on Kehoe's (1960) pre-equestrian estimates. The proposed numbers for the hide requirements for the tipis of Besant age are quite staggering; and warrant further discussion, especially with regard to procurement, processing, and transportation issues, as well as the social implications for group dynamics.

IMPLICATIONS FOR INCREASED HIDE USE

An obvious result of the increase in tipi size is the need to procure large numbers of bison in order to construct large enough covers and liners. Using the figures Brink (2004) derived in his analysis of Buffalo Bird Woman's account of a small pedestrian party hunting bison, it would seem difficult, if not impossible, to procure enough hides in a timely way to meet the requirements of the larger Besant tipi covers and liners. Buffalo Bird Woman's account tells of a twelve-person pedestrian bison hunt that procured seventeen bison in a period of approximately one week. They would have to transport the heavy green hides as they accumulated them. Thus, it is likely that the presence of tipis of the sizes seen during the Besant Phase is indicative of communal hunting strategies that could then be followed by intensive hide processing activities.

Ethnographic accounts do suggest that once a tipi was made, it would be carefully maintained and patched as needed, reducing the amount of hides needed after the initial construction (Laubin 1971:118). Communal kills such as those seen at Head-Smashed-In could easily yield one hundred or more bison over the course of a single kill event (Brink 2008:171). The ways in which the spoils of such a hunt were distributed likely varied between tribes; but generally, it was thought of as a communal event in which all people shared in the results (Brink 2008:171). Therefore, it seems highly likely that logically, the numbers of bison hides required to create the large tipis seen during the Besant Phase would come from communal hunts.

It has been said that the Besant Phase marks a cultural climax in terms of bison hunting that some feel was never reached again on the Northwestern Plains (Frison 1998) though this statement is not entirely true. While the Besant Phase does mark a significant increase in highly proficient communal hunting, Avonlea people were equally proficient; and Old Women's Phase people were even more so (Vickers 1986:81, 1994). It is also important to note that for both social and environmental reasons communal hunting likely did not take place annually. It may have occurred once, twice, or just a few times in an individual's lifetime (Brink 2004; Fawcett 1987; Ives 1990:327; Reher and Frison 1980). Excavation at the Vore Buffalo Jump in Wyoming showed that over a period of 141 years only five buffalo kills occurred, averaging to one kill every 25 years (Kornfeld et al. 2010:280; Reher and Frison 1980). With this information in mind, once a tipi was constructed, it might need to be patched and maintained over a considerable period before a complete replacement could occur.

The time of the year that is most lucrative for hunting bison in terms of fat stores is not the time of year that is best to hunt bison for tipi-covers (Brink 2008: 224). Autumn kills are the ideal time for food, because the bison are at their fattest during this time; yet, these hides are generally considered to be unsuitable for making tipi covers (Brink 2008:224). Ethnographic accounts suggest that spring hunts are the best for making tipi covers, because the animals have shed most of their fur by this time and the hide itself is thinner (Kehoe 1960). It is expected that this factor would have an impact on hide procurement strategies, and ultimately an impact on the seasonality of kill sites.

As has previously been stated, the Besant Phase is pre-equestrian; so the modes of transportation available for people in a Plains setting would typically have been by foot and with the assistance of dogs. According to Henderson (1994), it is reasonable to think that a Plains dog could have carried upwards of 27 kg (60 lbs) over long distances. In an attempt to determine how much the average bison hide weighs, websites that sell hides were sought out[3]. Unfortunately with these websites, the hides still have the hair on, a factor that definitely affects the weight. These estimates put the average weight of a tanned bison hide with the hair still on at approximately 9 kg (20 lbs). Tipis were of course constructed from hide that had the hair removed. From my experience with tanning moose hide, I would suggest that the average for brain-tanned moose hide with the hair removed would be more on the order of 1-3 kg (3-5 lbs) per hide. If we double this moose value as an estimate for brain tanned bison hide with the hair removed, a simple calculation for the smallest and the largest tipis found at the sites discussed above yields results of ranging from 110 to 540 lbs. According to Henderson (1994), the largest tipi in this analysis would require a minimum of nine dogs just to transport the cover and liner, not including the transport of the poles as well as the other camp items. Transportation would provide less challenge if dogs were readily available. At the Stelzer site, a minimum of five canid skeletons was represented

[3] www.chichisterinc.com/Buffaloskins.htm

in the assemblage (Neuman 1975:103), and a number of dogs are represented in the faunal assemblage of the Naze Site (Haury 1987).

Having determined that transportation of larger lodges could be managed, let us turn to a discussion of the labour required to process this volume of hides. Smaller tipis required complete replacement of the cover every two to three years (Brink 2004; Laubin 1971), and McClintock (1936) suggests that a tipi in constant use could need replacing in as little as one year. As discussed briefly already, in many cases, when women wished to make a new tipi cover, it became a communal effort, with multiple women within the camp assisting in the cutting and sewing of the cover and liner (McClintock 1936; Laubin 1971).

This practice certainly has implications for group size and group connectedness across the landscape. Fur trade accounts suggest that a single woman was capable of producing only around ten dressed hides per year (Habicht-Mauche 2005:42). Experience with Kaska Elders dictates that this number could be significantly higher, and this number could certainly increase if multiple women worked cooperatively within the same domestic group.

An intensification of hide processing is thus indirectly evidenced in the increase in tipi ring size. Increased need for tanned hides could manifest itself in the archaeological record in the form of more tools used for hide processing. The hide requirements of the tipis of the sizes witnessed during the Besant Phase should yield more tools associated with hide processing. The Ross Glen site yielded sixteen endscrapers, while the Muddy Creek site Complex yielded a minimum of 48 endscrapers (Reher 1983,1987). A rather exceptional case is the

Stelzer site, where more than four hundred scrapers were recovered (Figure 5-5) (Graham 2014).

The Stelzer site is an interesting case for a number of reasons (refer to Graham 2014 and Neuman 1975) for a detailed discussion of this site. For the purposes of this study, the presence of an extraordinary amount of scrapers warrants further consideration. The Stelzer site is an expansive site that encompasses 220,000 m^2 , of which only 0.5% was sampled (Graham 2014:165). Radiocarbon dates suggest that the site represents an occupation between ca 1800 and 1550 cal years BP (Graham 2014:170). Several different types of features were uncovered and described, including bone middens, pits, upright, post holes, and hearths. The end and side scraper assemblage amounted to 587 scrapers from both Neuman's (1975) excavations and surface collections. An already large number, when extrapolated over the entire site, becomes almost inconceivable at 30,000 scrapers (Graham 2014). Most of the endscrapers analyzed by Graham (2014) exhibited signs of significant use. It is reasonable to suggest that intensive hide processing was occurring at the Stelzer site.

Graham (2014) has proposed that the Stelzer site was an extremely intense Sonota occupation that occurred over a short period, during which groups of people came together for social and economic reasons, and to conduct mortuary and other ceremonies. It is very likely that hide processing and the exchange of hide products was an important part of these interactions, especially given the number of scrapers that occur at this site.

The stories of what is thought to be a Northern Cheyenne man, Wikis, were published in 1920 (Grinnell 1966). In it, the memories of life on the Plains were recounted, and Wikis speaks of when groups would come together to hunt the buffalo and participate in great ceremonies (Grinnell 1966:19). He spoke of the young men killing the buffalo, and the women and children collecting the meat and the hides and bringing them back to camp, where the women would make robes and dried meat. He also told of a large village camp that had nearly two hundred lodges: “All these had been made during the summer, and they were new, white and clean” (Grinnell 1966:97). If, for argument’s sake, we assume that all of these lodges were the size of Kehoe’s pre-equestrian estimates and required approximately 11 hides each, this calculation still would put the hide requirements of that single village at 2,200 hides. It is likely that there were a variety of lodge sizes, and this number could have been much larger. One cannot help but think that these events as told to Grinnell (1966) could be similar to events that unfolded at these large-scale gatherings at the Stelzer site.

Figure 5-5: Image showing a sample of the endscrapers recovered from the Stelzer site. Photograph by R. Graham (2014), courtesy of the South Dakota Historical Society.

<u>Discussion</u>

Why did tipi size increase during the Besant Phase, and what does this change tell us about the people who built these structures? For this discussion, plausible explanations for the increase in tipi size are proposed; and their consequences are discussed. This chapter is not designed to say what *did* happen; rather, what *might* have happened.

