DEFINING FUR TRADE DIET IN NORTHERN ALBERTA: AN EXAMINATION OF FAUNAL MATERIAL FROM FORT VERMILION I

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ABSTRACT

This thesis presents the faunal material from Fort Vermilion I (IaQf-1), a northern Alberta fur trade site. These data, totaling 49,967 faunal elements, were used to study dietary practices at the fort. Statistical values (NISP, MNI, MAU) were combined with utility indices (MUI, SCI), historical documents, and modern butchering methods to examine species and element choice. Finally, faunal data from contemporaneous forts was presented to contextualize the differences noted in the Fort Vermilion I faunal assemblage.

The presence of “preferred” animals (moose, beaver) suggests that fur traders at Fort Vermilion I experienced a high degree of dietary choice, while the lack of less desirable animals (snowshoe hare, elk) indicate that starvation was not common at Fort Vermilion I. Specific faunal elements showed that selection patterns described historically were present at the fort. Overall, Fort Vermilion I shows an atypical dietary signature, making it unique among Northern Alberta fur trade posts.

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CHAPTER 1: PROJECT OVERVIEW

Introduction

This study focused on the analysis and subsequent interpretation of the faunal assemblage collected from Fort Vermilion I, a fur trade post located along the Peace River in northern Alberta. Originally called Le Fleur's Post at the time of its establishment in 1798, Fort Vermilion I was one of many Northwest Company (NWC) forts built along the Peace River during the early western expansion of European fur traders. The Hudson's Bay Company (HBC) and the NWC amalgamated in 1821, and Fort Vermilion I fell under the control of the re-formed HBC. The occupation of the fort by two different companies makes Fort Vermilion I unique; many forts formerly owned by the NWC were closed and abandoned after 1821. Fort Vermilion I was occupied until 1830, when it was moved to its current-day position some 65 kilometres downriver to the modern townsite of Fort Vermilion.

The original location of the fort was unknown for many years until Dr. Heinz Pyszczyk discovered the site in 1998. Excavations at the site began in 1999 and have continued intermittently for the last 20 years. The most recent excavations were carried out in 2016. The faunal assemblage collected from the site represents economic, environmental, biological, and dietary activities, yielding 43 animal species and 49,967 bones. Faunal material collected over the course of the recent excavation seasons (2004-2016) was combined with previously synthesized data to produce a holistic understanding that focusses on the dietary activities and choices made by people at Fort Vermilion I during its 32-year occupation.

Research Objectives

This research aimed to complete two main objectives: (1) build upon previous work and hypotheses put forth by Pyszczyk (2015) to achieve an in-depth understanding of the dietary practices and choices present at Fort Vermilion I through the analysis of faunal remains collected from the site, as well as through the use of historical documents; and, (2) compare faunal data from Fort Vermilion I to other fur trade forts to establish context for species, portion, and element use at Fort Vermilion I.

A foundational component of this research is the establishment of a database containing the relevant information for all faunal material collected to date from the Fort Vermilion I excavations. To achieve this, new faunal material was catalogued, identified, and then combined with old data to create a master dataset. Once complete, the data were analysed to reveal patterns associated with dietary activities the fort's inhabitants engaged in. Patterns revealed through these analyses were then compared to other fur trade forts to further define the dietary context at Fort Vermilion I. One of the shortcomings of Pyszczyk's initial research that he himself identified was the small faunal sample size, which did not allow for the establishment of well-supported inferences regarding diet and other aspects of life at Fort Vermilion I. Several hypotheses he put forward were verified using the new dataset, and new aspects of the dietary signature at Fort Vermilion I were examined.

Analytical Framework

While this research focused on the zooarchaeological record at Fort Vermilion I, a historical component was integrated within the study. The use of historical documents to inform interpretations made from the archaeological data comes with several inherent issues. First, there is the problem of bias. The journals, diaries, and fort records used in this study were written by individuals that were generally high-ranking employees of one of the major fur trade companies. Their viewpoint of the world and of life in the fur trade was a product of their background, and generally reflected a Euro-centric interpretation. Second is the issue of omission. Fort records provided generalized information regarding the movement of goods, including meat, in and out of a fort, yet information concerning specific dietary choices, preferences, or aversions are conspicuously absent. Thus, there is little data to test hypotheses regarding specific dietary choices made by individuals living in a fort environment. Finally, the most prevalent issue is the lack of data. Due to the remote locations of many northern forts, records, journals, and diaries often did not survive. The NWC was notorious for an overall lack of record keeping (Pyszczyk 2015:35). When examining a site such as Fort Vermilion I, it is understood that much of the documentary evidence of the initial NWC occupation phase simply does not exist. Zooarchaeology can therefore be used to "fill in the gaps", as well as test the veracity of historical documents. This study employed both lines of evidence to fully understand the dietary landscape present at Fort Vermilion I.

Chapter Overview

A review of previous work in both fur trade archaeology and zooarchaeology is necessary to provide context and a foundation from which to design this research project and make relevant and well-supported interpretations about the data collected. Interpretations will then be discussed, both in the context of Fort Vermilion I as a single entity, and as the data related to other northern forts.

Chapter 2

The fur trade spanned across North America and lasted for over three centuries. Chapter 2 provides specific details regarding major companies, forts, and individuals present around the time of the occupation of Fort Vermilion I. This chapter also presents the history of fur trade archaeology and zooarchaeology. These histories, as well as the combination of the two disciplines in the mid-1970s and 1980s, provided a framework that guided the analysis of the Fort Vermilion I faunal assemblage.

Chapter 3

The context of the data, field methods, and laboratory procedures are outlined in Chapter 3. Decisions regarding placement of excavation units at the site were predetermined according to the mixed sampling strategy implemented by Pyszczyk (2015). Many excavations units targeted visible ground features, such as refuse and storage pits, as well as privy pits, as these were known to contain large quantities of faunal material. The laboratory work focused on the faunal remains collected during the 2014 and 2016 excavation seasons, which represented more than half of the total faunal material collected at the site. A comprehensive cataloguing system was used to analyse collected faunal material, and several statistics and utility indices were used to better understand the composition of the faunal assemblage. Utility indices used to measure specific attributes of the assemblage are summarized in this chapter.

Chapter 4

The results of the laboratory and statistical analysis are presented in Chapter 4. Patterns present within each animal class are discussed. The quality of the data allowed for basic statistical analysis. Raw element frequency data are presented according to individual animal class, as were the quantitative results of NISP, MNI, and MAU data tests. Using the methods outlined in Chapter 3, utility indices were calculated to better understand the skeletal completeness and meat utility of each species present at Fort Vermilion I. Finally, evidence concerning various natural and cultural modifications of elements were discussed.

Chapter 5

Key aspects of the faunal assemblage, including taxa richness, element selection, skeletal completeness, and element modification are elaborated on in Chapter 5. Data presented in Chapter 4 are interpreted at the site level and then compared to similar data from other northern forts to establish whether the faunal remains recovered from Fort Vermilion I were typical or atypical of northern fur trade forts. This inter-site comparison provides a picture of dietary choices and preferences that were present at Fort Vermilion I.

Chapter 6

A summary of the key results and conclusions from this research are presented in Chapter 6. The historical and archaeological context for the study is briefly discussed, and the significant results from laboratory work, historical document analysis, statistical analysis, and comparative analysis are highlighted. Finally, future work and the overall importance of the study concludes the thesis.

CHAPTER 2: A REVIEW OF FUR TRADE HISTORY AND LITERATURE

A Historical Overview of the Fur Trade in Western Canada

The beginning of the fur trade in eastern North America, and its eventual advancement west, has been well-documented (Davidson 1918; Innis 1975; Rich 1960; Williams 1983). The NWC and HBC pushed west into the Saskatchewan, Athabasca, and Mackenzie River drainages (later Districts), which the HBC collectively designated as the Northern Department. These advancements into the Athabasca, Peace, and Mackenzie drainages were beyond the boundaries of Rupert's Land, a vast HBC-controlled expanse that covered a third of modern Canada and whose rivers drained into HudsonBay (Figure 2-1).

Figure 2-1: Map of Rupert's Land (accessed from www.rupertsland.org).

Thus, the new northwestern territories were unclaimed (by Europeans), and these areas became contested in a vicious competition for fur resources between the various companies. A review of this period of time (c.1770s–mid-1800s), outlined here, presents the companies' economic structure, people, and overall dietary choices that provided the framework and impetus for the fur trade to expand into one of the richest fur-bearing regions in the world. Pyszczyk (1987; 2015) divided this time period into (1) Early (c.1787-1821), (2) Middle (c.1822-1869), and, (3) Late (c.1870-1890) Periods which will be used to discuss pertinent historical events; however, only the Early and Middle Periods are relevant to this study.

The Movement of the Euro-Canadian Fur Trade to Western Canada and the Peace River

The expansion of the fur trade into western Canada was an inevitability as the eastern regions of the country became trapped out. The efforts of individuals such as Peter Pond, an independent American trapper who wintered in the Athabasca region in 1778, helped fur trade companies realize the potential wealth encapsulated within this vast, unexplored region. Ten years later, Charles Boyer established a post at the mouth of the Boyer River along the middle section of the Peace River and Roderick Mackenzie established the NWC's northern headquarters at Fort Chipewyan on Lake Athabasca. A period of near-monopoly held by the NWC over the northern fur trade had begun along the Peace River. The NWC had a much more aggressive approach to obtaining furs than the HBC, initiating contact with local indigenous populations in their territories, and coercing these people to trade with and hunt for them through any means necessary (Daschuk 2013:50). The NWC used often-violent techniques, including bribery, extortion, blackmail, and kidnapping. The Nor'westers, as they were colloquially known, used these methods without scruple against any group refusing to trade or already engaged in trade with the HBC (Daschuk 2013:50). Traders treated those groups that willingly traded with the NWC lavishly, doling out significant quantities of alcohol and other trade goods to encourage groups to continue trapping and trading furs. The duality and unpredictability of the NWC resulted in several significant conflicts with various northern indigenous populations as well as the encroaching HBC.

Prior to their advancement west, the HBC relied on a very different method of gathering furs than was later practiced in the Northern Department. Yet the official creation of the NWC in 1783 forced the HBC to re-examine their business model (Williams 1978:40), which had required First Nations groups to travel to Hudson's Bay to trade, as the more direct approach taken by the NWC began to affect fur returns for the HBC. In 1800, the NWC collected and shipped £144,000 worth of furs, compared to the HBC's £38,000 (Williams 1983:42). Following the NWC inland and westward, the HBC attempted to establish a significant presence in the Northern Department along the Saskatchewan, Peace, and Mackenzie Rivers. Though they were more successful in the Saskatchewan District (Pyszczyk 2015:31, Figure 5), the HBC's attempts to build trading posts and establish positive trading relations with local indigenous groups in the Athabasca District were thwarted at every turn by the NWC. Being unfamiliar with local Athapaskan-speaking groups, in addition to the reluctance of these groups to trade with the HBC, meant that Company employees were forced to fight an uphill battle to establish a foothold in the Northern Department. Thomas Swain documented a failed attempt by the HBC to establish a fort to rival the NWC along the Peace River at Boyer River in the fall of 1802 (HBCA B.224/a/1). By January 10th, 1803, Swain and his men were "*obliged to leave this place for want of a good hunter and provisions…*" (HBCA B.224/a/1:9).

The HBC established Nottingham House on the shores of Lake Athabasca in 1802 as a counter to the NWC's Fort Chipewyan, but after four years of constant sabotage from the rival Nor'westers, Peter Fidler and his men were forced to pull out of the Athabasca District completely. In 1815, one hundred HBC men were sent back into the Athabasca District to attempt to depose the NWC's monopoly. They were to establish Fort Wedderburn as a competitor of Fort Chipewyan, as well as a fort near Fort Vermilion I. A fifth of the HBC regiment perished the following winter due to severe cold and starvation, a result of continued sabotage by NWC men. It was not until the merger of the two companies in 1821 that the feuding and sabotage came to an end and the new HBC was formed under new Governor George Simpson (Pyszczyk 2015: 29).

Originally established by French-Canadian Jean Baptiste LaFleur of the NWC, Fort Vermilion I was built in 1798 during a period when the HBC presence was almost non-existent in the trade along the Peace River. Due to the distance from the regional distribution centre of Fort Chipewyan, Fort Vermilion I was one of the major trading forts along the Peace River and was nearly as important as the regions' agricultural hub at Dunvegan. As shown in Pyszczyk (2015:32, Figure 8), numerous posts built by the NWC, HBC, and XY Company vied for supremacy along the Peace River. The 1821 merger removed the need for competition, and Simpson implemented a system of regularly-spaced forts along the major rivers, resulting in the closure of many forts previously run by the NWC (Pyszczyk 2015:33, Figure 9). Thus, the lengthy occupation of Fort Vermilion I that spanned both NWC- and HBC-dominated eras of the northern fur trade makes it unique amongst Peace River forts.

Structure of Fur Trade Companies

The activities carried out at fur trade sites are tied to the structure and hierarchical composition of the major trading companies but are also heavily influenced by aspects such as gender and ethnicity. The companies differed in their implementation of their regulations and hierarchical structure which directly influenced fur-collection techniques and European-First Nations interactions.

Prager (1985) provided a comparative figure that materializes the internal structure of each company as a hierarchical pyramid (Figure 2-2). The HBC, represented as a true pyramid, features the London Committee at the peak.

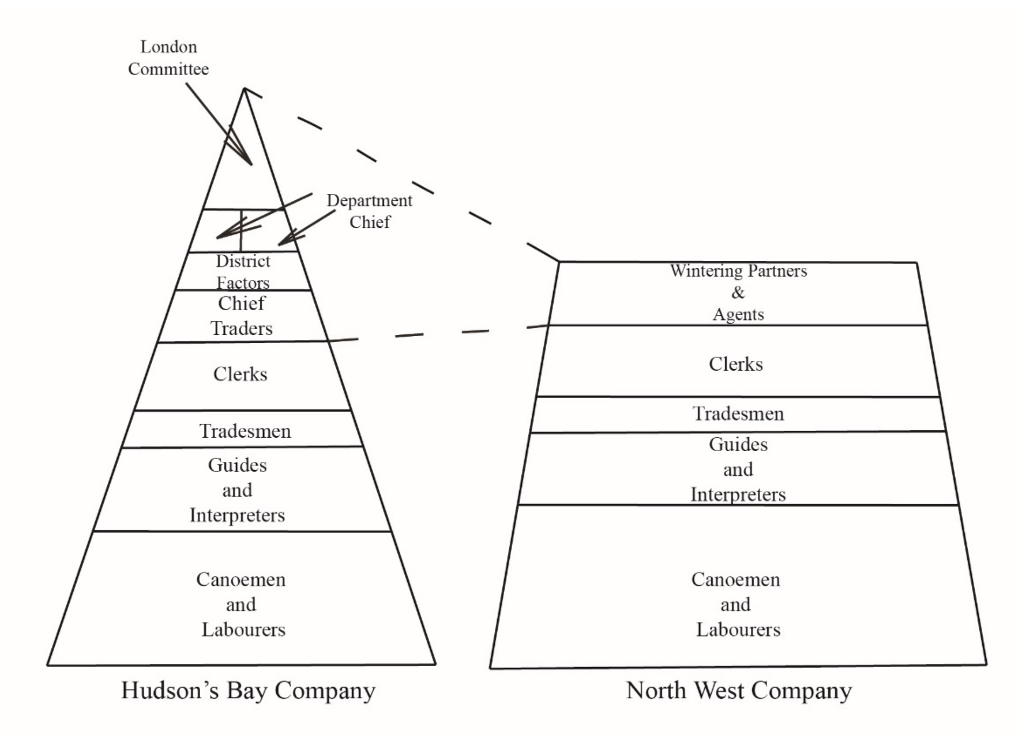

Figure 2-2: Fur trade company structure (adapted from Prager 1985).

This committee consisted of major stakeholders and policy-makers, all of whom permanently resided in London; most had never ventured across the Atlantic. These high-ranking officials possessed very little first-hand knowledge of the fur trading region from which they made their fortunes, and consequently, many of the policies regarding trading practices in Rupert’s Land were misguided and ill-suited for practical implementation. For example, the HBC had traditionally restricted the use of alcohol only for ceremonial purposes or the trading of exceptionally high-quality furs (Williams 1983:42). This practice was made obsolete once the NWC began freely distributing alcohol to indigenous groups, but due to bureaucracy and fear of losing valuable income, HBC men were not allowed to increase the alcohol allowance to HBC-friendly groups.

All other members of the HBC pyramid resided in North America, with the department factors holding the highest positions. Each fur trade district under HBC control had a principal fort which often acted as a regional distributional center. These larger centres were run and organized by the chief factors, while chief traders ran the secondary forts. The remainder of the Company employees, which made up the largest percentage of people, were engaged in the more physical tasks: 1) tradesmen, such as blacksmiths, interpreters, etc., were key members of fort populations, as they were usually the only ones with enough skill and knowledge to adequately provide the fort with essential goods such as nails, horseshoes, tools, and other utilitarian goods; 2) guides and interpreters, along with fort hunters, were constantly moving in and out of the fort, either gathering food and furs, or interacting with First Nations populations to form and secure new alliances; and, 3) canoemen and other laborers made up the majority of the labour force providing most of the manpower. These positions were the least desirable but often the most needed positions. While grueling on the body, the physical strength and endurance required to perform most tasks associated with the fur trade, especially the rowing of canoes, demanded the hardiest of men. The HBC often employed men from the Orkney Islands to fill these positions (Prager 1985:388-389).

The NWC was similarly organized, with clerks down to canoemen and labourers occupying relatively comparable percentages of the workforce. Unlike the HBC, the NWC was owned and operated by partners and agents that resided either full-time in Montreal or wintered at the principal forts, such as Alexander and Roderick Mackenzie at Fort Chipewyan. This allowed the NWC to have a more hands-on approach to fur trading and expansion, which often assisted them strategically. NWC employees had greater freedom to adapt to variable situations in the far reaches of the fur trading regions. Perhaps the greatest difference between the two companies was the economic disparity in their respective trading practices. The HBC emphasised frugal spending (of both company resources and employee incomes), while the NWC was known for their extravagance in the salaries of employees and the liberal allotment of goods to officers, as well as the many First Nations groups they traded with regularly. As shown by Pyszczyk (1987), the more direct approach taken by NWC partners was reflected in the distribution of wealth amongst employees. While all NWC employees generally had more wealth to spend, there were fewer officers controlling more of the wealth than was seen with the HBC ranks. The increased wages for lower positions were less of a reward for good work than they were an incentive to stay with the company, a suggestion that, if not followed, was quickly replaced by intimidation tactics similar to those used when trading with some indigenous populations.

Another important difference between the companies was the interactions and relations between First Nations women and European traders. Governances implemented by the London Committee forbad HBC employees from speaking to, much less engaging in intimate relationships with, women traveling with trading indigenous groups, though this did not prevent some employees from taking native wives (Brown 1980:52). NWC employees were far less restricted, as the partners of the company saw the benefits that such alliances between traders and indigenous groups could bring. Not only did native wives assist traders by manufacturing utilitarian goods, such as moccasins and snowshoes, but they were often responsible for procuring food and furs (Kirk 1980:54).

The creation of pemmican, a staple in the transport brigades' diet, was often overseen by First Nations women (Kirk 1980:56). Small game, such as hare and marten, were often trapped by women, and the creation and maintenance of fishing nets were handled by the traders' wives. Peter Fidler's Cree wife Mary was solely responsible for saving the English at Ile a le Crosse in 1810 as she was the only one who could mend the fishing nets, which were used to acquire the only source of food that winter (Kirk 1980:58). Given the important role indigenous women played in the procurement, processing, and in some cases, cooking of food, it can be assumed that a fort faunal assemblage would have been heavily influenced by these individuals.

Health and Welfare of Fort Populations in the Peace River Region

While health and welfare of fort populations are not explored in this study, they are important indicators of adequate diet and caloric intake. Therefore, a brief overview of general health trends in the region of Fort Vermilion I is provided for context and connection to the faunal assemblage.