The first potential explanation for the increase in tipi size during the Besant Phase could be that these large tipi rings represent tipis used for ceremonial purposes rather than for residential dwellings. This interpreation is supported by some of the ethnographic accounts of the Blackfoot ceremonial tipi that was made from some forty skins and could hold upwards of a hundred people (Kehoe 1960: 461). Rosoff (2010) discusses the double tipi that was used for large gatherings of people for events such as gifting ceremonies, coming of age ceremonies, and treaty signings. While ceremony might be an attractive explanation for some larger tipi ring diameters (and is supported by ethnographic accounts), it does not explain why average tipi ring sizes are larger during the Besant Phase. If we turn again to a site like the Muddy Creek site complex, many stone circles are larger than what might be expected for a pre-equestrian phase. The fact that many of the rings at this site are larger is not consistent with ceremonial purposes (where larger rings should be uncommon), favoring instead a change in residential structure.

Following this residential line of reasoning, a second potential explanation lies in the general assumption that tipi ring size is primarily related to family size (Finnigan 1984:31; Kehoe 1960; Otelaar 2003:114). This interpretation is based on the simple fact that more people require more room to live comfortably. If this is the case, what are the mechanisms through which households become larger?

One possibility is that men during the Besant Phase were practicing polygyny or having more than one wife. Informants of Kehoe (1960:435) testified that the practice of polygyny had a direct influence on the size of the lodge. Presumably, with more wives come more children and thus a need for more space. This factor could also help explain where you would find the labour force necessary to process enough hides to create some of these larger tipis.

Nutrition can have a significant impact on fertility (Rosetta 1992:83) Fertility decreases under chronic malnutrition and food deprivation (Gordon 1996:15). Studies of birth spacing among caribou herd-following Dene people indicated that conception peaked in July through August on the Tundra, coinciding with a time when caribou were fat, plentiful and readily available (Gordon 1996:15). This observation is interesting from a Besant perspective, when we consider that the Besant period is a time when people are actively and successfully exploiting bison. Perhaps the availability of a fat nutrition source contributed to sustained success with birth spacing and population growth.

Another possibility is that we are seeing a change in residence pattern that results in more than one family or extended families residing in a single lodge or tipi (Finnigan and Johnson 1984:32). Increased family size could be a concomitant of heightened social and economic status. It has been proposed that dwelling size is a function of status and wealth, with the wealthiest families having the largest homes (Otelaar 2003; Quigg 1981; Kehoe 1960; Laubin 1971; McClintock 1936). Otelaar (2003) proposed that perhaps the most successful hunters were able to generate enough hides to make larger tipis. Presumably, the largest tipis were reflections of the most prolific hunters.

We often think of status as a man's achievement; but because women were responsible for the tipi, an increase in tipi size would also be a symbol of heightened status for the woman as well. As we saw earlier, women were highly praised for their tanning abilities: having a tipi that required the tanning of a considerable number of bison hides could be a way of elevating women's status as well as men's. As previously mentioned, successful communal bison kills are a characteristic of the Besant Phase (Kornfeld et al. 2010). Frison (1998) proposes that communal bison kills indicate the accumulation of surpluses for storage. He was discussing primarily food, but this observation definitely could apply to hides as well. It is possible that with the proliferation of successful bison hunts, more hides became available; and in turn, dwelling size increased.

Differences in social structure might also explain greater lodge sizes. It has been proposed that communal hunting in the Besant era might have occurred under the direction of sodalities, or conceivably, corporate kin entities (e.g., Walde 2006, 2013). The connection between the Besant and Sonota worlds revealed in the Sonota burial mounds raises the possibility that corporate kin entities such as lineage segments or kindreds might be reflected in the burial mound populations. While anthropological analyses have frequently considered households from the perspective of conjugal pairs, Ives (1990, 1998) and Asch (1981) have suggested that many co-resident hunter-gatherers may actually conceive of themselves as groups of real or classificatory brothers who have married groups of sister; or alternatively, brothers and sisters who have married other sisters and brothers. It could also be that larger households in the Besant and Sonota arose as the consequence of different patterns of social organization upon lodge sizes. It is worth noting that in a number of societies, such arrangements are thought to foster close working relationships among men and women related either as affines or consanguines, with important implications for gendered tasks ranging from hunting to hide-processing.

An interesting trait of the Besant Phase that may be a reflection of wealth and status is the introduction of pottery into archaeological assemblages (Scribe 1997). Pottery production is more than just a technological innovation; it represents a change that had ramifications throughout social systems by providing a new range of food preparation capabilities (Scribe 1997:58). Did a new means of storage or food preparation instigate a shift to a more sedentary lifestyle that corresponded with larger tipi sizes? This hypothesis is attractive, but the rarity of Besant era pottery on the northern Plains makes it difficult to substantiate this claim. Scribe (1997) discusses a personal account that suggests that clay vessels had great sentimental value attached to them, a factor which could mean that these objects had more than a purely functional role.

Sites like Ross Glen and Muddy Creek are interesting from a social dynamics point of view because they represent snapshots in time when multiple families or households were residing in the same place at the same time (Quigg 1986; Reher 1987). What we observe at these sites is that there is variability within each site with respect to tipi ring size. If the pattern in sizes of the rings reflected a combination of social status and wealth within the group, it could be that higher status individuals had the largest dwellings, and that Besant society had a great degree of social differentiation than one would predict for a more purely egalitarian society.

Conclusions

The increase in tipi size during the Besant Phase presents an interesting archaeological problem. There is clearly something happening during this time period that results in increased dwelling size. With an increase in dwelling size comes a whole suite of other concerns, from the logistics of making such a structure, to transporting it when locations are changed, to procuring enough hides to make larger structures possible. In terms of hide procurement, Besant Phase populations evidently supported the acquisition of large numbers of bison hides through communal hunting strategies. Depending on how often a tipi cover and liner needed to be replaced, the initial investment in hides would be the most challenging. There are ethnographic accounts of women patching up holes in tipis rather than replacing the entire structure, while other accounts suggest that a tipi cover could be replaced every year (Laubin 1971). Regardless of how often a lodge cover was replaced, it is highly unlikely that one woman was responsible for the tanning and the sewing of all of the hides required to make a larger tipi cover and liner. This activity was likely a communal endeavor (Laubin 1971). It is interesting that there seems to be a greater focus on co-operative, communal endeavors during this time period, from hunting to the creation of tipi covers and liners. While we have much to learn about why both communal and prestige aspects of life seem to receive greater emphasis during the Besant Phase, it does seem that social dynamics of life on the Plains in this time range had a perceptibly different character.

Based on Henderson's (1994) accounts of Plains dogs, it has been determined that the transport of even the largest of the tipis observed during the Besant Phase would not be insurmountable. During the Coronado expedition on the Llano Estacado, Querecho Indians were described as using the portable hide tent with the assistance of dog transport as part of a specialized economy focused on bison hunting (Habicht-Mauche 1992:250). The camps of these people consisted of up to two hundred tents, which were made of finely tanned bison hide, carried from place to place on the backs of dogs (Habicht-Mauche 1992:251).

The large tipi ring sizes observed during the Besant Phase are likely the result of a number of variables. The availability of bison hides from sustained success in communal hunting made it possible to acquire sufficient resources to enable the construction of larger tipis. This availability of hides was a necessary but not sufficient first step, because we are also likely observing a change in social dynamics favoring larger family size. Whether this social change resulted from changing marriage practices or larger extended families living together is unknown.

Resource availability, proficiency in tanning, large family size, contemporary burials in Sonota mounds, and items such as ceramics could also be signifying a greater degree of status differentiation during the Besant era.

Extensive sites such as the Muddy Creek site Complex and the Ross Glen site show that there is variability with regard to tipi ring size within Besant age camps. The fact that these differences exist certainly seems to suggest that there are notions of wealth and status at play (Kehoe 1960; Quigg 1986; Reher 1987)

While this chapter may have produced more questions than it answered, one thing that can be said with absolute certainty is that there is much to learn about and from tipi rings. With more excavation of the areas surrounding tipi rings, combined with settlement pattern studies, we will be able to ascertain a more comprehensive understanding of the ways in which campsites were used and the ways in which tasks were spatially arranged during the Besant Phase. This information will facilitate a greater understanding of the types of activities taking place, in turn yielding insights into why tipi sizes increased.

It should be apparent that by approaching tipi rings from a slightly different perspective—in this case, the hide requirements of tipis—we are led to new and exciting questions that are worth pursuing. These types of studies provide insights into aspects of the archaeological record that are not often explored. In addition to this knowledge, by taking a hide processing focus, women's work, expertise, and art are put in the forefront of discussion. Archaeology is about people, so the next time a tipi ring is encountered on the landscape, a moment might be taken to think about the woman who chose that spot and set up camp for her family.

Chapter 6 - Concluding Remarks: Hidden Women and Celebrated Voices

This study has shown that hide processing is an essential aspect of the archaeological record. Three themes have arisen out of the preceding chapters and warrant further discussion: hide procurement, women's work, and the role of community experts in archaeological research.

HIDE PROCUREMENT AS A PRIMARY MOTIVATION FOR THE HUNT

The Promontory Caves, discussed in Chapter 4, offer insights into the sheer volume of hide products that could be expected at sites, were we to have high levels of preservation at every location. The descriptions of tipis in Chapter 5 show that the hide requirements observed during the Besant Phase were substantial. The importance of animal hide as a raw material is highly apparent throughout this study, and this observation raises questions about procurement strategies. The previous chapters have shown that the products of hide working are extremely important to hunting and gathering societies in the forms of clothing, shelter, and tools. Muniz (2013) discusses hunting in terms of risk management strategies, and states that:

"the failure costs associated with hide working can be estimated as the time, energy, raw materials, and social organization wasted to create a successful hunt that produced the appropriate animal with a hide that was in proper condition to work *but was not worked*" (Muniz 2013:284, emphasis in the original).

Muniz (2013) looked at how Cody Complex people organized lithic technology to manage the risks associated with tool production, hunting, butchery, and hide production at two Paleoindian sites. He found that at the Jurgans site, the occupants paid relatively high technological costs for making endscrapers, leading Muniz (2013) to suggest that Cody groups and other Paleoindians may have been conducting large fall bison kills for hides, sinew, and bone, as much as for edible meat (Muniz 2013:285-286). If this inference is true and hunting was, in some situations, being performed to obtain hides, then many of the taphonomic expectations that archaeologists have for kill sites (i.e., evidence of butchering) will need to be revisited and revised (Muniz 2013:286). Speth (2013) also discusses a number of instances in which the goal of communal hunting was to obtain hides for clothing, shelter, and shields; and not the procurement of food.

It stands to reason that tools associated with hide processing should be reexamined at sites in light of the possibility that the procurement of hides and other animal byproducts (sinew and bone) was at least as important as the procurement of meat. Given the central role that the products of hide processing would have played in the lives of Plains people, this idea certainly warrants future investigation.

WOMEN'S WORK

Archaeological literature is permeated with assumptions and statements of 'facts' about gender (Brumbach and Jarvenpa 2006, 2007). Ideas of the sexual division of labour in the past, what men and women were doing or what they should have been doing, are often a projection of our own gender ideology (Brumbach and Jarvenpa 2006, 2007; Gilchrist 1999; Kehoe 1983; Nelson 2006; Schneider 1983; Weedman 2006; Wylie 2002). The *Man the Hunter* Symposium in 1966 established that hunting was the exclusive role of males. The definition of hunting was narrowed to exclude the trapping of small animals—an activity in which women actively participated and even dominated (Brumbach and Jarvenpa 2006). Historically, there has been focus on the moment of the kill as the single most important aspect of hunting cultures (Gilchrist 1999). This focus ignores the significant amount of work required in the planning of a hunt, and the organization of labour in the aftermath.

We typically understand gendered roles in a binary way: men make stone tools and women make pottery; men hunt and women gather, despite the fact that there is ethnographic evidence to suggest that there was much more fluidity in gendered roles than this assertion (Gilchrist 1999:36). Women in the past were constrained to be homemakers; the gatherers who rarely contributed to economy, even when it is largely understood that the contribution of small game trapping and gathering of plant material was essential to economy and subsistence (Brumbach and Jarvenpa 2006: 505, 508). Further, women and women's status has been defined by their relationship to men as mothers, sisters, and wives, while male prestige has been defined in terms of achievements as hunters, warriors, and providers (Gilchrist 1999:33). These types of generalizations privilege perceived men's roles over those of women, and in turn have an effect on what is deemed important in archaeological interpretations and studies.

Manufacture and tasks essential to subsistence were a composition of a range of activities that involved both women and men (Gilchrist 1999:40). This cooperation was described in Buffalo Bird Woman's account of life on the Plains (Brink 2004; Wilson 1924). Ethnoarchaeological studies have furthered female contributions to subsistence while enhancing our understanding of the flexibility in societal roles, and showing that our categorizations of women and men are far from absolute (Gilchrist 1999:35-36; Nelson 2006, 2007).

It should be noted that sex and gender are not the same thing; one is biological and the other is cultural (Gilchrist 1999; Frink and Weedman 2005; Nelson 2006, 2007; Schneider 1983). Gender is not, nor should it be, used as a code word for women; and gendered archaeology is not simply about finding women in the past; yet, many of the archaeological studies of gender have focused on women (Gilchrist 1999; Nelson 2006, 2007). This focus is likely a product of the roots of gender archaeology arising out of the women's movement of the 1960s and 1970s (Nelson 2006:2).

Hide processing has been regarded largely as women's work, but the division of labor along sex lines is often blurred (Schneider 1983:104). Just because women of one group are the primary task performers in one domain does not mean that the role is the same for all groups. For example, Schneider (1983) discusses many ethnographic accounts of Plains people that revealed tanning could be done by either men or women, in cases in which the decision depended on the animal from which the hide was taken, and the degree of skill required to tan the skin. Kluckhohn et al. (1971) also discussed that among the Navajo, men were the primary tanners of hides. The blurring of the sexual division of labour should not come as a surprise, since it would be necessary for both men and women to be able to perform a number of tasks at times. Again, Schneider (1983) discusses how, when men were away from camp for extended periods of time, they would take the necessary materials and tools to patch moccasins and clothing as needed. This knowledge certainly suggests that we must be careful when ascribing the sex of the user to an object. Nevertheless, ethnographic accounts suggest that women were most often the primary artisans who created objects of hide, such that the presence of hide processing implements is likely to reflect the presence of women at archaeological sites (Albright 1984; Baillargeon 2010; Frink and Weedman 2005; Janes 1983; Schneider 1983; personal observation 2012).

Women's Tasks As Work and Not Just Crafts

There is a common assumption that Plains women produced secular and mundane objects, while men made the items of social and ritual importance (Schneider 1983:102). Women's work is thought of as uncreative; and it is recognized not as technology, but as craft skills (Nelson 1997:88). I have heard a projectile point described as beautiful; and yet calling it that does not take away from the technological aspect of its creation, nor the skill required to manufacture it. The ability to take an animal skin through a series of processes to convert it into a hide that can be used to make clothing, dwellings, pouches, or rope, (to name but a few of its functions) is a technological innovation; yet, discussions of hide processing often do not portray it as such.

The tipi I refer to in Chapter 5 is the home, the center of family life, created and owned by women, and cared for and maintained by women. Up to fifty-five bison hides need to be tanned to create some of those tipis attributed to the Besant Phase. Even so, the focus of discussion surrounding tipis is often on the painting of the covers and liners, a task typically attributed to men (McClintock 1936; Schneider 1983; Rosoff & Kennedy 2011). Schneider (1983) draws attention to the fact that women participated in and even had to approve of the design that would be represented on the tipi, since she was the owner (108). The woman was not simply the "home maker"; she was quite literally the "maker of the home". Creating fine tipis and robes was a highly prized skill that could bring a woman much prestige and wealth, and in turn give her husband and family prestige and wealth (Schneider 1983:115).

WOMEN: MAKERS OF TOOLS

Another assumption maintains that women do not make stone tools; and when they, do they are unskilled, crude, and expedient (Brumbach and Jarvenpa 2006,2007). Despite increasing evidence from ethnographic and ethnoarchaeological contexts indicating the contrary, there is still resistance from the community at large to accept the fact that women do today and certainly did in the past create stone tools (Albright 1984; Pokotylo and Hanks 1989; Rainey 1939; Weedman-Arthur 2010; Weedman 2005; personal observation 2012). It has become engrained into our most basic of understandings that stone tools are a masculine creation. Men are the keepers of that particular branch of knowledge, and they pass it down through generations (Nelson 1997:91).

In Chapter 2, I discussed a specific instance in which I observed a woman making, certainly with the intent of using it herself, a stone tabular biface. These tools have a long archaeological history (since Rainey's 1939 publication) of being associated with and made by women. Perhaps, as has been argued by

Eyman (1968) and myself, the expedient nature of these implements has been used as a justification for not studying them in greater detail. Further, the somewhat simple nature of stone tools associated with women has influenced the idea that women were not the creators of fine stone tools. Weapons have been highly valorized by archaeologists (tools typically associated with men), while objects such as awls and flake tools are largely ignored or simply mentioned in passing (Nelson 1997, 2006, 2007). This bias results in an incomplete and skewed understanding of the past. It is interesting that the objects used for collecting and transporting (i.e. digging sticks, rawhide containers, leather bags, etc.) are rarely discussed as tools at all (Nelson 2007).