Data regarding a specific populations' health and welfare are often difficult to obtain in the archaeological record, especially when those data do not include human remains. Historical documents in the form of personal journals and official reports slightly mitigate this issue. These documents generally give anecdotal accounts of health and wellness within a fort, rather than objective, analytical records. In addition, forts established by different companies have varying degrees of complete records. The HBC kept detailed records, many of which have survived to this day. The NWC was notorious for their inadequate record keeping. The only records for the NWC occupation of Fort Vermilion I comes from Thomas Swain's 1802-1803 journals, who, as an HBC employee, did not have intimate knowledge of the day-to-day activities of the fort. In the case of Fort Vermilion I, all population data found in historic documents comes from the post-1821 occupation when it was taken over by the HBC. Despite the difficulties that arise with using historic documentation, Pyszczyk (2015:59) pointed out that each fort (or data from several forts) represent regional population trends. Though minor idiosyncrasies existed, forts were populated and organized in much the same way, regardless of company affiliation. Therefore, given adequate data, a regional model of fort population and organization should be able to be formed using historical data from a handful of forts.

The journals and fort records from Fort Vermilion I and other important forts, such as Fort Chipewyan, provide information about the fort populations, as well as the indigenous groups that Company people interacted with. Regional populations of First Nations groups along the Peace River during the occupation of Fort Vermilion I after 1821 included the Beaver (Dunneza), Slave, Saulteaux, Chipewyan, and Cree. Some Iroquois populations moved into the area with the arrival of the NWC in the late 1700s, and Dene, or Dene tha', from the Northwest Territories were also known to travel south to the Peace River region. As Metis populations emerging from European-First Nations intermarriages were initially a part of the various companies' workforces, they eventually became a distinct ethnic group. These groups, save for the Cree, are listed as interacting with, and in some cases living among, the European traders that made up most of the fort's population (HBCA B.224/a/3). Pyszczyk (2015:60-61) combined demographic data found in the Fort Vermilion I and Dunvegan journals to study the population trends of First Nations communities that existed in the Peace River Region. These historic documents revealed that among all First Nations populations, adult women were more numerous than adult men[1]; yet this trend is reversed in the child population.[2] This was largely due to the common practice of female infanticide, which, according to several accounts from First Nations women, was to spare young girls the hardships of life; on the other hand, young boys grew up to be hunters, and were, therefore, more valuable for the community (Helm 2000:194). Population trends skewed towards male children also existed among the Metis and Iroquois (Pyszczyk 2015:61).

While scattered accounts of outside First Nations populations exist in these journals, more data are available for the permanent residents of the forts. Only three years of demographic data exist for Fort Vermilion I from the HBC occupation, but based on these records, an average of 30 people lived at the fort during this time.[3] This number includes men, women, and children, with marriages occurring between white traders and First Nations or Metis women. One stark contrast between the outside First Nations populations and those living within the fort is the number of female to male children: Fort Vermilion

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[1] The 1827-28 records from Fort Vermilion and Dunvegan list higher numbers of adult females in First Nations populations, most notably in the Beaver Indian populations (61 females to 46 males in Fort Vermilion population; 89 females to 50 males in Dunvegan population).
[2] Records from 1827-28 describe Beaver Indian populations; 68 males versus 50 females in Fort Vermilion population, and 83 males versus 62 females in Dunvegan population.
[3] Records from Fort Vermilion show population changes; 1822-23: 30 people; 1826-27: 23 people; 1827-28: 36 people.

I's population had higher numbers of female children.[4] Pyszczyk (2015:63) compared the Fort Vermilion I data to Dunvegan, which has a more complete population record, and found the demographic information was similar. Using the Dunvegan data as a model, it can be assumed that Fort Vermilion I had a much higher population during the NWC occupation, as the NWC forts were generally more highly populated than HBC forts at the time. Pyszczyk (1987:23) has shown that there is a positive relationship both between fort size and population to the number of First Nations groups trading at the fort; essentially, the more productive a fort was, the larger it became, both in size and population. Thus, given that NWC forts generally had larger populations than HBC forts, it can be assumed that NWC forts received larger numbers of First Nations traders. Consequently, as population declined with the HBC takeover, it is possible that First Nations populations at the fort also decline. This population shift is potentially observable in the archaeological record at Fort Vermilion I, but was not examined in this project

Pyszczyk (2015:69-77) used the historic records to define standards of living for the occupants of the fort, and to determine potential trends in individual health. The fur trade was known for difficult working conditions, lack of medical care, and infectious diseases, in addition to a diet that was often one of extremes. As discussed by Helm (1993) in her examination of Peter Fidler's journey with a band of Chipewyan Indians in 1791-92, life in the boreal forest often demanded a "feast or famine" style of eating. Given these circumstances it seems conceivable that employment at a remote inland fort would have a negative impact on lifespan and population longevity. Pyszczyk (2015:72) examined the life span of the individuals who lived at Fort Vermilion, determining that the average age

[4] Fort Vermilion records from 1827-28 show 6 female children and only 2 male children.

of death was around 67 years. While this age is slightly lower than the averages of forts from the rest of the Athabasca District (age of death of 72), as well as the Saskatchewan and MacKenzie River Districts (age of death of 74 and 70 respectively), the difference was found to be statistically insignificant. Numerous factors were considered as contributors to early mortality, such as occupation, ethnicity, and length of service; none of the factors used were found to contribute in a statistically significant way to mortality (Pyszczyk 2015:74-77). Given that historical documentation is lacking, data regarding specific health-related factors are often difficult to obtain. However, the few years of data gathered from Fort Vermilion I, when compared to other fur trade forts, show similar trends in life span. Further studies into fur trade populations will benefit from these preliminary findings, but, as suggested by Pyszczyk (2015:81), they need to delve further into demographic issues, as there are few bodies of literature on the subject.

Fur Trade Diet

Fur trade employees brought hundreds of pounds of goods from eastern Canada and Hudson's Bay with them each autumn as they travelled back to their respective fur trading areas. These goods were unavailable inland and, when stored at forts, acted as supplementary foodstuffs that may have offset poor hunting and gathering seasons. Among the most important of these goods were flour, sugar, tea, and tobacco. In addition to the imported goods, per recommendations from the heads of the respective companies, both HBC and NWC employees were also strongly encouraged to produce "country goods". These goods were locally grown and hunted foods and products (rope, etc.) that did not require storage and transportation from eastern Canada and Europe. This mandate was reinforced by Governor George Simpson in 1821 (Innis 1975:285), and in the Northern

Department especially, he quickly reorganized trade practices. Fewer provisions and supplies were sent to the regional distribution centres as the self-sufficiency of each post became more important (Innis 1975:286).

At Fort Vermilion I, Archibald McDonald, a NWC employee, discussed the successful gardens present at the fort, having both potatoes and barley that the fort residents used to supplement their diet (McDonald 1872:14). Colin Campbell, chief trader at Fort Vermilion I after the formation of the new HBC, also mentioned the gardens, as well as the small amount of hay that was grown to keep horses at the fort (HBCA B.224/a/2). Further west along the Peace River, Fort Dunvegan was the agricultural hub of the entire region. It had extensive gardens that yielded large quantities of produce for the inhabitants of both Fort Vermilion I and Fort Chipewyan, as well as the smaller forts upriver (Holmgren 1984:179).

The locally grown vegetables, gathered fruits, and supplies provided by the Company were important to the northern fur trader's diet, but locally acquired meat and fat made up the bulk of calories consumed. In their journals explorers and traders described the animals they encountered and ate, and often emphasised taste, methods of cooking, and the time of year when species were best to eat (Appendix 1). First-hand accounts of these preferences and descriptions recorded by explorers, fur traders, and naturalists are summarized in Appendix 1. Each animal mentioned in the various journals was given an individual entry on a master list, which includes large and small mammals, both seasonal and local birds, and various species of fish. Dietary trends and preferences present in the northern fur trade are apparent, as discussed below. Additionally, as many of the explorers travelled with various indigenous populations, the historic accounts also often mention indigenous dietary preferences and practices. Fort populations had frequent encounters with indigenous groups, and often relied heavily on the animals' portions traded to the forts (Colpitts 2007). These interactions perpetuated a cycle of sharing that entwined Europeans traders with First Nations groups. This not only secured a means of survival for the fur traders, but often meant that a section of meat traded to the fort came with unspoken assumption of reciprocity should the trading group ever need assistance (Colpitts 2007).

In the Northern Department, large game animals such as moose, caribou, wood bison, and elk were the most preferred meat sources, as these animals were large enough to provide meat for many people, and fur traders frequently salted and stored excess meat in cold cellars. In addition to the utility of such large sources of food, fur traders prized most of the large game animals for the taste of their fat and, subsequently, their meat. Along the Peace River, moose and wood bison were the most commonly hunted big game, and both David Thompson (1916) and Samuel Hearne (1911) praised the deliciousness of each animal. Further north, in the Mackenzie District, caribou, especially Barren-ground caribou (*Rangifer tarandus groenlandicus*), was the preferred meat; Hearne, Thompson, and John Richardson all wrote of its "*superior taste*", far exceeding even bison and moose. Of all the large game present in the Mackenzie and Athabasca Districts, elk was perhaps the least preferred. Hearne provided a vivid description of the repugnant effect elk fat had on the palate, and other journals echo his opinion of elk being inferior to other large game: "*their flesh is tolerable eating; but the fat is as hard as tallow, and if eaten as hot as possible, will yet chill in so short a time, that it clogs the teeth, and sticks to the roof of the mouth*" (Hearne 1911:337). Large game populations had the additional benefit of remaining relatively stable compared to smaller game mammals.

Though large game made up the majority of meat consumed daily by fort populations, small game, often including the species specifically targeted by the fur traders for their pelts, was also eaten. Snowshoe or varying hare (*Lepus americanus*) was the most important of the small game animals when large ungulates could not be hunted, as their populations were vast and trapping them was relatively easy. In lean times, hare often made up a significant portion of an individual's diet. This is evident at Fort D'Epinette/Fort St. John's, where the faunal assemblage contained an unusually high number of snowshoe hare remains, suggesting that the fort population suffered a period of dietary stress (Burley et al. 1996:135). Unfortunately, when the hare populations also declined, many people starved to death. Daschuk (2013:53) cites Willard Wentzel's letter to Roderick Mackenzie where he states such an occurrence took place in the winter of 1810 in the Athabasca District. Additionally, a heavy reliance on snowshoe hare could cause "rabbit starvation" and were therefore considered as a 'starvation' food only by many Europeans. As described by Stefansson (1913:27-28), rabbit starvation occurred to*"…any one…compelled in winter to live for a period of several weeks on lean meat,* [they] *will actually starve, in this sense: that there are lacking from his diet certain necessary elements, notably fat, and it makes no difference how much he eats, he will be hungry at the end of each meal, and eventually he will lose his strength or become actually ill."*

Beaver and porcupine were highly prized; the beaver for both its pelt and meat, the porcupine simply for its meat. Hearne (1911:357) stated that, *"the flesh of the porcupine is very delicious, and so much esteemed by the Indians, that they think it the greatest luxury that their country affords."* As with the hare, beaver was considered tastiest in the fall and winter when it was fat. It is not hard to imagine that with the huge numbers of beaver being brought to various forts for fur processing, the remaining carcasses made up a significant portion of the meat consumed during the harsh northern winters. According to Hearne (1911:246), *"In Winter they* [beavers] *are very fat and delicious…very poor during the*

Summer season, at which time their flesh is but indifferent eating…" Thompson (1968:199) echoed these comments: *"His meat is agreeable to most although fat and oily; the tail is a delicacy."*

Of all the small game animals discussed in the various journals, only two animals seem to have been off-limits in terms of consumption: the red fox (*Vulpes vulpes)* and the wolverine (*Gulo gulo*) (Hearne 1911:255). These animals were not eaten by the European traders or the various First Nations populations that the traders interacted with. According to Hearne (1911:255), the Chipewyan only ate these animals when they were "*in the greatest distress, and then merely to save life*". This occurred in at least one occasion as recorded by Peter Fidler in the winter of 1791. He described the consumption of a wolverine as a last resort after a period of several weeks with little to no food. Fidler (1934:526) wrote, *"…we snapped [it] up before it was well warm thro – a delicious morsel!!! but what cannot hungar do?*"

While mammals were key to the survival of fur traders, huge seasonal migrations of waterfowl also contributed to the diet of many fort populations. Contained within the Athabasca District is Lake Athabasca, an area where several forts belonging to both the NWC and HBC operated in period of intense competition before their amalgamation in 1821. Additionally, it was home to one of the largest gatherings of migratory game birds in North America. As such, vast populations of ducks, geese, swans, cranes, and other birds were present along the lakeshore and down the Peace River during certain times of the year, allowing fur traders to complement their diet of game mammals and local game birds, such as grouse and ptarmigan, with seasonal fowl. As Table 2-1 indicates, seasonal game birds, especially the ducks, varied greatly in their taste and, therefore, their desirability. For example, Hearne (1911:409-410) wrote that both the green-winged teal and the American widgeon were excellent eating. Yet the king eider and American black duck were considered "*by no means good*" but had "*not disagreeable*" eggs (Hearne 1911:408). The common merganser, according to Major William Ross King (1866:239) had "*no culinary qualifications, the flesh being lean and fishy*". The larger geese and swans were much more consistent in taste and were more highly desired due to the larger quantity of meat provided by a single bird.

As was the case in the diversity of mammal species consumed, various types of non-migratory birds were also consumed by the fur traders and indigenous populations of the Peace River region. Everything from grouse and ptarmigan, which were trapped year-round and considered good eating, to raptors were consumed. The latter group included bald eagles and several species of owl. Some of these taxa, such as the bald eagle and northern hawk owl, were typically only consumed by First Nations; others, such as the snowy and great-horned owls, were considered good eating by both Europeans and First Nations.

In addition to the birds and animals consumed, traders and First Nations alike relied heavily on fish for food during the winters. For forts in the Athabasca District, whitefish made up most of the caught fish. This was an important species as the traders consumed it and used it for food to feed the fort dogs. It was *"…a rich, agreeable, and very wholesome fish, that never palls the appetite; and* [was] *preferable, even when lean, for a daily article of diet, to any other fish of this country"* (Richardson 1836:519). At Fort Chipewyan, lake trout and lake sturgeon were more common, though never caught in as high numbers as the whitefish. Pike were also caught and were very highly regarded by both Thompson and Philip Turnor (Table 2-2).

Though preference, at least in times of plenty, seems to have played a role in the choice of species eaten by inhabitants of the forts, environmental conditions also affected animal populations and their availability. Severe winters affected large and small mammal populations, and subsequently many traders often faced a dearth of hunted game. The winter of 1810 was intensely cold, and due to the massive decline in the hare population, many traders in the Athabasca District starved, and 75% of the "Christian" population at the Mackenzie River Post died from starvation (Daschuk 2013:53). Diseases, such as the "great distemper" were noted amongst beaver populations near Edmonton House by George Sutherland in 1796 (Daschuk 2013:48), or the possible outbreak of anthrax and bovine brucellosis within herds of wood bison near Fort Chipewyan (Ferguson and Laviolette 1992:47-48), also played a role in determining animal population densities.

Table 2-1, Table 2-2, and Appendix 1 show a marked diversity in the species consumed by both European traders and indigenous populations that is noted in the historic journals, with only a few animals regarded as unfit to eat . This diversity was also reflected between the various European populations, even within small populations. For example, at Fort Enterprise, Sir John Franklin (1969), a British officer, described himself as having "too fastidious taste" when offered raw marrow from the hind legs of caribou, which was a great delicacy to the First Nations hunters and French voyageurs. Hearne (1911:351), also a British HBC officer, described an instance where his Chipewyan companions caught two skunks and promptly made a meal of them, a meal that Hearne himself refused to partake in. However, in times of dietary stress, it is likely that even those animals that were deemed unfit to eat would have been consumed in order to stave off death from starvation.

Table 2-1: Historic descriptions of the taste of various game birds.

Taxonomic Name	Remarks	Author
Melanitta americana	"The Scoters…are rank and oily in flavour, and almost uneatable when killed. So strong is the flesh of the common [American] Scoter that Yarrell says it is allowed by the Roman Catholics to be eaten in Lent, as being so completely identified with fish." [1]	[1] William Ross King (1860:232)
Melanitta fusca		
Melanitta perspicillata		
Cygnus columbianus	"…the eggs of the larger species [Trumpeter Swan] are so big, that one of them is a sufficient meal for a moderate man, without bread or any other addition…The flesh of both are excellent eating, and when roasted, is equal in flavour to young heifer-beef, and the cygnets are very delicate." [1] "...when fat they are good eating, but when poor the flesh is hard and dry." [2] "...the carcase [of the Trumpeter] even after undergoing that operation [skinning] is very good to eat, being nearly equal to that of a goose." [3]	[1] Samuel Hearne (1911:399) [2] David Thompson's Narrative (1968:64) [3] John Richardson (1836:512)
Cygnus buccinator		

Pyszczyk (2015:366) reflected that survival often forced the discarding of previous food preferences, instead requiring the hunting and eating of whatever was available. Increased diversity of species within the faunal record often marks these starvation periods (Pyszczyk 2015:366).

Table 2-2: Historic description of the taste of fish.

Taxonomic Name	Remarks	Author
Essox lucius	"They are as rich as meat." [1] "…is very good when made into a kind of forcemeat balls with the inside fatt of the Moose or Buffalo…" [2]	[1] David Thompson's Narrative (1968:60) [2] Philip Turnor (1934:456)
Salvelinus namaycush	"…the fish caught alive are better than those drowned…they are very rich fish, make a nutritious broth, and pound for pound are equal to good beef." [1] "…some of them are very good [though] they do not eat well after they have been froze a few days [as they] have a strong oily flavour." [2]	[1] David Thompson's Narrative (1968:158) [2] Philip Turnor (1934:441)
Coregonus clupeaformis	"They are delicate eating; being nearly as firm as a perch, and generally very fat." [1] "It is a rich well tasted, nourishing food; but in shoal muddy Lakes it is poor and not well tasted." [2] "…a rich, agreeable, and very wholesome fish, that never palls the appetite; and is preferable, even when lean, for a daily article of diet, to any other fish of this country." [3]	[1] Samuel Hearne (1911:114) [2] David Thompson's Narrative (1968:111) [3] John Richardson (1836:519)

Historical and Fur Trade Archaeology

To understand how the facets of life in the fur trade may have affected the zooarchaeological assemblage at Fort Vermilion I, it is necessary to examine the previous work done in both zooarchaeology and fur trade archaeology. Understanding the choices made by preceding researchers and how theoretical paradigms influenced their results gives this study a strong basis from which to expand upon. The following review of relevant literature highlights the studies that this work builds from and provides an understanding of how each field has evolved over the last five decades.

The trajectory of fur trade archaeology as a discipline mirrors historical archaeology. Interest in the western fur trade was driven by a nationalist agenda to promote early Canadian history (Klimko 1994:172). Originally spurred by the implementation of the Western Fur Trade Research Program by the National Historic Parks and Sites Branch in 1968 (Karklins 1981:210), research, funding, and public interest in fur trade archaeology began to increase. Beginning with Smythe's 1968 report *Thematic Study of the Fur Trade of the Canadian West*, researchers identified and excavated numerous high-profile fur trade sites across the country during this "boom", including Nottingham House (Karklins 1983), Fort D'Epinette (Williams 1978), and Fort Dauphin (Monks, Bradford, and Roberts 1983). These excavations encouraged new research, culminating in numerous theses and dissertations which focused on specific data, such as historical artifacts, architectural features, or faunal remains. Some of these works are included in this study, including Hurlburt (1977), Janes (1974), Rick (1981), and Williams (1978). These highly specific goals allowed for the creation of baseline data for future research to build upon. It was not until the 1970s, after the release of the works of Deetz (1977), Ferguson (1977), and South (1977), that fur trade archaeologists began to shift their approaches. South's emphasis on pattern recognition by focusing on quantitative techniques resonated with new fur trade archaeologists, including Forsman and Gallo (1979) and Adams (1979), among others. A shift in research approaches was notable in the archaeological reports (Klimko 1994: Table 32). Historical materialism dominated the research approaches in the 1970s, whereas the subsequent decades saw a decline in these focuses and a drastic increase in cultural ecology and cultural materialism. This research shift was also evident in the numerous papers dealing in material culture studies and social stratification (Adams and Lunn 1985; Hamilton 1985; Monks 1985; Prager 1985; Pyszczyk 1985) presented by fur trade archaeologists at the Chacmool conference hosted by the University of Calgary.