Spector's (1993) 'What This Awl Means," showed the multiple layers of meaning that are embodied in a single artifact. This example is not unlike the stories of the tabular bifaces that I myself heard in August of 2012. These tools, while admittedly simple looking, have considerable life stories. This study has demonstrated that it is not always possible for us to judge the importance of an object by its physical appearance.

Women in Ethiopia obtain, create, and use stone endscrapers for processing cow hides (Weedman-Arthur 2010; Weedman 2005). It is highly likely that women in North America would have been able to create their own scrapers as needed in the absence of men, and we know that women do make tabular bifaces for their own personal use. It is no longer acceptable to assume that all stone tools at a site are the product of men.

THE ROLE OF COMMUNITY EXPERTS IN ARCHAEOLOGICAL INTERPRETATIONS

Studies of gender and archaeology show that ethnoarchaeology and ethnography are invaluable resources for understanding how gender roles structure space and artifact deposition (Albright 1984;Janes 1983; Nelson, 2006, 2007; Weedman-Arthur 2010). Ethnoarchaeology is an area that has much to offer our discipline; but in order for the benefits to be truly realized, we must learn to redefine our understanding of what constitutes an "expert" and "expert knowledge" (Atalay 2007; Colwell-Chanthaphonh and Ferguson 2008; Lyons et al 2010; Tuhiwai Smith 1999; Zimmerman 2005). When doing ethnoarchaeology we must be careful not to view our teachers as objects to be studied. In these situations we are the students, and we have so much to learn from the people who trust us with their stories and knowledge.

This study of hide tanning in the archaeological record would not have been possible without the expert knowledge of the Kaska Elders who shared their experiences with me. Working with community experts has led to a much fuller understanding of how hide tanning and the roles of women are reflected in the archaeological record. It is through these partnerships that we can learn more about ourselves, about our pasts, and shape our futures.

References cited

Adams, Jenny L
1988 Use-Wear Analyses on Manos and Hide-Processing Stones. *Journal of Field Archaeology* 15(3): 307-315.

Agbe-Davies, Anna S.
2010 Concepts of community in the pursuit of an inclusive archaeology. *International Journal of Heritage Studies* 16(6):373-389.

Aikens, Melvin C.
1966 *Fremont-Promontory-Plains Relationships in Northern Utah*. Department of Anthropology University of Utah Anthropological Papers Number 82. University of Utah Press, Salt Lake City.

Albers, Patricia
1983 Introduction: New Perspectives on Plains Indian Women. In *The Hidden Half: Studies of Plains Indian Women*, edited by Patricia Albers and Beatrice Medicine, pp. 1-28. University Press of America, USA.

Albright, Sylvia L.
1984 *Tahltan Ethnoarchaeology*. Department of Archaeology, Simon Fraser University, Publication Number 15.

Anthony, David W
1990 Migration in Archaeology: The Baby and the Bathwater. *American Anthropologist* 92(4): 895-914.

Arkush, Brooke S
2014 *Report of Archaeological Investigations at 10Oa275 on the Curlew National Grassland in Southeastern Idaho*. Cooperative Agreement 04-CS-11041563-033.

Asch, Michael I.
1980 Steps toward the Analysis of Athapaskan Social Organization. *Arctic Anthropology* 17(2):46-51.

Ascher, Robert
1971 Analogy in Archaeological Interpretations. In, *Man's imprint from the past: readings in methods of archaeology*, edited by James Deetz, pp. 261-271. Little Brown & Company.

Atalay, Sonya
2007 Global Application of Indigenous Archaeology: Community Based Participatory Research in Turkey. *Archaeologies* 3(3): 249-270.

2010 'We don't talk about Çatalhöyük, we live it': sustainable archaeological practice through community-based participatory research. *World Archaeology* 42(3): 418-429.

Baillargeon, Morgan
2010 *North American Aboriginal Hide Tanning: the Act of Transformation and Revivial*. Mercury Series No 146, Canadian Museum of Civilization Corporation. Hull, Quebec, Canada.

Belitz, Larry
1973 *Step-By Step Brain Tanning the Sioux Way.* Indiana University. USA.

Billinger, Michael and John Ives
2014 Inferring Demographic Structure with Moccasin Size Data from the Promontory Caves, Utah. *American Journal of Physical Anthropology* 156:76-89.

Binford, Lewis R,
1967 Smudge Pits and Hide Smoking: The Use of Analogy in Archaeological Reasoning. *American Anitquity* 32(1): 1-12.

1968 A Theoretical Framework for Interpreting Archaeological Materials. In *Man the Hunter*, edited by Richard B. Lee and Irven DeVore, pp: 268-273. Aldine Publishing Company, Chicago.

1978 *Nunamiut Ethnoarchaeology*. New York: Academic Press, New York.

1983 *In Pursuit of the Past: Decoding the Archaeological Record*. Thames and Hudson Inc. New York.

2001 *Constructing Frames of Reference. An Analytical Method for Archaeological Theory Building Using Ethnographic and Environmental Data Sets*. University of California Press, Oakland, CA.

Brandisauskas, Donatas
2010 Hide Tanning and its Use in Taiga: The Case of Orochen-Evenki Reindeer Herders and Hunters of Zabaikalye (East Siberia). *Journal of Ethnology and Folkloristics* 4(2): 97-114.

Brink, John W.
1978 *An Experimental Study of Microwear Formation on Endscrapers*. Archaeological Survey of Canada Paper No. 83. National Museum of Man Mercury Series. Ottawa.

2004 The Lessons of Buffalo Bird Woman. In *Archaeology on the Edge, New Perspectives from the Northern Plains,* edited by Brian Kooyman and Jane H.

Kelley, pp. 157-185. Canadian Archaeological Association Occasional Paper Number 4, University of Calgary Press.

2008 *Imagining Head Smashed In. Aboriginal Buffalo Hunting on the Northern Plains*. Athabasca University Press. Edmonton, AB, Canada.

Brumbach, Hetty Jo and Robert Jarvenpa
2006 Gender Dynamics in Hunter-Gatherer Society. Archaeological Methods and Perspectives. In, *Handbook of Gender in Archaeology*. edited by, Sarah Milledge Nelson, pp. 105-135. AltaMira Press, Oxford, UK.

2007 Gender Dynamics in Hunter-Gatherer Society: Archaeology Methods and Perspectives. In, *Gender and Subsistence: Gender Strategies for Archaeology*, edited by Sarah Milldege Nelson, pp.169-202. AltaMira Press, Plymouth, UK.

Brumley, John H. and Barry J. Dau
1988 Historical Resource Investigations within the Forty Mile Coulee Reservoir. *Archaeological Survey of Alberta Manuscript Series* 13:1-370. Edmonton, AB.

Bubel, Shawn
2014 The Fincastle site: A Late Middle Prehistoric Bison Kill on the Northwestern Plains. *Plains Anthropologist* 59(231):1-35.

Buc, Natacha
2010 Experimental Series and Use-Wear in Bone Tools. *Journal of Anthropological Science* 38:546-557.

Burley, David V.
1990 Tipi Rings and Alberta Prehistory: Toward a Historical and Critical Review of a Legislated Archaeology. *Plains Anthropologist* 35(132): 343-357.

Campbell, Paul Douglas
2013 *The Universal Tool Kit: Out of Africa to Native California*. Published by Paul Douglas Campbell, Los Angeles, CA.

Clark, Desmond J. and Hiro Kurashina
1981 A Study of the Work of a Modern Tanner in Ethiopia and Its Relevance for Archaeological Interpretation. In, *Modern Material Culture The Archaeology of Us,* edited by Richard A Gould and Michael B. Schiffer, pp.303-321. Academic Press Inc. New York, New York.

Clayton-Gouthro, Cecile M.
1994 *Patterns in Transition Moccasin Production and Ornamentation of the Janvier Band Chipewyan*. Mercury Series no. 127. Canadian Museum of Civilization. Hull, Quebec.

Coleclough, Jeff
2010 *From Moose to Moccasins: A step-by-step guide to traditional hide-tanning.* Kakwa Publishing, Riceton, Saskatchewan.