Zooarchaeological Studies within Historical and Fur Trade Archaeology

Early historical and fur trade archaeology projects were initially focused on culture-history objectives. This focus naturally excluded examination of faunal remains, as artifacts were of primary importance. Yet much like its influence on historical archaeology, the processual paradigm influenced zooarchaeology as well. Landon (2005:2) argued that Deetz's (1977) work, among others, had a heavy influence on the inclusion of faunal analysis within historical archaeology projects. Able to provide environmental and ecological context to archaeological interpretations, zooarchaeology offered an additional lens with which to understand the archaeological record. Therefore, it is necessary to highlight several of the more important historical/fur trade zooarchaeological studies, as they provide relevant background information for this study.

As Landon (2005) outlined, much of the research carried out in the latter half of the twentieth century on diet and subsistence in historical and fur trade contexts was done in eastern Canada and the United States. Cleland's 1970 study at Fort Michilimackinac compared not only French and Native American faunal data but examined the changes between French and British diets; the fort and surrounding area was occupied by all three of these groups successively. Notable patterns include the gradual shift from fish to other wild game, and subsequently the shift from wild to domestic animals. Cleland (1970:16-17) discussed these changes, linking them to social changes between fort occupations; French peasants and working-class men constructed the fort, while British military personnel and upper-class citizens occupied the fort subsequently. Once the fort was established, the later British occupants imported larger numbers of domestic animals, thus reducing the need for wild game.

Ewen (1986) used the zooarchaeological record to identify dietary trends and highlight hierarchical status between two competing forts in Burnett County, Wisconsin. His study examined the faunal remains from an XY Company post and a Northwest Company post only 95 feet apart. After reviewing historical documentation, Ewen hypothesized that the XY post, a splinter cell of the larger, more powerful NWC, would show a higher quantity of mid- to low meat yielding skeletal elements. His hypothesis was confirmed but was based on the faunal remains recovered from the small amount of excavation done at the site. Ewen demonstrated how faunal remains, when used with historical documents, can be used to differentiate economic hierarchies, even within groups of similar ethnic origin. Finally, Martin (1991) examined French outposts and fur trade posts in the Illinois country to determine the influence interaction with indigenous populations had on forts of varying hierarchical status. While use of domestic species did not vary much between the various forts, outpost forts (those that were smaller and further away from regional distribution centres) showed a higher use of wild animals in the faunal assemblage than did the larger, more centralized forts. These studies demonstrate the benefit of using both historical documents and faunal remains to understand diet. They also highlight how faunal data can be used to gain insight into social relations, economic status, and ethnic identity.

Similar comparative faunal studies are rare in western fur trade archaeology. Mann (1991) discussed the effects of cultural processes on the faunal assemblage at Fort Dunvegan. She examined the relationship between historical documents and the faunal assemblage and assessed the veracity of the journals against the faunal samples retrieved from the site. Mann's (1991) study showed that while the faunal assemblage is useful for understanding certain aspects of diet, historical documents can shed light on dietary choices, such as pemmican or dried, boneless meat, which would not survive taphonomic processes. Therefore, both sources of information are necessary to understand the dietary habits of the occupants of fur trade posts.

Losey's (1973) analysis of the assemblage from Fort Enterprise investigated the faunal assemblage through the lens of the detailed accounts made by Franklin during his perilous exploration of the Coppermine River. The study showed that dietary preferences existed between the officers and the voyageurs as described in Franklin's journals, as the faunal remains in the two fort middens had a high degree of differentiation. Preferential choices of meat cuts and bones use are evident in the midden refuse. Based on archaeological investigations, it was determined that each building (men's quarters and officer's quarters) was exclusively associated with one of the middens, allowing for a comparison of consumption pattern between the men. This difference in diet, in turn, suggests a very rigid hierarchical structure within Franklin's crew, which is apparent in several of his journal entries (Franklin 1963:217). Losey's work shows, again, the importance of the use of both types of data (historical and archaeological) to provide a holistic view of fur trade practices.

Both Losey and Prager (1975) and Pyszczyk (1978) investigated the issue of animal population decline and its effect on various fur trade populations (Fort Edmonton, Fort George, and Fort Victoria). These studies used historical documents in the form of personal journals and fort records to contextualize the faunal assemblages at these various forts and investigated how fur traders reacted to the loss of a main source of food, namely bison (Losey and Prager 1975; Pyszczyk 1978). Use of historical documents to understand and interpret dietary choices based on preference can be seen in the work of Hurlburt's (1977) examination of faunal remains from Fort White Earth. Other western fur trade faunal studies, including Janes (1974), Rick (1981), and Williams (1978) focused on quantifying faunal data from specific forts and identifying activity areas rather than investigating the socio-cultural behavior and associated patterns responsible for creating the faunal assemblages.

Finally, Kooyman's (1981) thesis and his work on the Buffalo Lake Métis site (Kooyman 1988) examined the variability in butchering methods and preferences exhibited by Métis, Plains First Nations, and Europeans. He noted that specific portions or cuts of meat (and their related elements) could be assigned to each group based on their preferences. First Nations groups preferred the tongue, the "hump ribs" (the spinous processes of the thoracic vertebrae), the marrow (long) bones, and the ribs; Europeans were partial to cuts of meat associated with the pelvis, femur, humerus, and thoracic vertebrae/ribs; Métis preferences were somewhat similar to both groups, though were more akin to First Nations preferences (Kooyman 1988:343). Overall, the description of historical butchering practices indicated that, given an ethnically-diverse population, specific groups could be identified through the butchering variability present in the faunal assemblage.

The lack of comparative faunal studies between sites within the Western Canadian fur trade literature can be attributed to reduced funding and an increased growth within consulting archaeology. Most of the fur trade research projects in this region were carried out during the “boom” years of fur trade archaeology in the 1970s and 1980s. Unfortunately, with the rise of consulting archaeology shortly thereafter, that is, archaeological projects being conducted in response to industrial projects, fur trade archaeology experienced a swift decline. Klimko (1994:163-4) and Hamilton (1990:194) both commented on these issues, stating that the “mission orientat[ed]” goals of industry-based archaeology required that researchers focus on site location, integrity, and vulnerability of archaeological remains to the exclusion of most other theoretical investigations. In addition, consultants were required to submit reports in a cost-effective manner, leaving little time or money for additional research. Coupled with reduced funding, especially in Western Canada, the authors of many fur trade reports reverted to earlier trends; reduced interpretations, taxonomic lists, and basic activity identification. Other issues, including the lack of properly trained personnel to interpret the overwhelming amount of artifactual and faunal evidence amassed over the years only added to this problem (Klimko 1994:164).

Some researchers have gone so far as to state that zooarchaeological analyses in fur trade settings are pointless exercises, especially when attempting the recreation of social structure. Adams and Lunn (1985:371) stated that most fur trade posts had documentary evidence of goods moving in and out of the fort. Often, these documents also contained information regarding the allotment of rations to various groups of workers. Given that the workforce of the fur trade was comprised of men from various backgrounds (French-Canadian, Scottish, British, etc.) the differential treatment of certain population groups could be identified be examining the quality and quantity of rations doled out. Thus, Adams and Lunn (1985) argued that faunal analyses cannot add any information that cannot be found in the historical documents. However, forts like Fort Vermilion I, Fort George, Dunvegan, and Boyer River Post, to name a few, lack the high degree of documentation that is common in larger forts such as York Factory. Therefore, given the biased, incomplete, or even a lack of historical data, faunal analyses must be used or even supplant the traditional reliance on documentary information to understand the diet, social complexities, and organization of fur trade forts. This project provides an opportunity to "fill the gaps" present in the historical documentary record with the robust faunal data that has been collected from the fort excavations.

Pyszczyk (2015) addressed the limited historical data in his work at Fort Vermilion I. Using the faunal material collected from 1999-2001, he determined the basic characteristics of the fur traders' diet despite the scant evidence that was present in the few surviving journals from the fort. Modeling statistical approaches used by Binford (1978), Brink (2001), Grayson (1978), and Ziegler (1973), Pyszczyk successfully showed that a wide range of species were consumed at Fort Vermilion I, which was comparable to other forts in the region. Unfortunately, due to the small sample size, coupled with problems with site stratigraphy, he was unable compare the patterns of the early NWC and the later HBC occupations. Pyszczyk (2015:392) proposed that with enough research and excavation at the site, the data from Fort Vermilion I could be used to improve understanding of the dietary lifeways and compare them with other fort assemblages.

CHAPTER 3: METHODOLOGICAL FRAMEWORK

Introduction

This study builds upon previous research conducted by Dr. Heinz Pyszczyk (2000, 2002, 2015, 2016). To integrate his data and findings with this work, similar laboratory methods were employed, though the faunal analyses were significantly expanded upon. The incorporation of faunal remains from the 2014 and 2016 excavation seasons and other faunal data collected in previous years that had not been published more than doubled the initial sample used by Pyszczyk (2015). The larger faunal dataset allowed for a more thorough examination of the dietary patterns preserved at Fort Vermilion I.

Field Methods

The faunal remains used for this study were collected during the 1999, 2000, 2001, 2004, 2009, 2013, 2014, and 2016 excavation seasons at Fort Vermilion I. This assemblage was recovered from 139 units dug over the course of these field seasons (Figure 3-1). Standard 1 m x 1 m units were positioned across the site, with some smaller (50 cm x 50 cm) and larger (50 cm x 2 m) used to examine architectural remains present at the site, and additional random units were excavated to further cover all areas of the site (Pyszczyk 2015:404-405). Data collection methods remained the same no matter the unit size; excavators recorded bone and artifact proveniences within each 5 cm stratigraphic layer, and recorded structures and features with both plan view drawings and digital photographs. Units were excavated using a 5 cm perimeter baulk to ensure a strict control of the stratigraphy present at Fort Vermilion I. Due to the complex stratigraphy, units were excavated in 5 cm levels, which allowed control over the vertical separation of artifacts and faunal remains.

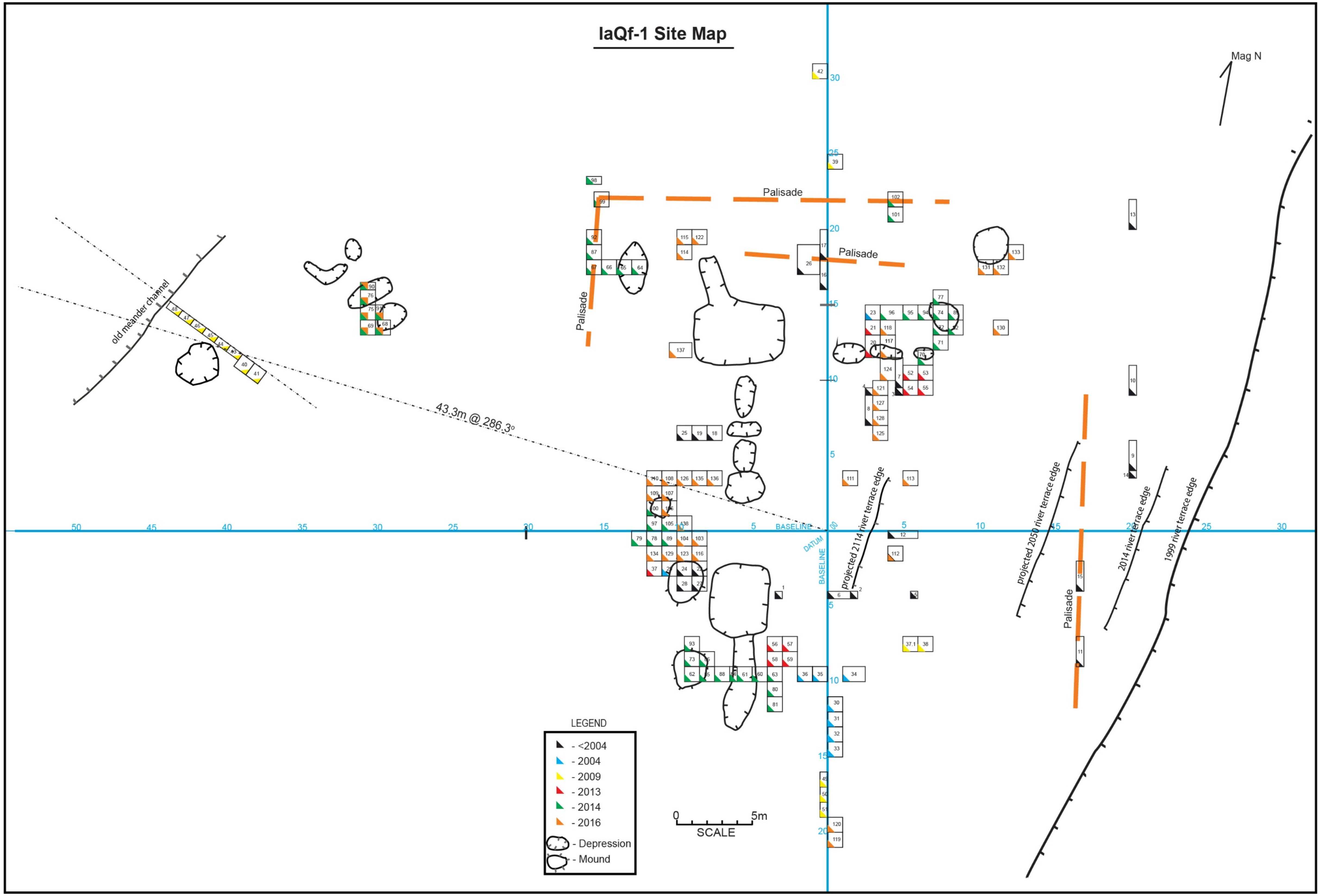

Figure 3-1: Site map of Fort Vermilion I (IaQf-1), modified from Pyszczyk (April 2018).

In some cases, more detailed horizontal separation of features and artifacts involved dividing them into units based on specific features (e.g. palisade footer trench fill). Cultural remains were concentrated at ~ 40 cm, 50 cm, 60 cm, and 70 cm below datum, but these occupation layers are not consistent across the site (Pyszczyk 2015:94-95). Excavated units generally contained some but rarely all these layers, making it impossible for previous studies to define separable occupation phases of Fort Vermilion I. Excavators screened all matrix, separating material in features and structural elements from that found in a non-specific context within each level. Faunal material was collected both from the screening process and in situ from deposits of sheet middens, hearths, refuse pits, and in and outside of architectural features, yielding a faunal sample of 49,967 bones used to examine the dietary habits of the fort's occupants (Figure 3-2, 3-3, 3-4).

Figure 3-2: In-situ faunal material in Unit 115, Level 11 near north palisade wall.

Figure 3-3: Moose scapulae in Unit 76, Level 15.

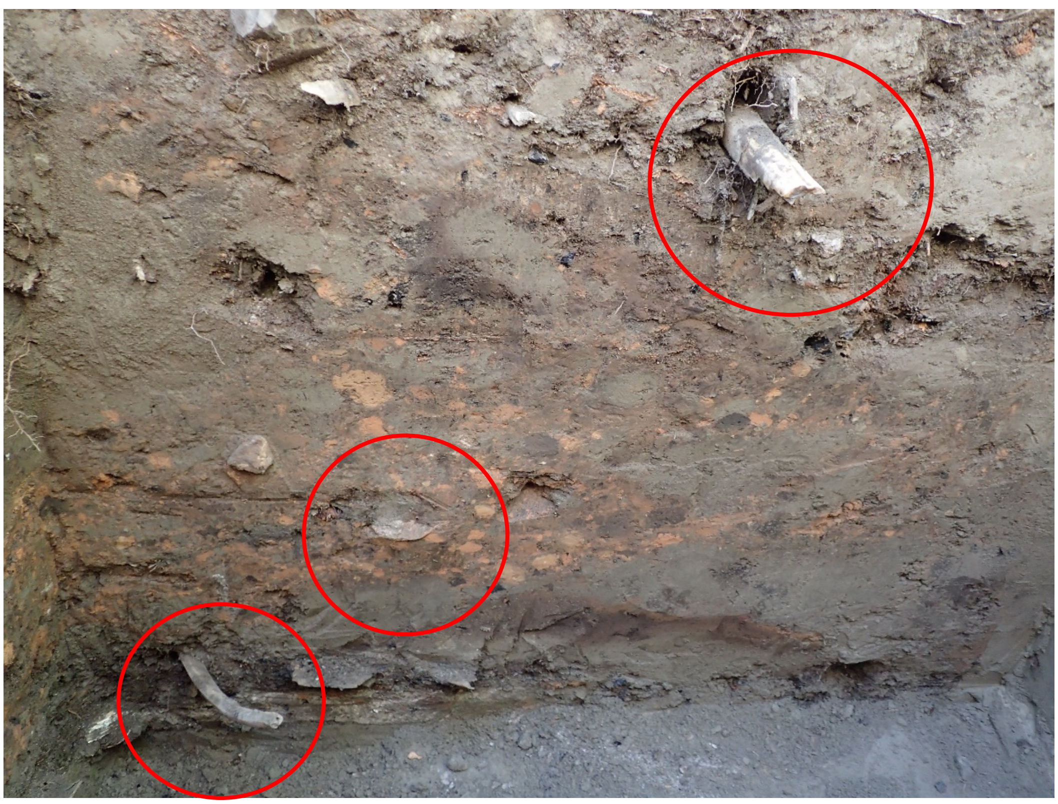

Figure 3-4: Faunal material within a refuse pit (red circles), Unit 117, East wall.

Laboratory Methods

All faunal remains recovered during the 2014 and 2016 excavations were cleaned and catalogued at the University of Lethbridge. Bones were dried, if necessary, and were then dry-brushed and sorted according to the category of each fragment. The classification categories used to catalogue the previously recovered faunal material (1999-2013) were adopted for the 2014 and 2016 bones, with the addition and refinement of several classification categories discussed below. Separate catalogue numbers were assigned to each individual fragment or whole bone. Unit provenience for each bone was recorded, as well as a specific northing and easting within each unit for those remains that were recorded in situ. Unit coordinates, as well as unit level numbers and depths, were determined in relation to a central site datum. Faunal elements recorded in situ included a centimetre-specific depth while screened elements were assigned a minimum and maximum level depth. Each identifiable bone was given an element designation as well as a Bone Unit (BU) as defined by Brumley (2011). Those fragments that could not be given an element designation or BU were classified as either a long bone fragment (LBF) or an unidentifiable bone fragment (UID). Finally, bones were weighed, individually for identifiable elements, and by group for broader categories (LBF, UID, etc.) (Appendix V).

Positive identification of both element and species was obtained using comparative skeletal collections at the University of Lethbridge and the University of Calgary, as well as zooarchaeological identification manuals (Cannon 1987; Elbroch 2006; Gilbert 1990; Gilbert, Martin and Savage 1996). The use of comparative collections was necessary to identify the wide range of taxa present within the Fort Vermilion I assemblage, as several specimens present in the assemblage are rarely found at archaeological sites. Taxonomic information for identified specimens was standardized using the Integrated Taxonomic

Information System (ITIS) website (itis.gov, accessed 2018). Recognizable bone elements not identifiable to the species-level were minimally given an order or family designation. Beisaw's (2013:120) size classes were used for animals that could not be identified to the order/family level (Sm. Mammal, Lg. Mammal, Lg. Aves, etc.). In the absence of any indicators relating to size, Beisaw's (2013:19) class groups (Mammal, Aves, Teleostei, etc.), were used. UID and LBF pieces fell into this classification level. This allowed these bones to be used in broad comparisons of large and small prey animals present at the site. Any natural (gnaw/bite marks or pathologies) and cultural (cut/saw marks, spiral fractures, and evidence of burning) modifications to bone were also recorded. It should be noted that while saw marks and axe cuts are clear indicators of butchering meat and processing bone for consumption, cut marks on certain bones, especially shallow knife cuts, may indicate fur removal rather than butchering practices. This is complicated by the fact that many of the animals that were trapped for furs were also used as a source of food (Hearne 1911; Appendix 1). Therefore, while it was useful to document which animals clearly showed cut marks, it was necessary to separate those with axe cuts from those that showed only knife cuts. Data from units #40-41, and #43-48 were not used in this analysis, as they were excavated far outside the confines of the fort, and very few faunal remains were recovered from these units.

All initial cataloguing was completed manually on physical catalogue sheets (Appendix IV); a database containing all catalogued faunal remains from Fort Vermilion I to date was then constructed in Microsoft Access to allow combine the new and old data. Ringrose's (1993:123) five stages of the taphonomic history of recovered bones were used as an analytical framework for the Fort Vermilion I assemblage. It states that the "Sample Assemblage" is essentially a "sample of a sample of a sample". This assumption dictates that the use of multiple simple analyses (NISP, MNI, MAU, etc.) are essential to verify any results. Thus, investigations of the combined faunal data ascertained the number of identified specimens (NISP), the minimum number of individuals (MNI), and the minimum anatomical units (MAU). To determine NISP, MNI, and MAU several amendments were made to the data: (1) fish scales were not fully counted for fish NISP as this would have severely misrepresented these taxa. A count of one was instead given for scales as they were technically “identifiable”; and, (2) all taxa that were deemed uncertain (ex. *Castor canadensis?* instead of *Castor canadensis*) were combined with the positively identified species for NISP, MNI, and MAU calculations. This allowed for a more refined comparison of data to be undertaken between and within species.

This study followed White’s (1953:397) method of defining MNI, with the addition of age to further refine the separation of left and right elements. There were no attempts to match potentially paired elements despite the argument made by Fieller and Turner (1982) that not doing so will result in a skewed MNI. This study followed White’s (1953:397) suggestion that the time expended to potentially match paired elements would likely only yield in a “small return”. Grayson (1979) cautioned against using MNI as an abundance measure, as absolute abundance is often dependant on aggregation methods used when analyzing faunal assemblages. Using MNI as an ordinal measure, as this study does, mitigates Grayson’s (1979) concerns. MAU was determined based on element portions present in the data. The data were then investigated with methods previously applied by Pyszczyk (2015:311-392). These analyses included: (1) using the usable meat index (MUI) pioneered by White (1953) to establish the percentage of usable meat from a given animal based on live weight; and (2) calculating the skeletal completeness index (SCI) outlined by

Ziegler (1972) for all identified taxa to determine the degree of element selection within a given species.

Several researchers have critiqued these proposed indices. White's (1953) method used averages of animal weights regardless of seasonality or sexual dimorphism. While White (1953:397-98) did not separate species exhibiting exaggerated sexual dimorphism, such as bison, into male and female weights, researchers (Lyman 1979) have suggested that this may still create a resolution issue for certain research questions. Further concerns regarding White's method related to his generalization of usable meat percentages of meat of animals, which he based on rough estimates made by modern European and American butchers and meat packers (Lyman 1979). According to White (1953:397-98, Table 14), mammals have between 50% and 70% usable weight, and birds consistently have 70% usable weight. Stewart and Stahl (1977) attempted to create more refined conversion factors to better represent usable percentages of specific animals but they were unable to do so.

Alternatively, Betts (2000) suggested that when analyzing faunal remains from a historical context, these conversion factors should be relatively accurate, especially when used in conjunction with primary historical texts such as order lists and inventory sheets. Unfortunately, this project cannot follow Bett's recommendations as the fur traders along the Peace River did not receive shipments of domestic meat. Instead, they relied on wild game, supplemented by the occasional delivery of pemmican. In fact, based on the close interactions the Europeans had with the indigenous populations, it can be assumed that the faunal assemblage at Fort Vermilion I is a product of both First Nations and European preference and butchering practices, as mentioned in Chapter 2 (Kooyman 1988). Therefore, use of White's index for determining usable meat weight, accounting for averaging, should give a reasonable estimation of the useable weight of each species present at Fort Vermilion I.

In conjunction with the aforementioned indices, modern data from animal butchering literature (BC Cook Articulation Committee 2015; Figure 3-5), as well as historic butchering patterns first discussed by Kooyman (1981), were used to identify portions and quality of specific portions for artiodactyls present in the assemblage. Modern butchering cuts, portions, and elements were determined to be appropriate for the discussion of fur trade diet, as historic butchering descriptions matched modern ones quite closely (Kooyman 1988:343). Quality, as shown in Figure 3-5, is defined as tenderness of specific portions which is directly correlated to the fat content of these cuts. Cuts featuring higher quantities of fat and less connective tissue are also those deemed “most tender”, while the opposite is true for “least tender” cuts (BC Cook Articulation Committee 2015:57). Additionally, the fat associated with cuts of meat, also called intramuscular or “body” fat, is unsaturated fat. This type of fat, unlike the harder “depot-fats” that surround the internal organs, is much easier to process and digest, and is also considered “tastier” (Morin 2007:80).

While using “tenderness” to describe meat portions is somewhat arbitrary, it is relevant when examining meat portions in the context of what was being eaten by whom. As described historically, fat was often the most prized part of any animal, and if the large game animal population was, as historic journals indicate, at its zenith during the initial establishment of Fort Vermilion I, it can be expected that the choice parts (i.e. most tender, highest amount of fat) will show up in greater frequencies than the lesser cuts of meat.

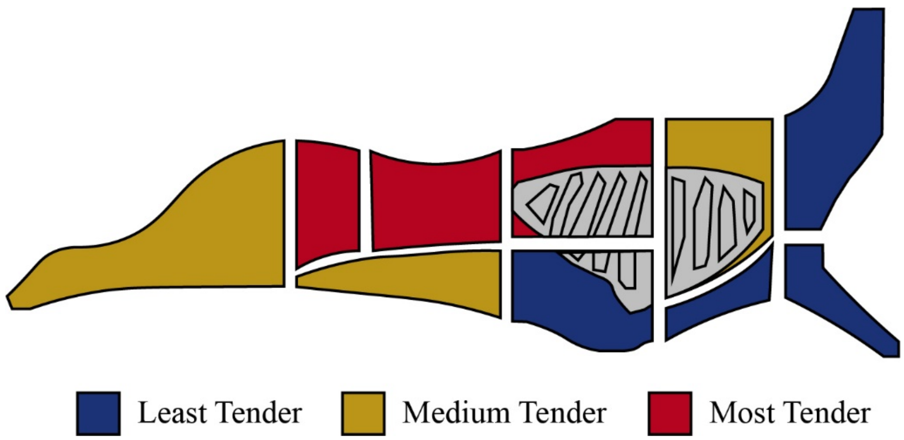

Figure 3-5: Meat tenderness guide (adapted from http://www.wapitiriver.com/images/Wapiti-Cutting-Chart_web.jpg).

As Figure 3-5 shows, the most tender cuts of meat are located along the vertebral column and pelvic area. Therefore, if taste and tenderness are important factors in choice, thoracic, lumbar, and sacral vertebra, along with proximal portions of the ribs and ilium would be present in higher proportions than other elements. Alternatively, we should see all portions being consumed in times of hardship, which are also described in the journals of many explorers, resulting in a relatively equal number of a wider variety of elements.

Dietary change at Fort Vermilion I was explored, but due to the inability to temporally separate many of the cultural levels within excavation units, the relative frequency of elements and portions of animals was difficult to adequately assess. Pyszczyk (2015) has shown that the described indices are useful and relevant to the understanding of dietary habits within Fort Vermilion I but his results were limited by the small numbers of faunal remains. This study builds upon his work, achieving a better understanding of the dietary signature of the inhabitants of Fort Vermilion I.

Other Fort Assemblages for Comparison

In order to contextualize and determine whether the Fort Vermilion I faunal assemblage is typical or atypical of late-18th and early-19th century fur trade forts in this region, and to highlight any significant differences, data sets from several other fur trade sites were needed to complete an inter-site comparative analysis. Given the location and time period of Fort Vermilion I, it was determined that forts from the same or similar ecoregion and period would contain the most suitable data for comparisons. Several challenges were encountered when choosing appropriate forts during this process. The relatively low number of excavated forts resulted in a small sample size to pull from; and the lack of suitable faunal data made this sample even smaller. Of the forts matching the search criteria, four were deemed appropriate: 1) Fort D'Epinette/St. John's Fort, 2) Fort Alexander, 3) Fort White Earth, and 4) Nottingham House. These forts were operated for varying lengths of time during the occupation of Fort Vermilion I and were, with the exception of Fort White Earth, located along boreal river systems. Fort White Earth was established along the banks of the North Saskatchewan River, and was used as a proxy for parkland/prairie forts.

The reports for the comparative sites were written in the 1970s and 1980s, thus it was expected that differences in excavation, recovery, and analytical techniques would not allow direct comparisons between the faunal datasets, as discussed in Chapter 2. Due to the inconsistent nature of faunal data from these reports, only NISP, MNI and SCI values were calculated for each of the forts. Moreover, each of these sites have population and temporal differences, as well as environmental ones. Despite these issues, the comparative approach between sites provides context for the Fort Vermilion I data. Comparing the Fort Vermilion I data to other datasets allows for regional trends to be examined. Using this approach, several key comparisons were possible between Fort Vermilion I and the other forts regarding differential use of species.

CHAPTER 4: QUANTITATIVE RESULTS OF FAUNAL ANALYSIS

Introduction

Using the quantitative methods and methodology outlined in the previous chapter, the number of identified specimens (NISP), minimum number of individuals (MNI), and minimum anatomical units (MAU) were determined for the Fort Vermilion I faunal assemblage. These data were then used to calculate the utility indices. NISP values for the entire collection are given, as well as for each identified species. MNI and MAU were calculated for each species; remains that were only identified to the genus or broader level were not included in these analyses. These species-determined quantities allow for an examination of animal, element, and portion selection at Fort Vermilion I.

Taxa Richness

The faunal assemblage consisted of bones from 43 mammal, bird, fish, and mollusk taxa (Appendix II). Of the 49,967 bones collected from Fort Vermilion I, 9,945 or ~20% were identifiable (site NISP).

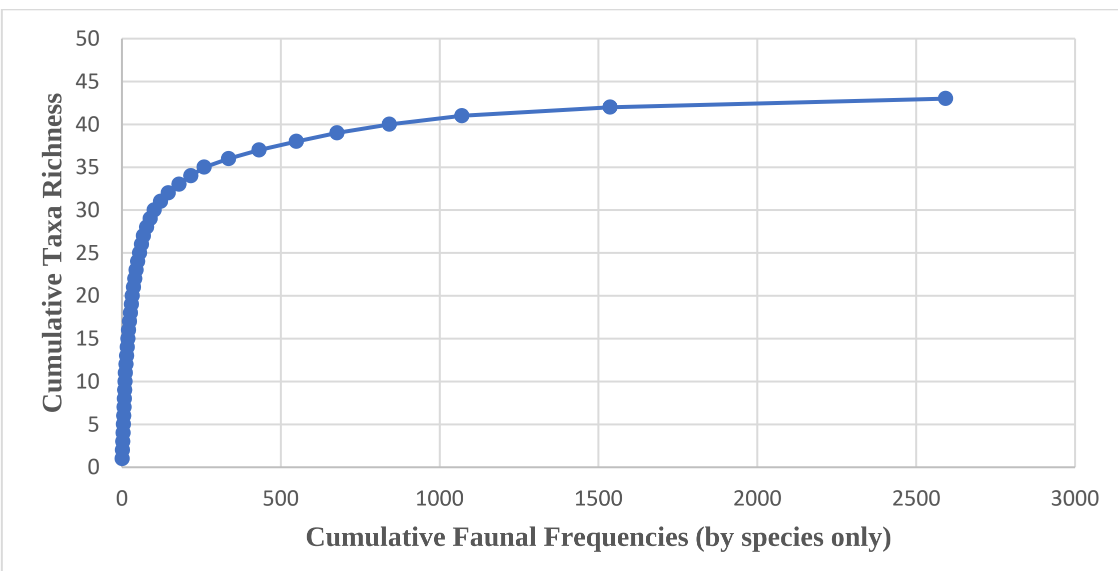

Figure 4-1: Fort Vermilion I taxa richness STR curve.

The remaining ~80% consisted of long bone fragments (LBF), bone identified as cartilage, eggshell fragments, fish scales, and unidentifiable fragments (UID). An updated sample-to-redundancy (STR) curve was created to examine the relationship between cumulative taxa richness and cumulative faunal frequencies (Figure 4-1). This STR curve shows that taxa richness is approaching a terminal limit at Fort Vermilion I, suggesting that nearly all of the taxa present at the site have been recovered (Pyszczyk 2015:356).

Density and Distribution of Faunal Remains

The faunal material recovered in 1999-2016 was analyzed by unit to determine density of remains present at Fort Vermilion I (Appendix III). The eight units excavated in the 1999 show relatively low yields, which is not surprising given that most of these units were test units, excavated either in 50 x 50 cm quarter-units or 50 cm x 2 m trenches. Units excavated in 2000 also showed low numbers of faunal remains, as Units 9-15 specifically targeted the definition of the site boundaries (i.e. finding the palisade walls that would have surrounded the fort during its occupation) which were on the fort's somewhat lesser used peripheries. An increase in faunal material collected in 2001 corresponds to the placement of excavation units over highly visible ground features, such as storage/privy pits, as was the case for Units 20 and 21 (Figure 3-1). Unit 20 was excavated over several years and yielded a high number of faunal remains. Units 30-33, which were placed in a linear fashion at the south end of the site did not yield as many remains due to the absence of significant features. Units placed in peripheral locations, such as Units 40, 41, and 43-48, yielded very low quantities of faunal material; based on the data collected from these peripheral locations at the site, it is expected that future outlying excavation units would have low yields.

The bulk of the faunal material in the collection was recovered in 2014 and 2016, totalling 34,823 or ~70%. Units featuring faunal counts over 1000 were all located inside or near large pit features, middens, or hearths. For example, 5983 bone fragments were recovered from a cooking hearth in Unit 106, excavated in 2016. Units 117 and 118 both bisected a portion of a deep refuse pit, containing 2875 and 1749 fragments respectively. Some units did not have large numbers of bone fragments but featured complete and/or articulated remains, such as those found in Units 115 and 116 located near the north end of the site, against a palisade wall, and in Units 131-133 which contained a wood-lined storage pit. Overall, the 2014 and 2016 excavation seasons, along with the faunal remains previously collected and identified, provided a robust sample for this study.

Relative Importance of Taxa

Element frequencies were calculated for all species as well as the broader taxonomic classifications (Artiodactyl, Cervidae, Lg. Mammal, Aves, etc.) as listed in Appendix II. It should be noted that in the discussion of element count, most elements are fragments (97%) rather than complete entities (3%). These data, described below, were used to examine element/species choice, cultural and/or social implications, and fort activity (Chapter 5).

Mammals

General mammal taxonomic categories (Lg. Mammal, M. Mammal, etc.) included unidentified bone (UID) and long bone fragments (LBF), which constituted nearly 80% of the entire Fort Vermilion I assemblage. Of the identifiable elements not identified to genus level, ribs, scapulae, and vertebrae fragments were most common. Small mammal pelvises and femora were the only other group that were able to be positively identified to element but not to a genus, and only included a few remains. All other elements within these broad taxonomic categories showed very low counts (<10).

Ribs were the most frequent element observed in all artiodactyl species, as well as within the broader Cervidae and Artiodactyla categories, consisting of nearly 20% of all *Alces alces* elements and ~30% of all *Bison bison* elements. All four of the large long bones (humerus, radius/ulna, femur, tibia) were also present in significant quantities, though the rear long bones showed higher quantities than the front elements. Flat bones, including the scapula and pelvis, were present in similar frequencies to long bones, as were vertebrae. The number of lumbar vertebrae in *Alces alces* was nearly twice that of thoracic and cervical vertebrae combined. While lumbar vertebrae showed the highest counts in *Bison bison*, vertebrae were more evenly represented within this species. Thoracic vertebrae were the most common in the Artiodactyla category. Given the high occurrence of ribs in this taxonomic category, which articulate with thoracic vertebrae, this is not surprising. Mandibles and hyoids were present among *Alces alces* in similar numbers, though they were very poorly represented in all other cervids and other broader taxonomic categories. The final element that occurred in any significant number in *Alces alces* were second phalanges, which were present in similar number to hyoids (*n*=10). All other elements, both in *Alces alces* and other categories belonging to large mammals, occurred in low frequencies (<10).

As with large artiodactyls, ribs were the most prevalent element in *Castor canadensis*, though they occurred in a smaller percentage (~12%). Additionally, long bones were present in high numbers, though ulnae and femora showed higher frequencies than the other long bones (Appendix II). Caudal vertebrae also occurred in high numbers. All phalanges were present in relatively high numbers, with the number of proximal phalanges nearly doubling the combined total of second and third phalanges. Flat bones, including scapulae and pelvises, occurred in similar frequencies, though there are fewer of them than the long bones. Mandibles were more prevalent than skull elements. Lumbar vertebrae, though occurring in significant numbers, were not as prevalent as caudal vertebrae. All other elements did not occur in high enough numbers to be statistically significant, especially given the extremely high NISP of *Castor.*

Very few elements of *Lepus americanus* were present in the assemblage (<10). Only tibiae and mandibles crossed the >10 threshold, with femora falling just under it. Other elements were present in low frequencies, with the majority falling below a count of five. The elements of the remaining mammal species occur at low frequencies (<5), and no discernable patterns were present in the element counts.

Birds

Few identifiable elements of very large bird species (*Branta canadensis, Cygnus buccinator, Cygnus columbianus*, and *Grus americana*) were present, making it difficult to make meaningful interpretations about element selection. Of the remains present, tibiotarsi and ulnae were most prevalent for *Cygnus columbianus*, ribs, ulnae and radii for *Branta canadensis*, and humeri for *Cygnus buccinator*, but these occured in quantities lower than 10. *Grus americana* was only represented by one ulna and one coracoid. Broader taxonomic categories of genus-level (*Cygnus*) and class-level (V.Lg. Aves) identification were most represented by LBFs and ribs. All other elements in these taxonomic categories were present in low frequencies.

Remains of other bird species, along with broader taxonomic bird categories, included LBFs and tracheal rings of unknown birds (Aves), which were the most prevalent (n=449). Other elements of significant counts were also attributed to broader taxonomic categories. The only prevalent elements identified to species were cervical vertebrae of *Anas platyrhynchos*. Other elements from the remaining bird species were present in counts of <10. It is noteworthy that the long bones (radii, ulnae, tibiotarsi, and tarsometatarsi) of *Anas platyrhynchos* occur in nearly identical quantities, and ulnae of *Anas acuta* exist in slightly higher numbers.

Fish

Fish species, as well as the broader category of Teleostei, were represented by extremely high occurrences of scales, with counts reaching into the thousands. Their presence speaks to the excellent preservation conditions of the site and the appropriate screening recovery methods. Their large numbers, however, do not account for a significant number of individuals, as there are hundreds of scales on each fish. More relevant was the high numbers of ribs for *Coregonus clupeaformis* and vertebrae for *Lota lota*. Other elements of the various fish species are present in low numbers and are mostly associated with the skull. *Hiodon alosoides* and *Coregonus clupeaformis* showed the highest frequencies of skull elements, specifically the cleithrum, opercle and hyomandibular in the former, and the preopercle and opercle in the latter. No patterns were observed among other species. Mollusks were also identified, but since they are shell fragments, nothing more can be said about their frequency.

NISP, MNI, and MAU

As mentioned in Chapter 3, NISP, MNI, and MAU were determined for each species. Additionally, MNI was determined for each age group within mammal species to provide a more accurate dataset. NISP for most taxa increased substantially from what was recorded by Pyszczyk (2015:313).

Table 4-1: Bird NISP, MNI, and MAU.