Colwell-Chanthaphonh, Chip and T.J.Ferguson.
2008 Introduction: The Collaborative Continuum. In *Collaboration in Archaeological Practice: Engaging Descendant Communities*,edited by Chip Colwell-Chanthaphonh and TJ Ferguson, pp 1-32. AltaMira, Lanham MD.

Dawe, Bob
1997 Tiny Arrowheads: Toys in the Toolkit. *The Plains Anthropologist* 42(161):303-318.

DeLaguna, Frederica
2000 *Travels Among the Dena Exploring Alaska's Yukon Valley*. University of Washington Press. Seattle and London.

Derry, D. E.
1975 Later Athapaskan prehistory: a migration hypothesis. *Western Canadian Journal of Anthropology* 5(3/4):134-47.

Drennan, Robert D.
1996 *Statistics for Archaeologists: A Common Sense Approach*. Springer Science and Business Media. Boston, MA.

Dyck, I.
1983 The Prehistory of Southern Saskatchewan. In, *Tracking Ancient Hunters: Prehistoric Archaeology in Saskatchewan*, edited by H.T. Epp and I. Dyck, pp. 63-139. Saskatchewan Archaeological Society, Regina.

Dyck, I and R.E. Morlan
1995 *The Sjovold Site: A River Crossing Campsite in the Northern Plains*. Canadian Museum of Civilization, Hull, Quebec.

Eiselt, B. Sunday
2012 *Becoming White Clay: A History and Archaeology of Jicarilla Apache Enclavement*. The University of Utah Press. Salt Lake City.

Ewers, J.C.
1958 *The Blackfeet: Raiders on the Northwestern Plains*, University of Oklahoma Press, Norman, Oklahoma.

Eyman, Frances
1968 The Teshoa, A Shoshonean Woman's Knife: A Study of American Indian Chopper Industries. *Pennsylvania Archaeologist* 4(3-4): 4-63.

Fawcett, William Bloys
1987 *Communal Hunts, Human Aggregations, Social Variation, and Climatic Change: Bison Utilization by Prehistoric Inhabitants of the Great Plains*. Unpublished PhD dissertation, Department of Anthropology, University of Massachusetts, Boston.

Finnigan, J.
1981 The Elma Thompson Site: A Preliminary Report. *Saskatchewan Archaeological Society Newsletter* 2(4):8-9

1982 *Tipi Rings and Plains Prehistory: A Reassessment of Their Archaeological Potential*. Paper No. 108. National Museums of Canada, Archaeological Survey of Canada Mercury Series, Ottawa.

Finnigan, J.T. and E. Johnson
1984 The Elma Thompson Site: A Besant Phase Tipi Ring in the West Central Saskatchewan Plains. *Saskatchewan Archaeology* 5:27-35.

Forbis, Richard G.
1970 *A review of Alberta Archaeology to 1964*. National Museums of Canada. Ottawa.

Forsyth, Donald W.
1986 Post-Formative Ceramics in the Eastern Great Basin. *Journal of California and Great Basin Anthropology* 8(2): 180-203.

Foster, Michael K.,
1996 Language and the culture history of North America. In *Handbook of North American Indians, Volume 17, Subarctic*, edited by Ives Goddard, pp. 64-110. Smithsonian Institution Press, Washington.

Fredlund, Lynn B., Dale Herbort, and Gene Munson
1985 Investigations at a Besant Stone Ring Site (320L270) in Central North Dakota. In, *Contributions to Plains Prehistory*, David Burley (ed). Occasional Paper no 26,pp 116-154. Archaeological Survey of Alberta, Edmonton.

Frink, Lisa and Kathryn Weedman (eds.)
2005 Introduction to Gender and Hide Production. In, *Gender and Hide Production*. pp. 1-11. Altamira Press, Walnut Creek, CA.

Frison, George
1998 The Northwestern and Northern Plains Archaic. In, *Archaeology on the Great Plains*, edited by Raymond Wood, pp 140-172. University Press of Kansas.

Garling, Mary E.
1964 Ross Rock Shelter (48NA331). *The Wyoming Archaeologist* 7(4):12-35.
Gilchrist, Roberta.
1999 *Gender and Archaeology Contesting the Past*. Routledge Press, New York NY.

Giles, Eugene and Orville Elliot
2005 Sex determination by discriminant function analysis of crania. *American Journal of Physical Anthropology* 21(1): 53-68.

Gilmore, Kevin P.
2005 These Boots Were Made for Walking: Moccasin Production, Gender, and the Late Prehistoric Hideworking Sequence on the High Plains of Colorado. In *Gender and Hide Production*, edited by Lisa Frink and Kathryn Weedman, pp: 13-36. Altamira Press, Walnut Creek, CA.

Gordon, Bryan C.
1996 *People of Sunlight People of Starlight. Barrenland Archaeology in the Northwest Territories of Canada*. Canadian Museum of Civilization. Mercury Series Archaeological Survey of Canada paper 154. Hull, Quebec.

Graham, Reid J.
2014 Breathing New Life into Old Records: Analysis of the Muhlbach and Stelzer Sites on the Northern Plains. Unpublished Master's Thesis, Department of Anthropology, University of Alberta, Edmonton.

Grayson, Donald K.
2006 Holocene Bison in the Great Basin, Western USA. *The Holocene* 16(6): 913-925.

Grinnell, George Bird.
1966 *When Buffalo Ran*. University of Oklahoma Press. Norman.

Gunnerson, James H.
1956 Plains-Promontory Relationships. *American Antiquity* 22(1):69-72.

Habicht Mauche, Judith
2000 Potter, Food, Hides, and Women: Labor, Production, and Exchange Across the Protohistoric Plains-Pueblo Frontier. In, *Archaeology of Regional Interaction: Religion, Warfare, and Exchange Across the American Southwest and Beyond (proceedings of the southwest symposium)* , edited by Michelle Hegmon, pp 209-231. University Press of Colorado. Boulder.

Hail, Barbara A.
2011 "To Honor Her Kindred": Women's Arts Centered in the Tipi. In, *Tipi Heritage of the Great Plains*, edited by Nancy B. Rosoff and Susan Kennedy

Zeller, pp119-140. Brooklyn Museum in association with University of Washington Press. Seattle and London.

Hale, Kenneth and David Harris, 1979, Historical linguistics and archaeology. In *Handbook of North American Indians, Volume* 9, *Southwest,* edited by A. Ortiz. Washington: Smithsonian Institution Press, pp. 170-177.

Hammer, T.J.
2002 *The Tr'ochek Archaeology Project, 2001*. Hammerstone Archaeological Consulting.

Hamza, Alyssa
2013 Cultural Difference of Archaeological Constructs: An Assessment of Projectile Point Variability From Late Middle Prehistoric Sites on the Northwest Great Plains. Unpublished Master's Thesis, Department of Geography, University of Lethbridge, Lethbridge.

Hanks Christopher C. and David L. Pokotylo
1989 Variability in Curated Lithic Technologies: An Ethnoarchaeological Case Study from the Mackenzie Basin, Northwest Territories, Canada. In, *Experiments in Lithic Technology*, edited by, Daniel S. Amick and Raymond P. Mauldin, pp:49-65. BAR International Series 528. University of Michigan.

Hansen, Emma I.
2011 The Art of Tipi Living. In, *Tipi Heritage of the Great Plains*, edited by Nancy B. Rosoff and Susan Kennedy Zeller, pp:39-56. Brooklyn Museum in association with University of Washington Press. Seattle and London.

Harp Jr., Elmer
2005 North to the Yukon Territory via the Alcan Highway in 1948: Field Notes of the Andover-Harvard Expedition. *Occasional Papers in Archaeology* No. 14. Archaeology Programme Government of Yukon. Hude Hudan Series. Yukon.

Haury, Cherie E.
1987 Vertebrate Faunal Remains from the Naze Site. In. *Archaeological Excavation at the Naze Site (32SN246)*, edited by Michael L. Gregg. Department of Anthropology, University of North Dakota. US. Department of Interior Bureau of Reclamation Missouri Basin Region, Billings MT 59103. pp. 343-385.

Hayden, Brian.
1979 Snap, Shatter, and Superfractures: Use Wear of Stone Skin Scrapers. In *Lithic Use-Wear Analysis*, edited by Brian Hayden , pp. 207-229. Academic Press, New York.

1986 Use and Misuse: The Analysis of Endscrapers. *Lithic Technology* 15(2): 65-70.

Helm, June,
1965 Bilaterality in the socio-territorial organization of the Arctic Drainage Dene. *Ethnology* 4(4):361-385.