Species	**NISP**	**MNI**	**MAU**
Aix sponsa	1	1	1
Anas acuta	20	4	3
Anas acuta/Anas strepera	1	1	1
Anas americana	1	1	1
Anas clypeata	3	1	1
Anas platyrhynchos	78	4	3
Anas strepera	11	1	1
Aythya affinis	1	1	1
Bonasa umbellus	5	2	2
Branta canadensis	36	3	3
Bubo virginianus	6	1	1
Bucephala albeola	1	1	1
Cygnus buccinator	11	2	2
Cygnus columbianus	24	4	3
Falcipennis canadensis	1	1	1
Gavia immer	1	1	1
Grus americana	2	1	1
Melanitta fusca	4	1	1
Tympanuchus phasianellus	2	1	1

Apart from beaver, birds were the most frequently represented within the assemblage, consisting of 18 different species ranging from large migratory game birds to indigenous grouse. All bird bone was assumed to be adult, as no juvenile or subadult bird elements were identified. Given the lack of edible meat in young birds, coupled with their susceptibility to taphonomic processes, it is unlikely that any of the bird elements designated as an unidentified (UD) age are not adult. Despite the high number of species, the NISPs, MNIs, and MAUs were relatively low (Table 4-1). NISPs are highest amongst game birds, with mallard duck (*Anas platyrhynchos*), Canada goose (*Branta canadensis*), northern pintail (*Anas acuta*), and tundra swan (*Cygnus columbianus*) having NISPs of 20 or greater. Though these quantities are much higher than what Pyszczyk (2015:313) had documented in his analysis of the earlier assemblage, the highest MNI and MAU (*Anas platyrhynchos*) represented only three individuals. The other bird species had an MNI/MAU of either one or two. While not included in the species count, there were also four elements associated with the family Accipitridae.

Seventeen species of mammals are present in the Fort Vermilion I faunal assemblage. Mammals showed the highest overall increase in NISP from the results discussed by Pyszczyk (2015:313). Beaver (*Castor canadensis*) alone (n=1056) surpassed the total NISP for all taxa previously calculated. Moose (*Alces alces*) and bison (*Bison bison*) also have high NISPs, (*n*=467 and *n*=165 respectively). Table 4-2 shows that these three taxa, along with snowshoe hare (*Lepus americanus*), constituted the bulk of the mammal elements present in the faunal assemblage. Elk (*Cervus elaphus*) and white-tailed and mule deer (*Odocoileus virginianus* and *Odocoileus hemionus*) are not as well represented as the other artiodactyls, (NISPs of *n*=35, *n*=13, and *n*=4 respectively). The MNI and MAU also reflect the reduced presence of these cervids. All remaining mammal taxa had low NISPs, MNIs, and MAUs. Mammal MNI was also calculated based on age categories, though several species were only represented by elements that could not be specified to an age (deemed "unknown"). These elements were used in a MNI calculation separate from the other age categories. Artiodactyls, beaver, and snowshoe hare showed the greatest age ranges. Moose and beaver were the only species with an MNI for all five age categories (Table 4-2).

Table 4-2: Mammal NISP, MNI, and MAU.

Species	NISP	MNI						MAU
		MNI Total	MNI Adult	MNI Subad.	MNI Juv.	MNI Fetal	MNI UID Age	
Alces alces	471	16	6	2	2	2	4	12
Alces alces/Cervus elaphus	2	1	1					1
Bison bison	174	8	2	1	2		3	3
Canis familiaris	1	1	1					1
Canis latrans	3	1					1	1
Canis latrans/familiaris	10	1	1					1
Canis lupus	9	3			1	1	1	1
Castor canadensis	1076	34	7	4	14	1	8	29
Cervus elaphus	38	4				1	3	3
Lepus americanus	98	6	2	1	2		1	5
Lepus americanus/townsendii	3	1					1	1
Lynx canadensis	3	1	1					1
Martes americana	1	1					1	1
Martes penanti	1	1					1	1
Microtus ochrogaster	6	2					2	1
Odocoileus hemionus	4	1					1	1
Odocoileus virginianus	13	3	1		1		1	1
Ondatra zibethicus	2	1	1					1
Sciurius vulgaris	1	1					1	1
Ursus americanus	2	1			1			1

Though fish are not as numerous as birds or mammals, there were six different taxa present at Fort Vermilion I. These bones were assumed to be from adult fish, as fingerlings would not likely have been caught for food, and if they were, the softer bone and cartilage would not have survived taphonomic processes, despite the superior preservation conditions at the site. Four of the six taxa, lake whitefish (*Coregonus clupeaformis*), goldeye (*Hiodon alosoides*), burbot (*Lota lota*) and walleye (*Sander vitreus*), have high NISPs, being in the top ten of all taxa within the assemblage.

Table 4-3: Fish NISP, MNI, and MAU.

Species	**NISP**	**MNI**	**MAU**
Coregonus clupeaformis	129	6	4
Esox lucius	4	1	1
Hiodon alosoides	55	6	6
Lota lota	117	3	2
Lota lota/Salmo gairdneri	3	2	2
Prosopium williamsoni	2	1	1
Sander vitreus	42	.5	4

Four elements from northern pike (*Esox lucius*) and two elements from mountain whitefish (*Prosopium williamsoni*) were also identified (Table 4-3). As with birds and mammals, MNI and MAU for fish was low, ranging from six to one.

Few mollusks were present in the faunal assemblage, and the NISP data for both previously identified species (*Lasmigona complanata* and *Pyganodon grandis*) did not change from Pyszczyk's (2015) calculations. Several pieces of mollusk shell were recovered in the 2014 and 2016 collections, but they were unsuitable for identification; the hinge ligament, necessary for positive species identification in freshwater mollusks, was missing. Both species were assumed to be represented by adults, as they would have been large enough to warrant collection for food. Both MNI and MAU for *Pyganodon grandis* was one and one for *Lasmigona complanata* (Table 4-4).

Table 4-4: Mollusk NISP, MNI, and MAU.

Species	NISP	MNI	MAU
Lasmigona complanata	3	2	2
Pyganodon grandis	2	1	1

Utility Indices

Ziegler's (1973) Skeletal Completeness Index (SCI) was used to analyze the data, though with several modifications. Pyszczyk (2015:385) used a standardized identifiable element per species number of 110 elements, as opposed to the species-specific numbers used by Ziegler (1973). The equation was thus:

$$\frac{100 * NISP}{MNI * n = 110}$$

where NISP was number of identified species, MNI was minimum number of individuals, and n was the number of elements present in the animal. This equation was used for the analysis of artiodactyl species but was modified for all other mammals to account for the increased number of elements in the fore and hind limbs. Modified equations were also used for birds and fish. The number of elements for birds was a rough estimate, as the number of cervical vertebrae can vary widely between species. The estimated elements for fish followed the same logic, because the number of vertebrae changes with the species. The following equations were used to calculate the SCI of non-artiodactyl mammals, birds, and fish respectively:

$$\frac{100 * NISP}{MNI * n = 200} \qquad \frac{100 * NISP}{MNI * n = 100} \qquad \frac{100 * NISP}{MNI * n = 120}$$

The SCI values are noted in Tables 4-5, 4-6, and 4-7. SCI scores for bird taxa are relatively low, with all species showing less than 20% completeness. The range of SCI data followed NISP, MNI, and MAU trends, that is, species with a high NISP/MNI/MAU have a higher percentage of skeletal completion. *Anas platyrhynchos* have the highest SCI at 19.5% and also have the highest NISP of all bird species present at the site.

Table 4-5: Bird SCI with NISP.

Species	**SCI**	**NISP**
Aix sponsa	1.0	1
Anas acuta	5.0	20
Anas acuta/Anas strepera	1.0	1
Anas americana	1.0	1
Anas clypeata	3.0	3
Anas platyrhynchos	19.5	78
Anas strepera	11.0	11
Aythya affinis	1.0	1
Bonasa umbellus	2.5	5
Branta canadensis	12.0	36
Bubo virginianus	6.0	6
Bucephala albeola	1.0	1
Cygnus buccinator	5.5	11
Cygnus columbianus	6.0	24
Falcipennis canadensis	1.0	1
Gavia immer	1.0	1
Grus americana	2.0	2
Melanitta fusca	4.0	4
Tympanuchus phasianellus	2.0	2

SCI values for mammals are similar to birds in that those species with high NISP, MNI, and MAU values also showed higher SCI totals. *Alces alces, Castor canadensis, Cervus elaphus, and Lepus americanus* have the highest SCI values, which mirror the MNI results. In addition to general SCI totals by species, results of SCI calculations were broken down by age. Table 4-6 shows the breakdown of SCI by age, which does not result in the same relationship with MNI as the overall totals do. For example, the MNI of adult, subadult, and juvenile *Castor canadensis* was 7, 4, and 14 respectively. Therefore, one should expect the SCIs to be ranked, highest to lowest similarly, i.e. juvenile, adult, and then subadult. Yet the SCI totals for these age groups shows adult *Castor* as the highest, followed by juvenile, and then subadult. It is interesting that overall MNI and SCI seem to share a much closer relationship than age-related MNI and SCI do.

Table 4-6: Mammal SCI with NISP.

Species	**NISP**	**SCI**					
		SCI Total	SCI Adult	SCI Subadult	SCI Juvenile	SCI Fetal	SCI Unknown
Alces alces	471	26.8	20.5	12.7	18.6	7.7	56.8
Alces alces/Cervus elaphus	2	1.8	1.8				
Bison bison	174	19.8	10.9	1.8	3.6		42.4
Canis familiaris	1	0.5	0.5				
Canis latrans	3	1.5					1.5
Canis latrans/familiaris	10	5.0	5				
Canis lupus	9	1.5			0.5	0.5	3.5
Castor canadensis	1076	15.8	11.2	7.8	9.9	3.0	35.9
Cervus elaphus	38	8.6				0.9	11.2
Lepus americanus	98	8.2	10.3	0.5	6.5		15.0
Lepus americanus/townsendii	3	1.5					1.5
Lynx canadensis	3	1.5	1.5				
Martes americana	1	0.5					0.5
Martes penanti	1	0.5					0.5
Microtus ochrogaster	6	1.5					1.5
Odocoileus hemionus	4	3.6					3.6
Odocoileus virginianus	13	3.9	1.8		1.8		8.2
Ondatra zibethicus	2	1.0	1.0				
Sciurius vulgaris	1	0.5					0.5
Ursus americanus	2	1.0				1.0	

Several fish SCI scores are higher than all other taxa present in the Fort Vermilion I faunal assemblage (Table 4-7). This is likely indicative of the transportation of whole fish into the site and in-fort butchery. If fish were butchered (de-headed) prior to them entering the fort as food, then expected SCI scores would be low, as most of the identifiable bones in a fish are in the head.

Table 4-7: Fish SCI with NISP.

Species	**SCI**	**NISP**
Coregonus clupeaformis	35.1	129
Esox lucius	3.3	4
Hiodon alosoides	31.7	55
Lota lota	32.5	117
Lota lota/Salmo gairdneri	1.3	3
Prosopium williamsoni	1.7	2
Sander vitreus	6.8	42

In addition to the SCI, White's (1953) Meat Utility Index (MUI) was used to ordinally rank species according to the amount of meat they produced, and therefore their nutritional importance at Fort Vermilion I. Since White (1953) only provided approximate weights for adult animals, MUI calculations effectively exclude data from subadult, juvenile, and fetal animals. Bones from bird and fish taxa were assumed to be from adults, so the MUI was applicable for species within these groups. MUI results are shown in Tables 4-8, 4-9, and 4-10. The MUI data corresponds positively with NISP and MNI values previously mentioned, with moose, bison, beaver having the most available meat, and thus the most meat for fort populations. These results must be examined with caution, however, as only a handful of elements represent many of the species. Additionally, several species present in the Fort Vermilion I assemblage are not listed in these tables, due to either a lack of data regarding weight and approximate percentage of usable meat, or because only a non-adult specimen was unearthed. Mollusks were excluded because only a small number were found and the edible meat in each specimen is low compared to overall weight.

Table 4-8: Mammal MUI.

Species	MUI (kg)
Alces alces	2181.8
Bison bison	818.2
Canis familiaris	5.7
Canis latrans/familiaris	5.7
Castor canadensis	122.5
Lepus americanus	1.4
Odocoileus virginianus	45.5
Ondatra zibethicus	0.9

Table 4-9: Bird MUI.

Species	MUI (kg)
Aix sponsa	0.5
Anas acuta	2.8
Anas americana	0.6
Anas clypeata	0.8
Anas platyrhynchos	2.4
Anas strepera	0.6
Aythya affinis	0.6
Bonasa umbellus	0.4
Branta canadensis	7.6
Bubo virginianus	2.1
Bucephala albeola	0.3
Cygnus buccinator	15.9
Cygnus columbianus	9.1
Falcipennis canadensis	0.3
Gavia immer	3.7
Grus americana	5.3
Melanitta fusca	0.9
Tympanuchus phasianellus	0.6

Table 4-10: Fish MUI.

Species	MUI (kg)
Coregonus clupeaformis	8.6
Esox lucius	1.8
Hiodon alosoides	2.6
Lota lota	3.4
Prosopium williamsoni	0.0
Sander vitreus	5.6

Bone Modification

Of the total 49,967 bones collected and catalogued from Fort Vermilion I, 29,422 or ~59% of the assemblage was modified in some way. The majority of these remains are burnt/calcined, but bones featuring spiral fractures and/or cutmarks do comprise ~5% of the total assemblage. The remainder of the assemblage includes whole, unmodified bones, fish scales, and fragmented remains. Given that many of the animals entering the fort were intended for food consumption, it is not surprising that the majority of the bones collected showed some signs of modification. The significance of these modifications is presented in the following chapter.

Bone modifications were identified and catalogued in the laboratory and then divided into: (1) natural, and, (2) cultural categories. Natural modifications were limited to gnaw/puncture marks from either rodents or carnivores. Cultural modifications, for the purposes of this project, include spiral fractures, burnt/calcined bone, and cut marks. Faunal remains with any other cultural modifications, such as grooves, etchings, or tool shaping were classified as artifacts and returned to the Royal Alberta Museum to be catalogued with the rest of the recovered artifacts.

Table 4-11: Counts of burnt/calcined bone by taxonomic category.

Burnt/Calcined			
Class/Family/Genus/Species	**Count**	**Class/Family/Genus/Species**	**Count**
Mammal	20985	Aves	34
Lg. Mammal	1772	VLg. Aves	7
Artiodactyla	99	Lg. Aves	3
Cervidae	2	Sm. Aves	2
Alces alces	7	*Anas acuta*	2
Bison bison	8	*Anas platyrhynchos*	9
Cervus elaphus	3	*Bucephala albeola*	1
M. Mammal	755	Cygnus	1
Canidae	1	*Cygnus columbianus*	3
Sm. Mammal	334	*Branta canadensis*	2
Rodentia	1	Accipitridae	1
Castor canadensis	213	Teleostei	1
Lepus americanus	13	*Sander vitreus*	4
Lepus americanus/townsendii	1		

Modifications, or lack thereof, on faunal remains were more regularly noted in the analysis of the 2014 and 2016 material. Bones that had no modification information were assumed to lack any and will not be discussed here. Analysis of type and frequency of these modifications, including by species, will be highlighted and further discussed in the following chapter.

Nearly half of the entire assemblage was identified as burnt/calcined, and often contained other modifications as well. Burnt/calcined "Mammal" bone alone consisted of 20,985 pieces. Both bird and fish bones were poorly represented in this category of modification, as the fragile nature of these bones make them less likely to be preserved during and after the burning process. There were very few burnt/calcined bones that could be identified to species; the exception was *Castor canadensis*, which also had a high number of identifiable elements in the assemblage. Most of the burnt/calcined bone was only identified to either a size class of mammal (Sm. Mammal, Lg. Mammal, etc.) or simply to mammal (Table 4-11).

Table 4-12: Counts of spirally fractured bone by taxonomic category.

Spirally Fractured			
Class/Family/Genus/Species	**Count**	**Class/Family/Genus/Species**	**Count**
Mammal	233	Aves	51
Lg. Mammal	1152	VLg. Aves	14
Artiodactyla	176	Lg. Aves	49
Cervidae	12	Anas	1
Alces alces	157	*Anas platyrhynchos*	2
Bison bison	25	*Anas strepera*	1
Cervus elaphus	5	Cygnus	1
Odocoileus virginianus	1	*Cygnus buccinator*	1
M. Mammal	52	*Branta canadensis*	3
S/M. Mammal	2	*Grus americana*	1
Sm. Mammal	4	*Bonasa umbellus*	1
Castor canadensis	28	*Tympanuchus phasianellus*	1
Lepus americanus	3		

Spiral fractures were more often noted on bone from large mammals, artiodactyls, and the broad mammal categories, and specifically for *Alces alces* and *Castor canadensis* (Table 4-12). Some unidentified bird bones also showed spiral fracturing, but not as often as the mammal bones. Very large birds, including unidentified *Cygnus*, *Grus americana*, and *Cygnus buccinator* have very low frequencies of spiral fracturing, and smaller birds, including ducks and grouse, showed almost no occurrences of spiral fracturing. As discussed below, spiral fractures were often associated with axe cut and hack marks, as this tool could have been used as both a blunt and sharp bludgeoning instrument to break bones.

Table 4-13: Count of bone with cutmarks by taxonomic category.

Class/Family/Genus/Species	Cut Mark Type & Count			
	Axe	Saw	Knife	Unspecified
Mammal			2	35
Lg. Mammal	7	4	7	129
Artiodactyla	8	1	2	20
Cervidae	1		1	5
Alces alces	28	4	9	37
Bison bison	5	2		24
Cervus elaphus				5
Odocoileus hemionus				1
Ursus americanus				1
M. Mammal		2		19
Canis latrans/familiaris				1
Lynx canadensis				1
Sm. Mammal				12
Castor canadensis		1	6	31
Lepus americanus				1
Aves				9
VLg. Aves				4
Lg. Aves				4
Anatidae				1
Anas platyrhynchos				2
Anas strepera			2	1
Cygnus				4
Cygnus buccinator				1
Cygnus columbianus				3
Accipitridae	1			

The significance of spiral fractures located on certain elements is discussed in Chapter 5. Cutmarks were seen on every artiodactyl species present in the Fort Vermilion I faunal assemblage, as well as on the general categories of artiodactyl, cervidae, and every size category of mammal (Table 4-13). Several species of smaller mammals also showed cutmarks, including *Castor canadensis* and *Lepus americanus*, though these were much lower in frequency than was present in the larger mammals. Game birds showing cutmarks included *Anas platyrhynchos*, *Anas strepera*, and *Cygnus columbianus*, as well as unidentified large and very large bird categories. These were also much lower in frequency than the artiodactyls.

To distinguish cut marks made when processing animals for furs as opposed to food, marks were divided by type: 1) knife cuts, 2) axe cuts, and, 3) saw cuts. Due to the blunt force applied when cutting with an axe, in addition to the splitting of bone that generally accompanies such cuts, all axe cuts were assumed to be linked with butchering. Saw cuts were also assumed to be associated with butchering. Mammal fur removal only required small, target knife cuts near the fore and hind legs as well as around the base of the skull. Nearly all of the *Alces alces* and *Bison bison* elements featuring cut marks showed evidence of axe cutting and hacking. Unidentified artiodactyl, cervid, and large mammal bone also featured a higher proportion of axe cuts compared to knife cuts. Saw cuts were most prevalent on *Castor canadensis* and medium mammal elements, although a few large mammal bones, including *Bison bison*, also had saw cuts.

Knife cuts are the only type of cut mark indicative of fur processing, but these cutmarks can be associated with butchering as well. The location of the cuts can potentially inform which activity took place. Cuts on carpals, tarsals, or phalanges of small and medium mammal were linked with pelt removal. Knife cuts on long bones, ribs, or axial elements were linked with food processing, as these elements were associated with prime meat sections of the animals. The majority of all knife cuts were present on food-important elements, especially ribs and long bones (identifiable and unidentifiable) of large mammal species. Knife cuts on *Castor canadensis* elements were also largely on long bones and ribs. Shallow knife cuts present on game birds, either on long bones or axial elements such as the sternum, were associated with food processing, as these species, other than swans, would not have been killed for their skins. Surprisingly, there is a lack of knife cuts on distal elements for all mammal species that would indicate fur or hide removal. Several *Alces alces* carpals have shallow cuts, but these were associated with removal of the most distal portions of the forelimbs for easier transport rather than hide removal.

Gnaw and puncture marks were the only cultural modifications observed on the bones in the Fort Vermilion I faunal assemblage. Carnivore gnawing was the second-most prevalent modification observed on the remains and was present among most species and other identified groups (artiodactyl, lg. mammal, m. aves, etc.). Nine species of bird, six species of mammal, and one fish taxa, along with almost every broad taxonomic category, featured carnivore gnaw or puncture marks. Gnaw marks in conjunction with spiral fractures, cutmarks, or both were less frequent, but present. Among large mammals/artiodactyls, ribs were the most common elements to have carnivore gnawing.

Table 4-14: Counts of bones with gnaw marks by taxonomic category.

Gnaw Marks			
Class/Family/Genus/Species	**Count**	**Class/Family/Genus/Species**	**Count**
Mammal	1923	Lg. Aves	11
Lg. Mammal	733	M. Aves	3
Artiodactyla	162	Anas	6
Cervidae	21	*Anas acuta*	1
Alces alces	114	*Anas platyrhynchos*	18
Bison bison	24	*Anas strepera*	1
Odocoileus virginianus	4	Cygnus	7
M. Mammal	130	*Cygnus buccinator*	4
S/M. Mammal	1	*Cygnus columbianus*	2
Sm. Mammal	8	*Branta canadensis*	11
Castor canadensis	95	*Grus americana*	1
Lepus americanus	7	Strigidae	1
Ondatra zibethicus	1	*Bonasa umbellus*	2
Sciuridae	1	*Tympanuchus phasianellus*	1
Aves	54	Accipitridae	1
VLg. Aves	6	*Sander vitreus*	1

Femora and ulnae of *Castor canadensis* showed the highest frequency of gnawing, but no other patterns were observed for small mammals such as *Lepus americanus*. Of all the bird species showing signs of carnivore gnawing, long bone fragments (LBF) of unidentified bird species (Aves) were most often gnawed; individual species did not show any significant pattern regarding element gnawing. Rodent gnawing was only observed on one artiodactyl bone and will not be discussed further.

CHAPTER 5: DIETARY INTERPRETATIONS

Introduction

The large faunal assemblage collected from Fort Vermilion I allowed for the confirmation of previous interpretations made by Pyszczyk (2015) and the formation of new conclusions. Building upon the data presented in the previous chapter, several key aspects in the assemblage are evident. High taxa richness at the fort allowed for patterns of choice to be examined among mammals, birds, and fish. From these interpretations, element selection is then examined to determine whether meat portion preferences and selection occurred at Fort Vermilion I. SCI data is scrutinized to bolster the interpretations made about element frequency, and faunal modification are examined to further flesh out assumptions and explanations for specific activities observed in the data. Finally, the social and cultural implications of the faunal data are discussed.

Taxa Richness at Fort Vermilion I

The Fort Vermilion I faunal assemblage was comprised of 43 different taxa representing mammals, birds, fish, and mollusks. This figure is nearly double what Pyszczyk (2015:369) reported, though is still well below the overall taxa richness for the boreal forest (Pyszczyk 2015:357, Table 109). For instance, there are 213 bird species present in the boreal forest ecoregion, yet only 18 bird taxa were identified in the fort assemblage. Almost all the boreal forest large mammal species are present in the fort assemblage, missing only two taxa (woodland caribou and grizzly bear). Overall, the taxa richness present at Fort Vermilion I points to a varied and seasonally-determined meat diet. As was discussed briefly in Chapter 2, fur traders ate a wide range of animals, both during travel and when stationed at various forts. Hearne (1911) described 66 species that he and his Chipewyan travelling companions ate, as well as those consumed by other traders stationed at Prince of Wales's Fort (Appendix 1). Though not exhaustive, Appendix 1 shows the diversity present in the diet of traders and First Nations populations that lived across the northern regions of the continent. The question then becomes, was this diversity of species in the diet a product of choice, preference, or necessity on the part of the traders and fort hunters? Or, as other researchers (Burley et al. 1996, Melaney 1997) have suggested, were they necessities as more preferable foods were unavailable?

Historically, large game animals were the most highly prized for food by fur traders, regardless of where they were stationed. Moose, bison, caribou, and elk were prime sources of meat, grease, and fat. These artiodactyls can be ranked from most preferred to least preferred for food. Historically, caribou were the most preferred, followed by moose, bison, and finally elk being the least preferred (see discussion of these animals in Appendix 1). Therefore, if all these animals were available in similar quantities in the region surrounding a fort, one would expect to see higher frequencies of elements from the more preferred animals over the least preferred ones. With the exception of caribou, this assumption appears to be correct at Fort Vermilion I, as NISP, MNI, and MAU of moose is significantly higher than bison, which is in turn much higher than elk. This interpretation is not conclusive, as there is no available baseline data regarding relative frequencies of these species in the Peace River region. Deer, both white-tailed and mule, also showed a low presence in the faunal assemblage. Unfortunately, not much can be said about the preference or necessity of eating deer; many of the journal entries that mention the larger cervids (moose, elk, caribou) refer to them simply as "deer", so it is difficult to separate the instances when actual deer were hunted and eaten. Given the low NISP of both deer species, it is likely that they were not hunted as often as any of the other large game mammals, either because they were not as plentiful or not as desired.

Beaver and snowshoe hare were also well-represented in the fort faunal assemblage, beaver especially so with a NISP of 1076. Both animals were mentioned historically as preferred small mammal sources of food but were much more appealing in the winter when fatter (Appendix 1). Beaver shows the highest NISP of all species present in the faunal assemblage, suggesting that it was actively sought after, likely for both its pelt and its meat. The implications of such a high NISP are quite telling. If First Nations groups were bringing prepared furs to the fort to trade, there would be few bone elements associated with these furs; the NISP of beaver would be much lower. Yet that is not the case. The high NISP means a high number of identifiable elements, that is, a high number of beavers with their fur attached were brought into the fort. This information will be discussed further in the following section.

The ordinal ranking of snowshoe hare within the assemblage puts it equal, at least by MNI, in importance to *Coregonus clupeaformis* and *Hiodon alosoides*. Yet based on the results of White's (1953) Meat Utility Index (MUI), the total projected weight of meat from all snowshoe hare at Fort Vermilion I places it much lower in the ordinal rankings (Table 4-9). Therefore, this study agrees with Pyszczyk's (2015:379) original suggestion that traders did not frequently consume snowshoe hare at Fort Vermilion I. Because snowshoe hare was viewed primarily as a starvation food (Burley et al. 1996), this also means that it is unlikely that the inhabitants of Fort Vermilion I experienced any severe and prolonged periods of starvation.

Due to the low NISP, MNI, and MAU of the remaining mammal species, it is difficult to say much about their use and relative importance at the site. Lynx, pine marten, and fisher were certainly hunted for their furs, although based on historical journals, these animals were also eaten (Hearne 1911:341; Thompson 1968:70). The low numbers of elements of these animals in the faunal record suggests that they were not consumed very often at Fort Vermilion I. The presence of black bear in the assemblage matches fort records kept by Colin Campbell, who mentions the killing of a black bear on December 31, 1827 (HBCA B.224/a/2; Pyszczyk 2015:377). Hearne (1911:345), Thompson (1968:113-114), and Richardson (1836:487) all described eating black bear, so it is likely that the fort inhabitants consumed the specimen. This, again, is an assumption based on the presence of only a few elements. Muskrat was hunted for its fur; cub beaver became illegal to trap by 1826 to allow the species to repopulate, and procurement of secondary furs began to increase (Williams 1983:57). However, it is possible that muskrat was also eaten, much like beaver.

There are several explanations for the presence of the canids in the faunal assemblage. Firstly, *Canis familiaris* and *Canis familiaris/latrans* are likely one and the same species. The dogs kept by the First Nations groups, and subsequently by fort hunters, were likely very similar in build to wild canid species such as coyote and wolf. Based on accounts by Father Crestien LeClercq (2009:18), *"…the French eat* [dog] *when they are at* [the Mi'kmaq] *feasts… they like it better than mutton"*, and so it is possible that the remains of all canid species are also products of consumption. Wolf and coyote were also prized for their furs, so no definitive explanation can be made for the presence of these species at the fort. Finally, *Microtus ochrogaster* and *Sciurius vulgaris* are present in the Fort Vermilion I assemblage, albeit in relatively small numbers. They are both native species to the Peace River area today, and due the lack of edible meat per animal and the fact that they are prey for many species, it is unlikely that the fort inhabitants consumed these animals. However, as various types of squirrel were historically eaten (Appendix 1), there is no conclusive evidence that these species are invasive. Due to the low numbers of elements for these species, they do not provide useful dietary information and will not be discussed further.

Based on its relative proximity to Lake Athabasca, which was home to one of the largest migrations of waterfowl in the world, Fort Vermilion I shows expected high numbers of various species of ducks, geese, and swans in its faunal assemblage. These species would have only been available seasonally and were likely a welcome repast given the heavy reliance on mammal and fish meats throughout the rest of the year. This also points to why the MNI for these species is lower than more continually available animals. While the migratory birds would mostly have been hunted for their meat and eggs, it is documented that there was also a trade in swanskins. This may explain the ordinal ranking of *Cygnus columbianus*, which shares the highest MNI amongst all represented bird species with *Anas platyrhynchos*. The variety of birds, specifically ducks, in the record reflects the sheer number of birds available during the seasonal migrations; traders likely shot whatever came close enough and consumed whatever they could get their hands on. Hearne (1911) and King (1866) described more than 15 species of duck alone that were frequently hunted and eaten by northern fur traders. The Fort Vermilion I data suggests that the fort inhabitants followed this pattern. Non-migratory birds, such as the various grouse that lived in the Peace River region, were likely supplementary items in the fur traders' diets, as evidenced by their low presence in the faunal record. Great-horned owl, which is only represented by one individual, may have been intrusive in the record, but based on Hearne's (1911:372) and Thompson's (1968:64) accounts, it is likely that this species also served as a supplemental meat source at the fort.

Fish taxa showed a much lower diversity than both birds and mammals, yet several species showed very high counts, which made them much more important in the traders' diet than birds. Whitefish were very common in the assemblage, as were goldeye. The ordinal ranking of fish places whitefish slightly above goldeye, which, given that whitefish are much larger and thus have more meat per fish, confirms why they were preferred. Whitefish were food not only for the human population at northern forts but were also an important part of the diet for the fort dogs. This was likely the case at Fort Vermilion I. Burbot and walleye also scored relatively high in the ordinal ranking of the fort taxa; these fish, while not mentioned as often in the historical journals, would have also been important food items because they were easy to either smoke or salt for storage. Additionally, the mollusks present in the assemblage point to other sources of aquatic foods collected by the traders. These taxa were likely not harvested in large numbers, given the few remains collected at the site, but, as with the migratory birds, mollusks were probably items that supplemented a mammal-rich diet.

Overall, the diversity of animal species in the Fort Vermilion I faunal assemblage suggests that the fort population consumed a variable diet. While there were certainly staples in the diet, namely large mammals and fish, those animals were supplemented from time to time with migratory birds, local raptors, and even mollusks.

Element Frequency and Choice at Fort Vermilion I

The choice of specific elements, especially within large mammal species, represent certain portions of meat and fat. Modern butchering literature (BC Cook Articulation Committee 2015) on primal and sub-primal cuts was used in conjunction with the element frequency data to establish patterns of consumption. These results were then examined with the historic accounts of preference among traders and First Nations populations. As modern butchering manuals for wild game such as deer and moose were unavailable, this study used information on the butchering of beef as a proxy for cervids; the discussion of bison butchery followed that of beef very closely. The frequency of elements in each quarter (e.g. hind limb or fore limb) was calculated for each species of ungulate (Tables 5-1 and 5-2).

Table 5-1: Element frequency of Fort Vermilion I ungulates (front quarter).

Quarter	**Element**	**Species**				
		Alces alces	*Bison bison*	*Cervus elaphus*	*Odocoileus virginianus*	*Odocoileus hemionus*
Front Quarter	Astragalus	6				
	Atlas	4	1			
	Axis	3	2			
	Cervical vertebra	12	2			
	Humerus	12	2		1	
	Hyoid	10				
	Lunate	5				
	Magnum	2				
	Mandible	15	2			
	Maxilla	1	1			
	Metacarpal	3				
	Pisiform	3				
	Radius	23	3	3		
	Rib	96	55	7	3	
	Scaphoid	5				
	Scapula	21	2	6	1	1
	Sesamoid	4				
	Skull	25	2	1		
	Sternebrae		1	2		
	Thoracic vertebra	14	9		2	
	Tooth, incisor	2	1	1		1
	Tooth, molar	6	1			
	Tooth, premolar	3				
	Ulna	16	9	7		
	Unciform		1			
	Vestigial Metacarpal	1				

The overall use of each animal was likely far greater during the fur trade era than it is today, and so additional portions of the animal, such as the skull and bones, will be also discussed for their utility.

Table 5-2: Element frequency of Fort Vermilion I ungulates (hind/both quarters).

Quarter	Element	Species				
		Alces alces	*Bison bison*	*Cervus elaphus*	*Odocoileus virginianus*	*Odocoileus hemionus*
Hind Quarter	Calcaneum	1				
	Caudal vertebra	2	4			
	Cuneiform	6				
	Cuneiform Pes	1				
	Femur	24	12	1	1	
	First Tarsal	1				
	Lateral Malleolus	4		1		
	Lumbar vertebra	22	10		1	
	Metatarsal	7	5	1		
	Navicular cuboid	2		1		
	Patella	4	2			
	Pelvis	24	8	5	1	1
	Sacrum	15	1			
	Tibia	28	9	1		
	Vestigial Metatarsal	3			1	
Both Quarters	First Phalanx	5				
	Manus V	2				
	Metapodial	1				
	Pez	1	1		1	
	Second Phalanx	10				
	Third Phalanx	8				
	Vertebra	10	24	1	1	1

As moose had the highest NISP of the large mammals present at Fort Vermilion I, patterns were clear. Ribs were by far the most numerous elements, yet thoracic vertebrae were much lower. Using these data alone, it would seem that the short rib, cross rib, and brisket portions of moose were preferred over the proximal portions attached to the thoracic vertebrae (7-bone rib portion). However, because moose is the most common artiodactyl at

Fort Vermilion I, it is assumed that most of the thoracic vertebrae identified to animal class level belong to moose. Therefore, the ratio of ribs to thoracic vertebrae becomes much more even, making the 7-bone rib portion present in similar number to the other sub-primal cuts. The inclusion of the artiodactyl data to increase the frequency of thoracic vertebrae supports the journal entries written by numerous traders and explorers about the depouillé, a deposit of fat attached to the thoracic vertebrae. *"The fat...is quite soft, and the layer on the chine* [vertebrae]*, known as the depouillé, is highly esteemed by the trappers and Indians..."* (King 1866:66). Fat was an important caloric component for traders and hunters who expended an enormous number of calories per day when carrying out the necessary activities to sustain and upkeep the fort.

Relatively high occurrences of the scapula may suggest a higher consumption of the blade sub-primal cut. Humeri were not as frequent in the assemblage, which is curious given the articulation of the humerus and scapula. Due to the humerus being rich in marrow, it may be that this element was smashed beyond identification for grease extraction. Radii and ulnae are much more frequent, which, given the relative lack of meat on the fore shank, suggests an alternative use for these bones, likely as a source of marrow or were broken down into fragments for grease rendering (Morin 2007:80). The frequency of skull, mandible, and hyoid elements, while lower than the cuts just described, were higher than expected (>10). This supports Hearne's (1911:262) and King's (1866:66) discussion that the nose, tongue, and mouffle (loose portions around nose and lips) were all prized cuts of the moose.

Hind quarter elements of moose were more frequent than the fore quarter portions (Table 5-1 and 5-2). Identical numbers of pelvic and femora elements point towards an increased preference for the primal hip cut, where some of the tenderest sub-primal cuts are found. Additionally, the long, straight shaft of the femur allows for easy access to the coveted marrow inside these long bones. The proximal portions of the pelvis, along with the relatively high frequencies of lumbar vertebrae and sacrum portions, indicate selection of the loin, a cut that is tender and easy to cook. Tibiae, the main bone in the hind shank, were also very prevalent. As with the fore shank, the relatively high presence of hind shank elements suggests the meat associated with this cut may not have been as important as the marrow and grease potential of the long bones (Table 5-2). Second phalanges were less frequent relative to other marrow-rich bones (Table 5-1), but also likely represent grease extraction activities. The remaining moose elements were infrequent and represented portions of the animal that have little to no caloric value (carpals, tarsals, etc.).

Bison, elk, and both white-tailed and mule deer featured similar ratios of element frequency, with more emphasis on elements representing the hind quarter for bison and the front quarter of elk. Deer elements did not feature any discernible patterns regarding choice of meat cuts, as only one bone specimen represented most elements. Ribs were the most common element in both bison and elk, with both species showing much lower quantities of thoracic vertebrae, suggesting that the lower portions of the rib and brisket cuts were more commonly consumed. The hind portions of bison, including the loin and hip, have a similar muscular composition and tenderness as beef, and were clearly more desired and consumed than other portions. As with moose, this suggests that the availability of bison allowed for traders to choose the portions that were taken back to the fort, in this case the most tender and choice cuts of meat. Elk meat and fat was not overly preferred by traders as moose and bison was, which may explain the lack of fat-heavy elements in favor for more lean cuts (specifically the fore shank) that would have been improved by slow cooking by boiling or roasting.

The meat cuts and portions data could not be applied to small mammals in the same fashion that they were to large mammals. Given that most small mammals could simply be roasted whole, element frequency may not be as useful for determining choice of edible portions. Rather, element frequency within small mammal species was more indicative of other activities such as pelt removal. Many beaver elements were present in high frequencies, and made up the largest NISP of any species at Fort Vermilion I. Some elements, like caudal vertebrae, allude to dietary practices regarding the species. Thompson (1968:199) wrote that *"his* [beaver] *meat is agreeable to most although fat and oily; the tail is a delicacy"*. King (1866:37) commented that *"the trappers esteem the tail a great delicacy…"*. Therefore, the high presence of caudal vertebrae is likely due to consumption of beaver tails, which, as shown above, were highly prized delicacies. The rest of the numerous beaver elements present in the fort assemblage do not point to any specific consumption of certain meat portions. As King (1866:38) wrote, *"the orthodox method of cooking it is to roast the animal in its skin, but as this is worth several dollars, it is not often that a trapper is willing to make the sacrifice."* Beavers seem to have been roasted whole rather than cut into individual portions, and the similarities between the frequencies of many beaver elements seem to support this inference. Other elements, such as the metapodials, carpals, tarsals, and phalanges, provide information regarding skinning practices. Due to the high number of many of these elements, especially phalanges, it can be assumed that both the furs brought into the fort by traders and furs collected in-house were harvested in such a way as to leave the entire body and all its elements intact for cooking.

Snowshoe hare specific element frequencies were also relatively similar and were likely cooked in the same manner as beaver. Lynx elements likely represent a preparation of furs for transport; traders would have removed and discarded any residual carpal or tarsal elements still attached to pelts before furs were packed into bales. Canid elements provided no discernable pattern regarding fort activity, diet-related or otherwise. The presence of *Canis familiaris* elements in the record is evidence that fort dogs were kept for transportation, but there are not enough coyote or wolf elements to make any further concrete interpretations.

Relatively even bird taxa element frequencies suggests that these animals were roasted or boiled whole. The same cannot be said for fish. The high presence of skull elements versus vertebral elements suggests several things: 1) fish brought back to the fort whole; 2) fish heads were removed at the fort and discarded; 3) fish, especially whitefish and goldeye, may have been used to feed the dogs rather than for human consumption. This last inference is based on the lack of vertebral elements within whitefish and goldeye compared to burbot. Dogs would have eaten most of the vertebral elements within a fish, while human consumption would have kept the vertebral column of the fish intact. Therefore, it is possible that burbot was eaten by the traders while their dogs ate more whitefish and goldeye.

To summarize, several species showed significant differences in element frequencies, reflecting diet and choice at the fort. Preferred meat cuts of the large mammals are expanded upon in the following sections.

Skeletal Completeness of Taxa

The skeletal completeness index (SCI) calculations provide information on the portions of each species within the faunal assemblage; there is an inverse relationship between SCI scores and the degree of element selection. Low SCI scores reflect selection of specific elements, while high SCI score indicate more intensive use of an animal (less element selection). As stated by Pyszczyk (2015:385), it is assumed "…*that each element has an equal chance of being selected and that preservation is not a biasing factor for the SCI measure.*" The SCI data are not comparable between classes, as the number of elements per species differs. Non-artiodactyl mammals, which make up the small and medium mammal categories (black bear was included in medium mammals due to the similar physical characteristics as other non-artiodactyls), have nearly twice the number of elements that artiodactyls do; birds and fish have a similar number of elements, but due to their differences of importance in the diet that these species represented, they required a separate analysis. Therefore, the SCI results were first divided into animal class, with mammals being further subdivided by size class (small, medium, large).