1968, The nature of Dogrib socio-territorial groups. In *Man the Hunter*, edited by R.B. Lee and I. DeVore, pp.118-125. Chicago: Aldine.

Helm, June and Nancy O. Lurie
1961 *The Subsistence Economy of the Dogrib Indians of Lac La Martre in the Mackenzie District of the Northwest Territories*. Northern Co-ordination and Research Centre, Department of Northern Affairs and National Resources, Ottawa.

Henderson, Norman
1994 Replicating Dog Travois Travel on the Northern Plains. *Plains Anthropologist* 39(148):145-159.

Hilger, Sister M. Inez
1951 *Chippewa Child Life and its Cultural Background*. Bureau of American Ethnology, Bulletin 146. Smithsonian Institution, Washington.

1952 *Arapaho Child Life and its Cultural Background*. Bureau of American Ethnology, Bulletin 148. Smithsonian Institution, Washington, D.C.

Hodder, Ian
1982 *The Present Past: An Introduction to Anthropology for Archaeologists*. B.T. Batsford LTD. London.

1986 *Reading the Past. Current Approaches to Interpretation in Archaeology*. Cambridge University Press. Cambridge. UK.

Honigman, John J.
1949 *Culture and Ethos of Kaska Society*. Yale University Press: London.

1954 The Kaska Indians An Ethnographic Reconstruction. Yale University Press: London.

Hughes, Susan S.
1991 Division of Labour at a Besant Hunting Camp in Eastern Montana. *Plains Anthropologist*. Memoir 36 (134): 25-49

Ives, John W.
1986 A First Millennium B.C. Smudge Pit from Eaglenest Lake, Birch Mountains. Archaeological Survey of Alberta Occasional Paper No. 29. Pp. 200-

205. Edmonton.

1990 *A Theory of Northern Athapaskan Prehistory*. Westview Press, Boulder; and University of Calgary Press, Calgary.

1998 Developmental processes in the Pre-Contact History of Athapaskan, Algonquian and Numic kin systems. In *Transformations of Kinship, the Round Table: Dravidian, Iroquois and Crow-Omaha Kinship Systems*, edited by Maurice Godelier, Thomas R. Trautmann, and Franklin Tjon Sie Fat, pp. 94-139. Washington and London: Smithsonian Institution Press.

2003 Alberta, Athapaskans and Apachean Origins. In *Archaeology in Alberta: A View from the New Millennium*, edited by Jack W. Brink and John F. Dormaar, pp. 256-289. Archaeological Society of Alberta, Medicine Hat.

2010 Dene-Yeneseian, migration and prehistory. In: *Special Issue, the Dene-Yeneseian hypothesis, Anthropological Papers of the University of Alaska*. Edited by, Karie J and B Potter. Volume 5:324-334.

2014 Resolving the Promontory Culture Enigma. In *Archaeology in the Great Basin and Southwest, Papers in Honor of Don. D. Fowler*, edited by Nancy J. Parezo and Joel C. Janetski, pp.149-162.University of Utah Press, Salt Lake City.

Ives, John W., Joel C. Janetski, Duane Froese, Fiona Brock, and Christopher Bronk Ramsey
2014 A High Resolution Chronology for Steward's Promontory Culture Collections, Promontory Point, Utah. *American Antiquity* 79(4):616-637.

Ives John W., and Sally Rice
2006 Correspondences in Archaeological, Genetic, and Linguistic Evidence for Apachean History. In *Proceedings of the International Conference on Languages and Genes*, September 6-10, 2006, edited by Bernard Corie. University of California, Santa Barbara.

Ives, John W., Lindsay Johannson, Reid Graham, and Courtney Lakevold
2014 Some Preliminary Observations on Bison Hunting in the Promontory Caves. Paper presented at the Great Basin Anthropological Conference, Boise, Idaho, October 15-18, 2014.

Janes, Robert R.
1983 *Archaeological Ethnography Among Mackenzie Basin Dene, Canada*. The Arctic Institute of North America Technical Paper No. 28. University of Calgary.

Jensen, Britta J.L., Sean Pyne-O'Donnell, Gill Plunkett, Duane G. Froese, Paul D.M. Hughes, Michael Sigl, Joseph R. McConnell, Matthew J Amesbury, Paul G. Blackwell, Christel van den Bogaard, Caitlin E. Buck, Dan J. Charman, John J.

Clague, Valerie A. Hall, Johannes Koch, Helen Mackay, Gunnar Mallon, Lynsey McColl, and Jonathan R. Pilcher.
2014 Transatlantic distribution of the Alaskan White River Ash. *Geology* 42(10): 875-878.

Johansson, Lindsay D.
2013 *Promontory Culture: The Faunal Evidence*. MA Thesis. Department of Anthropology, Brigham Young University.

Johnson, Matthew
2010 *Archaeological Theory: an Introduction 2nd ed*. Blackwell Publishing ltd., West Sussex, United Kingdom.

Keeley, Lawrence H.
1980 *Experimental Determination of Stone Tool Uses: A Microwear Analysis.* edited by Karl W Butzer and Leslie G Freeman. Prehistoric Archaeology and Ecology Series. University of Chicago Press. Chicago.

Kehoe, Alice
1983 The Shackles of Tradition. In, *The Hidden Half Studies of Plains Indian Women*. edited by Patricia Albers and Beatrice Medicine, pp 29-52. University Press of America, Lanham MD.

Kehoe, Thomas F.
1957 Tipi Rings: The "Direct Ethnological" Approach applied to an archaeological problem. *American Anthropologist* 60(5):861-873.

1960 Stone Tipi Rings in North-Central Montana and the Adjacent Portion of Alberta Canada: Their Historical, Ethnological, and Archaeological Aspects. In, *Anthropological Papers No. 6*2. Bureau of American Ethnology Bulletin 173: 417-473. Smithsonian Institution, Washington, D.C.

Klokkernes, Torunn
2010 Women's Work: Skin Processing in Northern Hunter-Gatherer Settlements and the Archaeological Context. In, *Archaeological Invisibility and Forgotten Knowledge Conference Proceedings, Lodz, Poland, 5th-7th September 2007.* Edited by Karen Hardy pp144-153. BAR International Series 2183. Archaeopress. Oxford, UK.

Kluckhohn, Clyde and Dorothea Leighton
1956 *The Navaho*. Harvard University Press, Cambridge, MA.

Kluckhohn, Clyde, Dorothea Leighton, and Lucy Wales Kluckhohn
1971 *Navaho Material Culture*. The Belknap Press of Harvard University Press. Cambridge, MA.

Kornfeld, Marcel, George C. Frison, and Mary Lou Larson
2010 *Prehistoric Hunter-Gatherers of the High Plains and Rockies. 3rd Edition*. Left Coast Press Inc., Walnut Creek, CA.

Krauss, Michael E. and Victor K. Golla
1981 'Northern Athapaskan languages.' In *Handbook of North American Indians* Volume 6. Subarctic, edited by June Helm, pp.67-85. Smithsonian Institution Press, Washington.

Laubin, Reginald and Gladys
1971 *The Indian Tipi Its History, Construction, and Use*. University of Oklahoma Press, Norman.

LeBlanc, Raymond Joseph
1984 The Rat Indian Creek Site and the Late Prehistoric Period in the Interior Northern Yukon. *Archaeological Survey of Canada Paper No. 120*. National Museum of Man Mercury Series. Ottawa.

2004 *Archaeological Research in the Lesser Slave Lake Region: A Contribution to the Pre-Contact History of the Boreal Forest of Alberta*. Mercury Series Archaeology Paper 166. Canadian Museum of Civilization, Hull QC.

Leighton, Anna
1995 Traditional Hide Tanning Techniques of the Saskatchewan Woods Cree. *Papers of the Algonquian Conference* 26: 195-202. University of Michigan.

Leechman, Douglas
1954 *Vanta Kutchin*. National Parks Branch National Museum of Canada. Anthropological Series No. 33. Ottawa.

Liebmann, Matthew
2008 Introduction: The Intersections of Archaeology and Postcolonial Studies. In *Archaeology and the Postcolonial Critique*, edited by Matthew Liebmann and Uzma Rizvi, pp. 1-20. AltaMira Press, Lanham MD.

Loebel, Thomas J.
2013 Endscrapers, Use-Wear, and Early Paleoindians in Eastern North America. In *In the Eastern Fluted Point Tradition*, edited by Joseph A. M. Gingerich, pp. 315-330.