Pyszczyk (2015) ran a preliminary test of the Fort Vermilion I SCI data against faunal assemblages from other boreal forest and parkland forts. His results suggested a much more intense use of animals at Fort Vermilion I than was seen at the parkland forts. This study followed a similar line of testing, but with altered SCI equations for small mammals, refined data for large mammals, and adjusted measures for birds and fish.

Using the revised SCI equations (see pg. 55, Chapter 4), SCI was calculated for each species present in the Fort Vermilion I assemblage. In addition, an SCI score was calculated for age groups of all mammal species. Bird and fish remains were categorized as adult, so only one SCI number was calculated. Moose and beaver were the only two species to have a NISP and MNI for each age category, but several other species had age data, allowing for more refined SCI scores to be obtained.

Moose had the highest SCI scores of the large mammals at 26.8, followed by bison (n=19.8), elk (n=8.6), and finally white-tailed and mule deer (n=3.9 and n=3.6

respectively). As stated above, the inverse relationship between SCI and degree of element selection suggests that moose, having the higher score, were more intensely used; that is, traders consumed a wider variety of portions of moose than they did of bison, elk, and deer. These results are supported by the historical documents, as well as the data regarding element selection. It has been shown that of the large ungulates present within the fort assemblage, moose was the tastiest and most desired, followed by bison, elk, and then deer. Therefore, it seems that traders were more willing to eat "less tender" portions of moose than other lesser preferred animals. It may be that the best portions of the "lesser" large mammals (tenderloin, hip roast, tongue, etc.) were only selected for when moose was unavailable. Overall, these data point to an abundance of moose around Fort Vermilion I, which was either hunted by the fort hunter(s) or brought for trade by the indigenous populations. High SCI scores of all large mammals would have denoted less choice to widespread/common starvation at the fort; a situation where traders would have eaten whatever was available with little discrimination regarding species or portions. The Fort Vermilion I data suggest otherwise; that the population ate the *"best and most juicy meat"* (Richardson 1836:498) available in the region.

Small and medium mammals contain roughly the same number of elements, so comparisons between the SCI data were able to be performed between these size class groups. Many of SCI scores were low (< 5) which denotes that only a select few elements from these species (lynx, bear, marten, wolf, coyote, etc.) were selected for. In fact, these data provide a false positive; the low number of elements for many for these species artificially lowers the SCI, and the "element selection" is likely a product of skinning techniques rather than dietary choices (although lynx, a desired source of meat, may have represent a food and fur source). Beaver and snowshoe hare were the only species with higher SCI scores that could be interpreted in the context of both dietary choice and economic practice. Beaver had a higher SCI score than hare, and based on the interpretations made regarding element selection, it is likely that this seemingly high score represents a more complete use of the entire animal. One would expect that the SCI scores for small and medium mammals to be lower than large mammals for two reasons: 1) the increased number of elements per non-artiodactyls compared to artiodactyls requires a much higher NISP to reach comparable SCI scores; and 2) element size decreases with overall body size, making it more difficult to collect the entire skeleton of small and medium-sized mammals. If these animals were roasted whole, consumed, and then thrown to the dogs (see discussion below), many of the small carpals and tarsals would be lost to the archaeological record, thus lowering the SCI score despite the presence of the complete animal at the fort at a certain point. Therefore, other data must be used to create an appropriate interpretation of the use of small and medium mammals, as SCI is too easily influenced by these conditions.

Bird SCI data also produced ambiguous results. Because the highest SCI was less than 20%, which was with *Anas platyrhynchos*, it was assumed that element selection was very high with birds. However, there is no documentary evidence to support that specific portions were harvested from hunted birds and brought back to the fort. Most birds would have fed one man. Dividing birds into smaller portions would have been a waste of time and energy. Thus, the low SCI is a product of low element frequency. There is simply not enough data to make valid interpretations regarding element selection, or lack thereof, of the bird species present at Fort Vermilion I.

SCI data for fish show expected results that correspond well to the interpretations made using element frequency. High SCI scores were present among the most prevalent fish (*Coregonus clupeaformis*, *Hiodon alosoides*, and *Lota lota*). These data compliment the regular presence of many of the elements found in fish, suggesting whole fish were brought to the site and butchered throughout the year. As the majority of bones in a fish are in the skull, a high SCI score indicates that fish heads, assumingly still attached to bodies, were brought into the fort, and were likely discarded as whole entities, allowing for the relatively complete recovery of many skull elements.

Modification of Faunal Elements

Burnt/Calcined

Most of the burnt/calcined bone was not identifiable to species level. Moose, bison, and elk have a combined total of only 16 elements, which are largely small fragments containing some sort of identifiable feature or were barely charred. The number of burnt/calcined elements only identified to class dramatically increased but was still largely restricted to fragments or portions that were barely charred. A higher proportion of non-food elements were present at this taxonomic level, such as teeth, as well as unidentifiable fragments from calorie-rich elements (LBF, UID vertebrae, small rib shaft fragments, etc.). These UID and LBF fragments likely represent intensive breakdown of larger bones for grease rendering. This grease would have used for making pemmican and fortifying other dishes.

As identification to taxa became more difficult, the number of unidentifiable bone fragments (LBF, UID, UID vertebrae, rib shaft etc.) also increased. Several instances of specific element identification still existed, but these were reserved for carpals or tarsals. At the broadest mammal identification level, most of the burnt/calcined elements were unidentifiable. Smaller mammals, such as snowshoe hare and beaver, featured a higher percentage of identifiable elements than large mammals. For beaver, this was expected due to the high NISP and the presence of more identifiable elements since these animals would have been roasted whole and then discarded without much fragmentation. Bird and fish taxa showed very low frequencies of burnt/calcined elements. As these bones are more fragile than mammals, it is likely that many bones were destroyed through the burning process. Overall, burnt/calcined bones in the faunal assemblage seem to represent grease extraction, which may subsequently indicate pemmican manufacture at the fort. It is unknown at this time how grease use/creation changed at the fort throughout time. Fort records from 1826-1828 (HBCA B.224/a/2:44-45; HBCA B.224/a/3:38-39) show amounts of grease distributed to fort occupants, but there are no records from the NWC occupation.

Cutmarks

As discussed in Chapter 4, cutmarks are directly associated with either dietary activities or fur and hide removal processes. Fur removal required fine knife work; thin knife cuts along specific bones such as the skull or distal portions of the limbs are likely evidence of this activity. All other types of cuts (deep knife cuts, axe cuts/hacks, saw cuts) are indicative of butchering to extract meat, marrow, grease, or all three. General insights on the types of cuts of meat that are associated with specific elements was presented above. The following analysis provides information regarding the exact procurement methods used to obtain these dietary components.

Moose faunal remains were the most well-represented that have cutmarks on specific elements. Femora featured knife, saw, and axe cuts, though the latter were only associated with spiral fractures. As mentioned above, the femur sits inside the primal hip cut, and is associated with the inside round sub-primal cut (modern day roast). Knife cuts are likely from meat removal, while saw cuts may indicate individualization of meat portions (Kooyman 1981:54). The axe hacks associated with the spiral fractures also indicate marrow extraction, though are also likely to have been the impetus for further fracturing of these long bone fragments for grease extraction.

The cut marks present on pelvises indicate some meat removal, but mostly represent the separation, possibly during field butchering, of specific elements. Several pelvises have axe hack marks on or near the acetabulum. This corresponds very closely to the separation between the inside round and sirloin butt sub-primal cuts (Figure 3-5), which is also a natural joint separation point for primary disarticulation. This would have yielded a very portable portion of meat that could have been easily transported to the fort, either by the fort hunters or by First Nations groups coming to trade meat for goods.

Axe marks along the sacrum are likely from the same separation of meat cuts as those found on pelvises. Tibiae, radii and humeri all showed axe cut marks in association with spiral fractures, again suggesting marrow extraction along with the potential fracturing of bone for grease extraction. The humeri and scapulae showed knife cuts as well, suggesting that the shoulder and blade sub-primal cuts were removed before the bones was fractured. Ribs also showed a high number of knife cuts which are representative of meat removal, either before or after cooking. Axe cuts in association with spiral fractures indicate removal of the rib section from the thoracic vertebrae, again an indication of field butchering to create easily transportable portions. Metapodial and phalanges showed clear evidence of marrow extraction, with axe hack marks present alongside spiral fractures. Axe marks along both lumbar and thoracic vertebrae are likely from field dressing and separating the carcass into transportable sections. These cuts represent the short loin and the 7-bone rib sub-primal cuts which would have featured one of the tenderest cuts, the tenderloin, as well as the coveted *depouillé*.

Several carpals and tarsals have knife cuts, which likely represent the dismemberment of the fore or hind leg; phalanges were fractured for marrow extraction. Fore and hind shanks were likely trimmed of their meat, had their marrow extracted from the applicable bones, and then discarded as a relatively intact portion. This is seen in several instances with radii and the associated carpals being found mostly articulated in various refuse or storage pits around the site. Finally, the axe cuts along the mandible in conjunction with knife cuts on hyoid bones reinforces the earlier discussion of the collection of prized portions on the head, namely the tongue, nose, and mouffle.

Bison and elk, as well as artiodactyls, cervids, and large mammals, featured very similar butchering patterns as those described above, albeit in smaller numbers for bison and elk. Long bones exhibit meat removal cuts as well as marrow extraction impact marks and axe cuts. Delineations between primal/sub-primal cuts showed axe hacking, and there was a lack of cutmarks on distal portions of appendages. The broader mammal taxonomic categories showed very high frequencies of cut ribs and LBFs, with the latter also featuring significant numbers of axe cuts with spiral fracturing. Given that large mammals, while existing on a sliding scale of preference themselves, were the most preferred sources of food and shared a similar physical makeup, it is not surprising that they show similar patterns of disarticulation and meat/marrow removal. All other mammals featured knife cuts primarily on long bones, ribs and LBFs. Spiral fractures were completely absent amongst these species, as were axe hack marks. One medium mammal femur exhibited saw cuts, but aside from this specimen all other cuts were made with knives. Phalanges, carpals, tarsals, and skulls were absent in this part of the assemblage, and vertebrae were very infrequent. These data suggest meat removal from various long bones and ribs, which, as discussed earlier, was likely due to small mammals' ability to be roasted whole, thus negating the need to divide them into smaller portions.

Bird bones featured similar cuts as non-artiodactyl mammals; knife cuts were located primarily on long bones and ribs. The total number of bird bones with cut marks was very low compared to mammals which speaks to the methods of butchering and consumption. As described by Hearne (1911:399), the main method of cooking most birds was roasting, presumably whole; *"the flesh of* [swans] *are excellent eating, and when roasted,* [are] *equal in flavour to young heifer-beef, and the cygnets are very delicate."* Therefore, any knife cuts are likely the product of meat removal from bones. Only bones of migratory birds had cutmarks, though this is likely due to higher proportions of elements present in the assemblage compared to other bird species. Additionally, remains of *Cygnus columbianus* show the only possible evidence for the trade in swan skins. One skull portion has shallow knife cuts, which, given the lack of meat around the skull, seems to denote skin removal.

Spiral Fractures

As was discussed earlier, a number of long bone and rib spiral fractures, generally in association with axe marks are present for all species of mammals and several species of game birds. These data reflect expected results, as these bones contain large quantities of marrow and were important for grease rendering. Given that many Peace River fur trade posts supplied Mackenzie District posts with pemmican (made from moose or bison), this evidence suggests that these activities may have occurred at Fort Vermilion I. Additionally, these products provided high numbers of calories, and therefore were highly prized by northern traders. There were no patterns observed regarding the selection of specific long bone elements over others, and other elements, including vertebrae and pelvises, were fractured because of portion selection as described previously. Again, the broader taxonomic categories featured higher counts of spirally fractured LBFs and ribs, but this is due to nature of identification; the more fractured an element is, the broader the taxonomic identification.

Gnawed Bone

Evidence of carnivore gnaw marks and puncture marks was prevalent in the assemblage. Nearly 7% of the faunal assemblage shows signs of carnivore modification. The placement of gnaw marks did not discriminate to element or species, suggesting that the fort dogs were simply chewing on the discarded remains of all consumed animal species at the fort. This is rather surprising as, according to Father Chrestien LeClercq (2007:18), "[the dogs] *are not given any* [bones], *for fear of damaging their teeth, not even those of the Beaver*". LeClercq's experience was with the Miq'mac populations in eastern Canada, and perhaps the treatment of dogs was not the same in the northwestern forts. Regardless, the high number of carnivore gnaw marks is evidence of one or more dogs that were likely used for transportation were living at the fort.

Fort Vermilion I and other Northern Forts

The faunal data recovered from Fort Vermilion I seems to show a lack of dietary stress given the high proportions of choice cuts of meat and more preferred species in the assemblage. But the degree of dietary choice is difficult to determine by looking only at the Fort Vermilion I faunal assemblage. Are these patterns similar in degree to those present at other northern forts? Due to the inconsistencies in sample size, occupation length, population density and diversity, excavation techniques, and reporting methods, a direct comparison between the Fort Vermilion I data and other fort datasets is not possible. However, broad overviews of species richness at each comparative fort, along with an examination basic raw data (NISP, MNI, and SCI when available) allowed for generalized discussions of species use. Tables 5-3 - 5-7 show the NISP, MNI, and SCI values for species present at each of the four forts.

Fort White Earth

Established by Alexander Henry the Younger in 1810, Fort White Earth was built as one of two Fortes des Prairies along the North Saskatchewan River (Hurlburt 1977:2). This NWC fort, along with its HBC counterpart, Edmonton House III, functioned as both fur trade and provisioning posts, providing northern canoe brigades and fort populations with dried meat and fat, as well as pemmican. While occupants at Fort White Earth had access to a few domestic animals (Henry 1965: 609), wild game comprised the bulk of meat consumed at the fort.

Fort White Earth was used as a proxy for parkland forts in the comparative analysis. Given its location in a border-region between parkland and boreal forest ecoregions, it provides data regarding dietary choices made in a region that had a higher diversity of species that either the boreal or prairie ecoregions (Pyszczyk 2015:367, Figure 160), and a greater availability of large game animals overall. The Fort White Earth faunal assemblage exhibits a high relative percentage of large game mammals (moose, bison, and elk) (Table 5-3). This reflects the production of large quantities of pemmican that were sent north with the canoe brigades, as dried meat and grease obtained from rendering bones were the main ingredients in pemmican. Beaver shows a relatively low NISP, and snowshoe hare is virtually non-existent in the assemblage. Again, given the availability of large game mammals, it is likely that small mammals were not an important source of food and were hunted more for their pelts.

Table 5-3: NISP, %NISP, MNI, and SCI values from Fort White Earth (NA = Not Available).

Species	NISP	%NISP	MNI	SCI
Coregonus artedi	NA	NA	NA	NA
Coregonus clupeaformis	NA	NA	NA	NA
Esox lucius	NA	NA	1	NA
Hiodon alosoides	NA	NA	NA	NA
Catostomus commersonii	NA	NA	NA	NA
Sander vitreus	NA	NA	5	NA
Cygnus buccinator	3	0.3%	1	3.0
Branta canadensis	1	0.1%	1	1.0
Anas platyrhynchos	17	1.6%	2	8.5
Anas crecca	2	0.2%	1	2.0
Anas discors	1	0.1%	1	1.0
Aythya affinis	1	0.1%	1	1.0
Buteo jamaicensis	3	0.3%	1	3.0
Bonasa umbellus	19	1.8%	1	19.0
Grus americana/Grus canadensis	3	0.3%	1	3.0
Ectopistes migratorius	1	0.1%	1	1.0
Lepus americanus	2	0.2%	NA	NA
*Spermophilus richardsonii**	61	5.8%	NA	NA
Tamasciurus hudsonicus	65	6.2%	NA	NA
Castor canadensis	183	17.4%	9	10.2
Ondatra zibethicus	1	0.1%	NA	NA
Canis latrans	8	0.8%	NA	NA
Ursus americanus	9	0.9%	1	4.5
Mustela erminea	1	0.1%	NA	NA
Lontra canadensis	6	0.6%	NA	NA
Odocoileus virginianus	13	1.2%	NA	NA
Odocoileus hemionus	2	0.2%	NA	NA
Alces alces	202	19.2%	18	10.2
Cervus elaphus canadensis	300	28.5%	27	10.1
Bison bison	135	12.8%	14	8.8
Canis familiaris	14	1.3%	NA	NA

Bird taxa relative frequencies show that they did not constitute a large portion of the diet and were likely used as a diet supplementation. While fish remains were collected at the site, there are no references to specific quantities.

While direct comparisons of most statistic values cannot be made between Fort White Earth and Fort Vermilion I, there is a key difference that is identifiable. Mammals appear to constitute almost all the meat consumption at Fort White Earth (n=95.2%), while fish and birds complimented the consumption of mammals more at Fort Vermilion I (n =69%). This is likely due to environmental differences; inhabitants of Fort White Earth had access to herds of bison and elk that were likely not present in equivalent numbers in the north. Additionally, the Fort White Earth data must be examined with a degree of caution, as the incomplete dataset skews the listed %NISP values. Although other prairie forts were not used to contextualize the Fort Vermilion I dataset, it is likely that the abundance of large game mammals compared to small mammals, birds, and fish seen at Fort White Earth is indicative of other southern forts.

Nottingham House

Nottingham House was built on the shores of Lake Athabasca by the HBC in1802 in opposition to the NWC's Fort Chipewyan. The fort was established with the intention of it becoming the regional distribution centre within the Athabasca District for all HBC-related activities. However, due to constant harassment by the NWC and restricted access to First Nations trading groups (Karklins 1983:11), the HBC was forced to close Nottingham House in 1806.

Nottingham House was located on Lake Athabasca rather than along a major river system, but the physical and temporal proximity to Fort Vermilion I along with a detailed faunal analysis in the site report (Rick 1981) made this fort ideal for comparative purposes. The Nottingham House faunal assemblage shows a reduced presence of mammals, especially compared to Fort White Earth. Fish and bird taxa comprise nearly 75% of the total fort NISP, while mammals make up just over 25% (Table 5-4). Though large mammals such as moose and caribou provide more meat per animal than any other taxa in the assemblage, the relative NISP of these species seems to indicate that they did not constitute a majority of the meat consumed. This may be due to the higher reliance on fish (n=36.1%) or, as suggested by Rick (1981:264), the use of boneless or partially boned meat (dried meat, pemmican, etc.) at Nottingham House. The latter is, unfortunately, not observable in the archaeological record, and thus cannot be tested. Migratory bird taxa are also present in the assemblage in similar relative percentages as fish taxa (n=37.6%), suggesting a more intensive use of these species than is seen at Fort Vermilion I (n=7.5%). Though both Fort Vermilion I and Nottingham House fall within the migration zone of many of the species present in both assemblages, Lake Athabasca attracts a higher number of birds than does the Peace River. This is likely why these species constitute a higher relative percentage of the assemblage at Nottingham House.

Small mammal relative percentages are also different between the two forts. While beaver shows the highest NISP and %NISP at Fort Vermilion I (n=1076 and n=38.7% respectively), it is present in low numbers in the Nottingham House assemblage. All other small mammals, aside from snowshoe hare, are also present in low numbers, likely representing fur removal rather than consumption. The relative high numbers of snowshoe hare in the Nottingham House assemblage indicate that periods of starvation may have occurred at the fort.

Table 5-4: NISP, % NISP, MNI, and SCI results Nottingham House.