Lyons, Natasha, Peter Dawson, Matthew Walls, Donald Uluadluak, Louis Angalik, Mark Kalluak, Philip Kigusiutuak, Luke Kiniksi, Joe Karetak, and Luke Suluk.

2010 Person, Place, Memory, Thing: How Inuit Elders Are Informing Archaeological Practice in the Canadian North. *Canadian Journal of Archaeology* 34(1):1-31.

Magne, Martin P.R., and R,G.Matson
2007 *Athapaskan Migrations. The Archaeology of Eagle Lake, British Columbia*, The University of Arizona Press, Tucson, AZ.

2010 Moving On: Expanding Perspectives on Athapaskan Migration. *Canadian Journal of Archaeology* 34(2): 212-239.

Malhi R, Gonzalez-Oliver A, Schroeder KB, Kemp BM, Greenberg JA, Dobrowski SZ, Smith DG, Resendez A, Karafet T, Hammer M, Zegura S, Tatiana Brovko T.

2008. Distribution of Y chromosomes among Native North Americans: a study of Athapaskan population history. *American Journal of Physical Anthropology* 137:412–424.

Malhi RS, Mortensen HM, Eshleman JA, Kemp BM, Lorenz JG, Kaestle FA, Johnson JR, Gorodezky C, Smith DG.

2003 Native American mtDNA Prehistory in the American South- west. *American Journal of Physical Anthropology* 120:108–124

Malouf, Carling
1961 The Tipi rings of the High Plains. *American Antiquity* 26(3): 381-389.

Mandelbaum, David G.
1979 The Plains Cree An Ehthnographic, Historical, and Comparative Study. *Canadian Plains Studies* 9. Canadian Plains Research Center, University of Regina.

Marquis, Thomas B.
1973 *Cheyenne and Sioux The Reminiscences of Four Indians and A White Soldier*. ed. Ronald H. Limbaugh. Pacific Centre for Western Historical Studies. Monograph Number 3.

McClintock, Walter
1936 The Blackfoot Tipi. *The Masterkey* 10: pp. 85-96.

McClellan, Catherine.
1975 *My Old People Say. An Ethnographic Survey of Southern Yukon Territory, Part 1*. Publications in Ethnology No.6(1). National Museum of Man. Ottawa.

McConnell, Ruth
2010 The Chemistry of Hide Tanning. In, *North American Aboriginal Hide Tanning the Act of Transformation and Revival.* Morgan Baillargeon 133-139. Mercury Series No 146, Canadian Museum of Civilization Corporation. Hull, Quebec, Canada.

McFayden Clark, A.
1974 The Athapaskans: Strangers of the North An International travelling exhibition from the collection of the National Museum of Man, Canada, and the Royal Scottish Museum. National Museum of Man. National Museums of Canada. Ottawa, Canada.

Meskell, Lynn
2012 Archaeological Ethnography: Materiality, Heritage, and Hybrid Methodologies. In, *Archaeology and Anthropology Past, Present and Future*. edited by David Shankland, pp:133-144. ASA Monographs 48. Berg Publishers, London.

Monroe, C, B.M Kemp, and, D.G. Smith
2013 Exploring prehistory in the North American Southwest with mitochondrial DNA diversity exhibited by Yumans and Athapaskans. *American Journal of Physical Anthropology* 150: 618-631.

Morlan, Richard E.
1973 *The Later Prehistory of the Middle Porcupine Drainage, Northern Yukon Territory*. Mercury Series Archaeological Survey of Canada Paper No 11. National Museum of Man, Ottawa.

Muniz, Mark P.
2013 Managing Risk on the Western Plains during the Cody Complex. In *Paleoindian Lifeways of the Cody Complex,* edited by Edward J. Knell and Mark P. Muniz, pp 269-288. University of Utah Press, Salt Lake City.

Nabokov, Peter and Robert Easton
1989 *Native American Architecture*. Oxford University Press, New York.

Nelson, Richard K.
1983 *Make Prayers to the Raven: A Koyukon View of the Northern Forest*. The University of Chicago Press, Chicago and London.
Nelson, Sarah Milledge
1997 *Gender in Archaeology Analyzing Power and Prestige*. AltaMira Press, Oxford, UK.

2006 Archaeological Perspectives on Gender. In, *Handbook of Gender in Archaeology*, edited by Sarah Milledge Nelson, pp. 1-29. Altamira Press, Oxford, UK.

Neuman, Robert W.
1975 *The Sonota Complex and Associated Sites on the Northern Great Plains*. Publications in Anthropology 6. Nebraska State Historical Society, Lincoln, Nebraska.

Nicholas, David and Carol Kramer
2001 Ethnoarchaeology: Its Nature, Origins, and History. In *Ethnoarchaeology in Action*, edited by, Nicholas David and Carol Kramer, pp. 1-32. Cambridge University Press. Cambridge, UK.

O'Brien, Thomas.
2011 *Gwich'in Athabascan Implements History, Manufacture, and Usage According to Reverend David Salmon*. University of Alaska Press. Fairbanks.

Odell, George H.
2010 *Lithic Analysis.* Springer Science and Business Media Inc, New York.

Osgood, Cornelius
1966 *Ethnography of the Tanaina.* Yale University Publications in Anthropology Number16. Human Relations Area Files Press. New Haven.

1970 *Ingalik Material Culture*. Yale University Publications in Anthropoloy Number 22. Human Relations Area Files Press. New Haven.

Otelaar, Gerald A.
2003 Tipi Rings and Alberta Archaeology: A Brief Overview. In, *Archaeology in Alberta: A View from the New Millennium*, edited by Jack W. Brink and John F. Dormar, pp: 104-130.The Archaeological Society of Alberta. Medicine Hat, Alberta.

Peck, Trevor R.
2002 Archaeologically Recovered Ammonites: Evidence for Long term Continuity in Nitsitapii Ritual. *Plains Anthropologist* 47(181):147-164.

2011 *Light From Ancient Campfires: Archaeological Evidence for Native Lifeways on the Northern Plains*. Athabasca University Press. Edmonton, AB.

Potter, Brian Austin.
2005 Site structure and organization in Central Alaska: Archaeological investigations at Gerstle River. University of Fairbanks. UMI Dissertations Publishing.

Quigg, Michael J.
1978 Tipi Rings in Southern Alberta: The Lazy Dog Tipi Ring Site (FbOr-57). *Archaeological Survey of Alberta Occasional Paper No.8*. Alberta Culture Historical Resources, Edmonton.

1986 Ross Glen: A Besant Stone Circle Site in Southeastern Alberta. *Archaeological Survey of Alberta Manuscript Series No. 10.* Edmonton.

Rainey, Froelich
1939 Archaeology in Central Alaska. *Anthropological Papers of the American Museum of Natural History*. Volume 36 (4). The American Museum of Natural History. New York.

Reeves, Brian O.K.
1983 Culture Change in the Northern Plains: 1000 B.C.-A.D. 1000. *Archaeological Survey of Alberta Occasional Paper No. 20.* Alberta Culture Historical Resources Division. Edmonton.

Reher, Charles A.
1983 Analysis of Spatial Structure in Stone Circle Sites. In *From Microcosm to Macrocosm: Advances in Tipi Ring Investigation and Interpretation*, edited by Leslie B. Davis,pp.193-222. *Plains Anthropologist Memoir* 19.

1987 Documentation and Evaluation of the Muddy Creek Archeological Site Complex. Report prepared for the Bureau of Land Management Rawlins District Office, Wyoming.

Reher, Charles A. and George C. Frison.
1980 The Vore Site. *Plains Anthropologist* 25(88):1-153.

Rice, Keren
2012 Linguistic evidence regarding Apachean migration. In, *From the land of everwinter to the American Southwest. Athapaskan migrations, mobility and ethnogenesis*.,edited by, DJ Seymour, pp.249-270. University of Utah Press, Salt Lake City..

Rosoff, Nancy B.
2011 *Tipi Heritage of the Great Plains*, edited by Nancy Rosoff and Susan Kennedy Zeller. Brooklyn Museum in association with University of Washington Press. Seattle and London.

Russell , Frank
1898 *Exploration in the Far North*. University of Iowa, AMA Press. New York.

Sapir, Edward
1936 Internal Linguistic Evidence Suggestive of the Northern Origin of the Navaho. *American Anthropologist* 38:224-235.

Schiffer, Michael B.
1987 *Formation Processes of the Archaeological Record*. University of New Mexico Press. Albuquerque.

Schneider, Mary Jane
1983 Women's Work: An Examination of Women's Roles in Plains Indian Arts and Crafts. In, *The Hidden Half Studies of Plains Indian Women*. Edited by, Patricia Albers and Beatrice Medicine, pp. 101-121 University Press of America, Lanham MD.

Schultz, Jack M.
1992 The Use-Wear Generated by Processing Bison Hides. *Plains Anthropologist* 37 (141): 333-351.

Scribe, Brian
1997 *Nistam Ka-ke Askihkokechik Puskwaw-askihk: An Assessment of Besant-Sonota Pottery on the Canadian Plains*. MA thesis Department of Anthropology and Archaeology. University of Saskatchewan, Saskatoon.

Scriver, Claus
2000 Use-wear analysis of flint artefacts used for cutting roasted meat and fresh hide: a methodological problem? In, *Lithics in Action*, edited by Elizabeth A. Walker, Francis Wenban-Smith, and Frances Healy pp. 152-155. Oxbow Books, Oxford, England.

Semenov, S.A.
1974 *Prehistoric Technology*. Moonraker Press.Wiltshire, U.K.

Shinkwin, Anne D.
1979 Dakah De'nins Village and the DIxthada Site: A Contribution to Northern Athapaskan Prehistory. *Archaeological Survey of Canada Paper No. 91*. National Museum of Man Mercury Series. National Museums of Canada, Ottawa.

Siegel, Peter E.
1984 Functional Variability within an Assemblage of Endscrapers. *Lithic Technology* 13(2):35-51.

Silver, Annette
1984 Functional Analysis of the Scraper-Type Tools From Smoking Point (STD 14-3), Staten Island, New York. In. *Proceedings-Staten Island Institute of Arts and Science* 33(2): 85-105.

Simms, Stephen R.
2008 *Ancient Peoples of the Great Basin and Colorado Plateau*. Left Coast Press, Walnut Creek, CA.

Smith, David Glenn, Joseph Lorenz, Becky K. Rolfs, Robert L. Bettinger, Brian Grefguijen, Jason Eshelman, Beth Sschultz, and Ripan Malhi,
2000 Implications of the Distribution of Albumin Naskapi and Albumin Mexico for New World Prehistory. *American Journal of Physical Anthropology* 111:557–572.

Soressi, Marie, Shannon P. McPherron, Michel Lenoir, Tamara Dogandzic, Paul Goldberg, Zenobia Jacobs, Yolaine Maigrot, Naomi L. Martisius, Christopher E. Miller, William Rendu, Michael Richards, Matthew M. Skinner, Teresa E. Steele, Sahra Talamo, and Jean Texier.
2013 Neandertals made the first specialized bone tools in Europe. *Proceedings of the National Academy of Science* 110(35):14186-14190.

Spector, Janet
1993 *What This Awl Means: Feminist Archaeology at a Wahpeton Dakota Village*. Minnesota Historical Society Press. MN.

Spencer-Wood, S. M.
2005 Feminist Boundary Crossings: Challenging Androcentric Assumptions and Stereotypes about Hideworking. In *Gender and Hide Production*, edited by L. Frink and K. Weedman, pp. 197-213. AltaMira, Lanham, MD,

Speth, John D.
2013 Thoughts about Hunting: Some Things We Know and Some Things We Don't Know. *Quaternary International* 297: 176-139.

Steward, Julian
1937 *Ancient Caves of the Great Salt Lake Region*. The University of Utah Press. Salt Lake City.

Stig-Sorensen, Marie Louis
2006 Gender, Things, and Material Culture. In, *Handbook of Gender in Archaeology*, edited by Sarah Milledge Nelson, pp-105-135. AltaMira Press, Oxford UK.

Sundstrom, Linea
2008 Buffalo Gals: Images of Women in Northern Great Plains Rock Art. *American Indian Rock Art* 34: 167-79.

Swanton, John. R.
1969 *The Indians of the Southeastern United States*. Greenwood Press, Publishers. New York.

Syms, E.L.
1977 Cultural Ecology and Ecological Dynamics of the Ceramic Period in Southwestern Manitoba. *Plains Anthropologist Memoir 12* 22(76):1-160.

Theriault, Madeline Katt
2006 *Moose to Moccasins: The Story of Ka Kita Wa Pa No Kwe*. Natural Heritage Inc. Toronto,

Thompson, Judy
2013 *Women's Work Women's Art Nineteenth Century Northern Athapaskan Clothing*. Canadian Museum of Civilization. McGill-Queen's University Press. Gatineau Quebec.

Trigger, Bruce G.
2010 *A History of Archaeological Thought. 2nd Edition*. Cambridge University Press. New York.

Tyrell, J.
1911 Hearne: A Journey from the Prince of Wales Fort in Hudson's Bay to the Northern Ocean in the Years 1769, 1770, 1771, and 1772. Toronto: The Chaplain Society.

Van Gijn, Annelou
2007 The use of bone and antler tools. Two examples from the late Mesolithic in the Dutch coastal zone. In, *Bones as Tools, Current Methods and Interpretations in Worked Bone Studies*, edited by Christian Gates St. Pierre and Renee B. Walker, pp. 81-92. BAR International Series 1622. Archaeopress. Oxford, England.

Vickers, J. Roderick
1986 Alberta Plains Prehistory: A Review. *Archaeological Survey of Alberta Occasional Papers No 27.* Alberta Culture Historical Resources Division. Edmonton.

1994 Cultures of the Northwestern Plains: From the Boreal Forest Edge to Milk River. In, *Plains Indians, A.D. 500-1500*, edited by Karl H. Schlesier, pp. 3-34. Norman, University of Oklahoma Press.

Vuntut Gwitchin First Nation and Shirleen Smith
2009 *People of the Lakes. Stories of our Van Tat Gwich'in Elders/ Googwandak Nakhwach anjoo Van Tat Gwich'in.* Unversity of Alberta Press. Edmonton.

Walde, D.
2006 Sedentism and Pre-Contact Tribal Organization on the Northern Plains: Colonial Imposition or Indigenous Development? *World Archaeology* 38(2):291-310.

2013 The Bow and Cultural Complexity of the Canadian Plains. *Evolutionary Anthropology* 22:139–144.

Weedman, Kathryn
2005 Gender and Stone Tools: An Ethnographic study of the Konso and Game Hideworkers of Souhern Ethiopia. In *Gender and Hide Production*, edited byLisa Frink and Kathryn Weedman,pp. 175-196. AltaMira Walnut Creek, CA:.

2006 An Ethnoarchaeological Study of Hafting and Stone Tools among the Gamo of Southern Ethiopia. *Journal of Anthropological Method and Theory* 13(3): 188-237.

2007 Gender and Ethnoarchaeology, In. *Women in Antiquity: Theoretical Approaches to Gender and Archaeology*, edited by Sara Milledge-Nelson, pp: 217-264. AltaMira Press Plymouth, UK.

Weedman-Arthur, Kathryn
2010 Feminine Knowledge and Skill Reconsidered: Women and Flaked Stone Tools. *American Anthropologist* 112 (2):228-243.

White, John R.
1976 Ethnoarchaeology, ethnohistory, ethnographic analogy, and the direct historical approach: four methodological entities commonly misconstrued. *Conference on Historic Site Archaeology Papers* 11:98-110.

Wilson, G.
1924 The Horse and the Dog in Hidatsa Culture. *Anthropological Papers, American Museum of Natural History* 15:125-331. New York.

Wilson, Michael Clayton
1983 Test of the Stone Circle Size-Age Hypothesis: Alberta and Wyoming. In, *From Microcosm to Macrocosm: Advances in Tipi Ring Investigation and Interpretation*, *Plains Anthropologist Memoir 19* : 113-137.

Wissler, C.
1910 Material Culture of the Blackfoot Indians. *Anthropological Papers of the American Museum of Natural History* 5, Pt 1, New York.

Workman, William B., 1978. Prehistory of the Aishihik-Kluane Area, Southwest Yukon Territory. National Museum of Man, Mercury Series, *Archaeological*

Survey of Canada Paper 74. Ottawa.

Wylie, Alison
2002 *Thinking from Things: Essays in the Philosophy of Archaeology*. University of California Press, Berkeley.

Young, David, Gertrude Nicks, Ruth McConnell and Linda Suss.
1991 Birchbark Industry and Brain Tanning in the Central Canadian Subarctic. *Arctic Anthropology* 28 (1):110-123.

Zimmerman, Larry J.
2005 First, Be Humble: Working With Indigenous Peoples and Other Descendent Communities. In, *Indigenous Archaeologies: Decolonizing Theory and Practice* edited by C. Smith and H.M. Wobst, pp. 301-314, Routledge, London.