Species	NISP	%NISP	MNI	SCI
Salvelinus namaycush	47	2.0%	4	9.8
Coregonus clupeaformis	188	8.0%	28	5.6
Hiodon alosoides	15	0.6%	3	4.2
Esox lucius	184	7.9%	23	6.7
Catostomus catostomus	4	0.2%	1	3.3
Lota lota	24	1.0%	4	5.0
Sander vitreus	382	16.4%	33	9.6
Anas americana	4	0.2%	1	4.0
Anas crecca	1	0.0%	1	1.0
Anas platyrhynchos/Anas actua/Anas strepera	91	3.9%	10	9.1
Aythya americana	1	0.0%	1	1.0
Aythya collaris	1	0.0%	1	1.0
Aythya valisineria	3	0.1%	2	1.5
Buteo lagopus	1	0.0%	1	1.0
Corvus brachyrhynchos	1	0.0%	1	1.0
Corvus corax	18	0.8%	2	9.0
Cygnus buccinator	8	0.3%	2	4.0
Cygnus columbianus	4	0.2%	1	4.0
Falcipennis canadensis	1	0.0%	1	1.0
Grus canadensis	5	0.2%	1	5.0
Lagopus lagopus	13	0.6%	3	4.3
Large Goose	36	1.5%	4	9.0
Larus argentatus	1	0.0%	1	1.0
Medium Goose	657	28.1%	32	20.5
Small Goose	27	1.2%	5	5.4
Tympanuchus phasianellus	5	0.2%	1	5.0
Alces alces	99	4.2%	6	15.0
Bison bison athabascae	1	0.0%	1	0.9
Canis familiaris	88	3.8%	2	22.0
Canis familiaris/Canis lupus	19	0.8%	2	4.8
Castor canadensis	14	0.6%	2	3.5
Gulo gulo	40	1.7%	2	10.0
Lepus americanus	302	12.9%	22	6.9
Lynx canadensis	31	1.3%	2	7.8
Martes pennati	1	0.0%	1	0.5
Ondatra zibethicus	4	0.2%	1	2.0
Rangifer tarandus caribou	1	0.0%	1	0.9
Vulpes lagopus	1	0.0%	1	0.5
Vulpes vulpes	13	0.6%	2	3.3

As the historical accounts mention sabotage of the fort by the NWC, including some of the men firing guns to scare away game (Karklins 1981:11), it is likely that the HBC men were forced to eat lesser preferred foods at times.

Fort Alexander

The establishment of Fort Alexander in 1817 followed a long tradition of the dominance of the North West Company in the MacKenzie District. Fort Alexander was built on the northern bank of the Willowlake River, 115 river miles north of Fort of the Forks (later named Fort Simpson in 1823) (Janes 1974:9). However, the fort was only in use for four years. After the NWC and HBC-merger in 1821, numerous forts were closed to create a more even distribution of posts, and the trade operations were permanently moved from Fort Alexander to Fort of the Forks.

Fort Alexander is the only comparative fort that was located in the Mackenzie District. This region was considered the "*hardest of the hard districts*" (Lewes 1840, cited in Pyszczyk 2015:59), as the short summers, long winters, and general lack of food made living in the Mackenzie District very difficult. Fort Alexander was deemed suitable for comparison to Fort Vermilion I as it was located in the boreal forest ecoregion along a major river system. As shown in Table 5-5, bird and fish resources are conspicuously absent from the archaeological record. Janes (1974:72) wrote that while birds and fish, namely ducks and jackfish, were present in the assemblage, a lack of comparative skeletal material did not allow for a proper analysis, resulting in their exclusion from any discussion. Thus, the discussion of the Fort Alexander faunal assemblage is limited to mammals, and the %NISP presented in Table 5-5 is a product of this limited data.

Moose and caribou are the most prevalent large mammal, and likely provided the bulk of the meat consumed at Fort Alexander, but the high numbers and relative percentage of snowshoe hare indicates periods of starvation likely occurred at the fort. This relative percentage does not reflect the overall relative percentage within the assemblage due to the lack of bird and fish data but as a relative percentage of mammals (n=66.5%), it is much higher than what is seen at Fort Vermilion I (n=5.1%). All other species likely indicate fur acquisition, though may have been used for food as well.

Table 5-5: NISP, %NISP, MNI, and SCI values from Fort Alexander.

Species	NISP	%NISP	MNI	SCI
Alces alces	39	8.6%	2	17.7
Canis latrans	1	0.2%	1	0.5
Castor canadensis	43	9.5%	5	4.3
Lepus americanus	300	66.5%	31	4.8
Martes americanus	1	0.2%	1	0.5
Martes pennati	3	0.7%	1	1.5
*Microtus**	4	0.9%	3	0.7
Ondatra zibethicus	4	0.9%	2	1.0
Rangifer tarandus caribou	54	12.0%	3	16.4
Ursus americanus	2	0.4%	1	1.0

Fort D'Epinette/St.John's Fort

Fort D'Epinette was built by the NWC in 1806 to fill the gap along the Peace River trade route left by the closing of Rocky Mountain Fort (Williams 1978:28). Fort D'Epinette became the sole trading centre for the indigenous populations in New Caledonia and was successful for nearly 20 years. It was closed in 1823 after five traders were killed by members of the local Dunneza (Beaver Indian) populations (Williams 1978:32).

Of the forts used for comparative purposes, Fort D'Epinette most closely resembles Fort Vermilion I; it is located in the boreal forest along the Peace River and was occupied for a relatively long time (17 years). Thus, any differences observed between the two forts are likely culturally generated. Due to the high species richness at Fort D'Epinette, the faunal data is presented in two tables (Table 5-6 and 5-7).

Table 5-6: NISP, %NISP, MNI, and SCI values for birds and fish from Fort D'Epinette

Species	NISP	%NISP	MNI	SCI
Thymallus arcticus	1	0.0%	1	0.8
Mylocheilus caurinus	4	0.1%	3	1.1
Ptychocheilus oregonensis	13	0.4%	3	3.6
Lota lota	13	0.4%	2	5.4
Sander vitreus	30	1.0%	2	12.5
Podiceps grisegena	1	0.0%	1	1.0
Cygnus buccinator	8	0.3%	3	2.7
Branta canadensis	14	0.5%	4	3.5
Anas platyrhynchos	25	0.8%	2	12.5
Anas crecca	1	0.0%	1	1.0
Anas americana	4	0.1%	3	1.3
Aythya marila	1	0.0%	1	1.0
Bucephala albeola	5	0.2%	1	5.0
Falcipennis canadensis	1	0.0%	1	1.0
Bonasa umbellus	7	0.2%	1	7.0
Lagopus lagopus	2	0.1%	1	2.0
Lagopus leucura	11	0.4%	1	11.0
Grus canadensis	6	0.2%	1	6.0
Chroicocephalus philadelphia	1	0.0%	1	1.0
Ectopistes migratorius	6	0.2%	1	6.0
Surnia ulula	18	0.6%	3	6.0
Bubo virginianus	1	0.0%	1	1.0
Picoides villosus	1	0.0%	1	1.0
Perisoreus canadensis	28	0.9%	3	9.3
Corvus corax	16	0.5%	2	8.0
Pheucticus ludovicianus	2	0.1%	1	2.0

Moose and elk exhibit the highest relative percentages within the Fort D'Epinette assemblage (Table 5-7) and seem to be the source of most of the meat consumed at the fort. Elk seems to be consumed the most of all ungulates as evidenced by its high %NISP and SCI score. Using historical indications of preference, the high numbers of elk point towards a lack of highly preferred animals available to hunt near Fort D'Epinette. Additionally, snowshoe hare is also present in large relative percentages. As this species was also considered a starvation food, it seems likely that the inhabitants of Fort D'Epinette experienced numerous and prolonged periods of starvation.

Table 5-7: NISP, %NISP, MNI, and SCI values for mammals from Fort D'Epinette

Species	NISP	%NISP	MNI	SCI
Lepus americanus	639	21.0%	49	6.5
Marmota caligata	2	0.1%	2	0.5
Tamiasciurus hudsonicus	59	1.9%	2	14.8
Castor canadensis	136	4.5%	10	6.8
Peromyscus maniculatus	5	0.2%	3	0.8
Neotoma cinerea	48	1.6%	2	12.0
Myodes gapperi	1	0.0%	1	0.5
Microtus pennsylvanicus	14	0.5%	5	1.4
Canis lupus	13	0.4%	1	6.5
Vulpes vulpes	20	0.7%	2	5.0
Ursus americanus	60	2.0%	11	2.7
Ursus arctos	11	0.4%	5	1.1
Martes americana	18	0.6%	2	4.5
Gulo gulo	36	1.2%	6	3.0
Alces alces	708	23.2%	48	13.4
Cervus elaphus canadensis	917	30.1%	47	17.7
Bison bison	132	4.3%	11	10.9
Canis familiaris	10	0.3%	3	1.7
Equus caballus	1	0.0%	1	1.0

Bird taxa in the Fort D'Epinette assemblage represent more locally-available species than seen at other forts (Table 5-6). However, Fort D'Epinette is not as close to the migratory routes as Nottingham House or Fort Vermilion I, so these results are expected. Fish are also present in lower relative percentages than seen at other forts. If fish were not as available and seasonally migrating birds were not hunted as frequently, then mammals would have been the only consistent source of wild game. If the more desired animals, such as moose, became difficult to locate and hunt, then less desired animals would have been needed to feed the fort populations, which is what the data seem to indicate.

Non-ungulate mammals other than snowshoe hare are present in low frequencies, and while species such as black bear and beaver were likely sources of food and furs, the rest of the species represent fur processing. It is interesting to note that both red fox and wolverine, the species mentioned by Hearne (1911:255) that were never eaten except in dire circumstances, are present in the Fort D'Epinette assemblage. While these are likely present due to fur harvesting, they may also indicate a period of intense starvation and subsequent consumption by members of the fort.

On a broad scale, dietary trends at the five forts appears relatively similar. Large ungulates provided the majority of the meat consumed by traders, with fish, birds, and secondary mammals providing supplementary meat to the diet. The historical journals correspond positively to these results, as discussed previously. However, the data from the four contemporaneous forts highlights the major differences seen only at Fort Vermilion I. Higher numbers of preferred ungulates (moose) at Fort Vermilion I, as well as the low numbers of "starvation foods" (snowshoe hare), suggest a fort environment free of frequent periods of starvation. However, when compared to forts, such as White Earth, northern fort were places of relatively greater resource stress than their parkland counterparts. Large numbers of beaver provided an amount of meat and fat not seen at any other fort. A wide range of bird species, both local and migratory, bolstered the pantries at Fort Vermilion I, and fish were used to feed both men and dogs. These unique aspects of the diet at Fort Vermilion I provide a better understanding of dietary choices, preferences, and restrictions experienced by northern fur traders.

CHAPTER 6: CONCLUSIONS

Research Overview

This study investigated the faunal assemblage collected from Fort Vermilion I, a fur trade site located along the Peace River in Northern Alberta. Building upon the previous work by Pyszczyk (2015), the dietary components of the fort's inhabitants were examined to establish the dietary trends present throughout the forts' 32-year occupation. A faunal sample of 49,967 bones that included 43 different species (mammal: n=17, bird: n = 18, fish: n = 6, mollusk: n = 2) collected from 139 excavation units was used to examine species richness, bone element selection, modification patterns, degree of skeletal completeness, and meat utility.

A brief overview of fur trade history in Western Canada as well as the history of archaeological and zooarchaeological work performed in this region was first presented to provide context for the interpretations made regarding the faunal assemblage. Historical documentation of dietary preferences and general information regarding species consumption written by key explorers and fur traders provided insights into the patterns observed in the faunal assemblage (Appendix I). Modern butchering data was used to provide context for element selection, as Kooyman (1981) illustrated that these data were suitable for the analysis of historical faunal remains. The faunal remains excavated in 2014 and 2016 (n=34,823) were combined with previous data in a master database to allow for a holistic examination of dietary patterns present at the site. Basic statistical values (NISP, MNI, MAU) along with utility indices (MUI, SCI) were derived from which comparisons between species and between sites could be made. The large number of faunal remains were carefully cleaned, and a thorough cataloguing system was created to establish specific identification of key bone characteristics (Appendix IV). Finally, a basic comparative analysis using four northern forts was completed to provide context for the Fort Vermilion I data. Though Fort Vermilion I does share some similarities to other forts regarding species consumption, a varied dietary pattern relative to northern forts was detected.

Results Summary

Age-specific analyses on the abundant mammal remains revealed subtle differences between species in terms of age frequencies. Species that contained multiple ages were generally most represented by adults, though overall, age MNIs did not exceed 6 (Table 4-2). Beaver faunal elements (n=1079) were the most prevalent within the assemblage. The age-specific MNI analysis showed that juvenile beavers (n=14) were the most represented, a result not seen in any other mammal species. While many of the species present in the Fort Vermilion I faunal assemblage provided dietary information, there are several species represented only by a single element (*Canis familiaris, Martes americana, Martes penanti*, *Sciurius vulgaris, Aix sponsa, Anas americana, Aythya affinis, Bucephala albeolus, Falcipennis canadensis,* and *Gavia immer*). These data were not able to provide reliable insight into diet but did expand the breadth of species present at the site, and links to the historical journals (Appendix I).

The two utility indices (MUI and SCI) were used to examine the potential meat weight provided by each species and the skeletal completeness of each species respectively. The MUI results confirmed the ordinal rankings of species determined by Pyszczyk (2015:379). SCI was calculated using species-specific equations (Chapter 4), as the number of elements in each animal varies greatly within and between taxonomic classes

Bone modification provided information regarding specific use patterns by species. Four main categories were used in this analysis (spiral fractures, burnt/calcined, cutmarks, and gnaw marks), with cutmarks being sub-divided into knife, axe, and saw cut marks. The burnt/calcined bone category included many different species, while butchering modifications (spiral fractures and cutmarks) were mainly present on large mammals, beavers, hares, and larger species of birds (geese and swans), as these were the most commonly consumed animals. Gnaw marks were present on the same species as butchering modifications were, pointing to a close relationship between the traders and the fort dog(s). These modifications and butchering methods indicate a preference for choice (most tender) cuts of meat (Figure 3-5) in large ungulates. Long bones were also selected for over other bones for their marrow and grease content. Modifications on non-ungulate mammals, birds, and fish generally indicate whole-animal cooking, with cuts on bones indicating meat removal rather than fur removal.

Interpretations and Comparative Analysis

Moose provided the most meat per species at Fort Vermilion I and were more selected for over bison and elk. Bison and elk elements suggest a specific selection of the choicest portions of the animal (thoracic vertebrae and ribs for important meat and fat deposits, hyoid and mandible for tongue and nose meat, limb bones for marrow, etc.). Moose show a lesser degree of element selection, which may speak to traders' preference for the "lesser" cuts of moose over bison and elk meat or simply to availability of species Historically, traders such as Hearne (1911), King (1866), and Thompson (1968) described a "scale of preference", with caribou and moose being the "tastiest" and most desired ungulates, and bison and elk being the least, so traders may have preferred the lesser preferred cuts of moose. Element selection within ungulate species also indicates a partiality to elements representing meat cuts that were, as described in Figure 3-5, “most tender” and contained high proportions fats: femorae, pelvises, thoracic and lumbar vertebrae, and ribs. Elements not considered by modern North American butchering practices as “standard” cuts, such as the nose and tongue, are also heavily represented in the faunal assemblage. These cuts are described in the historical journals as some of the most highly prized components of the animal, thus providing additional context for the zooarchaeological data.

Beaver was the most skeletally-complete small/medium mammal, as it was a source of both fur and meat/fat and was therefore utilized much more completely than other species. Snowshoe hare, historically considered a starvation food, is present in low numbers. The relatively low SCI scores for small and medium mammals reflects the increase in the number of elements compared to ungulates rather than the reduced utilization of the carcasses. Bird and fish SCI values showed expected results, as ease of access to these resources, coupled with the ease of transport, allowed traders to bring whole animals to the fort to be processed for food. Thus, SCI scores for bird and fish, which are generally higher compared to mammal species, is not surprising.

Butchering modifications were divided into cutmarks and spiral fractures. These represented carcass disarticulation, meat removal and portion separation, as well as marrow acquisition and grease extraction. Axe cuts were present on artiodactyl bone and were frequently associated with spiral fracturing. These findings suggest that full animals were rarely brought back to the fort and were instead transported in manageable sections. Many of the disarticulation cuts seen on moose, bison and elk correspond positively to those described in modern butchering literature (BC Cook Articulation Committee 2015; Figure

3-5), providing evidence for the selection of the choice portions as described in the historic journals. Saw and deep knife cuts on numerous species, seen in Table 4-13, provided evidence for meat removal and potential evidence for individualized portioning (Kooyman 1981:54). These butchering cuts confirmed which species were consumed, a result which was also supported by journals and fort records (Appendix I). Burnt/calcined bones made up the majority of modified bone and did not provide much information in terms of dietary practices aside from potential evidence for grease rendering.

Finally, to provide context for the interpretation made about the dietary patterns at Fort Vermilion I, the faunal data was compared to three other northern forts that reflected similar environments, and one fort located in the central parkland of Alberta: Fort White Earth, Nottingham House, Fort Alexander, and Fort D’Epinette/St. John’s Fort. Limited data, different populations sizes and occupations, and varying sample sizes reduced the comparisons between forts to generalized observations of relative percentages, but several differences and similarities were noted.

Large mammals were the main source of meat at all forts, though elk was the primary meat eaten at Fort D’Epinette and Fort White Earth, rather than moose as was the case at Nottingham House, Fort Alexander, and Fort Vermilion I. Beaver was the most numerous at Fort Vermilion I, which suggests a heavier use of these animals as food compared to the other forts. Snowshoe hare was present in much higher numbers at Fort D’Epinette and Fort Alexander, alluding to periods of dietary stress experienced at these forts. Migratory birds were more common at Fort Vermilion I and Nottingham House, as these two forts were in the seasonal migration path and, therefore, had access to these species seasonally. Fish was also consumed in larger quantities at Fort Vermilion I and Nottingham House than at other forts.

The faunal data at Fort Vermilion I showcase several unique dietary characteristics not seen at other forts. They indicate that Fort Vermilion I inhabitants were able to express a relatively greater degree of dietary choice than at other forts. Fort Vermilion I has the strongest link between dietary preference and choice meat cuts as noted in the historical journals. Higher proportions of “preferred” animals and low quantities of “lesser” or starvation animals suggests that starvation was not as serious an issue as it was at Fort D’Epinette or at Fort Alexander. The variation in diet, as expressed by the higher relative percentages of fish and birds to mammals at Fort Vermilion I, speaks to the wide range of food sources available throughout the year. The abundance of seasonal and local foods, coupled with an ideal placement between major regional supply forts, is likely the impetus for the successful occupation of the fort for so many years.

It is important to note that the faunal assemblage and, subsequently, any interpretations made from it are subject to several factors, namely biases associated with collection of archaeological material and placement of excavation units. The use of finer screens may have resulted in the collection of finer elements such as fish bones and delicate bird bones, but the collection of these elements would not have changed the overall relationship between species and elements in a statistically significant way. Excavation units were placed to target artifact-, faunal-, and architecturally-rich areas of the site, thus providing the largest yield of material from which significant interpretations could be made. While there are large portions of the fort that are unexcavated, it is unlikely that these areas, containing less faunal and archaeological material, would drastically change the conclusions that this and other studies have reached. Rather, more information would only strengthen the results presented in this study.

Future Work and Thesis Contributions

There are several aspects of the faunal data that were not examined for this project, namely the spatial context of the site. Hopefully, continued excavations will better define the locations of buildings, rooms, and associated refuse deposits, if they exist. Additionally, the issue of ethnicity and how it may have affected the assemblage was briefly touched on but not explored in depth. More data is needed, ideally from a positively identified First Nations encampment outside the fort boundary, which may or may not exist at Fort Vermilion I. A comparison between these two faunal assemblages would provide important information regarding the propagation of European-influenced dietary preference, the role that First Nations groups played in the overall determination of the fort diet, and other associated questions regarding the interplay between various ethnic groups.

Initial investigations of the Fort Vermilion I faunal assemblage provided the foundation for this study, and the addition of nearly 35,000 bone elements allowed for several new conclusions to be formed. This study confirmed that the veracity of the historical journals written by explorers and fur traders by identifying patterns present in the zooarchaeological data and comparing them to a compiled historical dataset that highlighted qualitative aspects of diet such as choice, preference, and tastiness. The broad diet and varied use of species at the fort was expanded upon, identifying a total of 43 species present in the assemblage. Finally, through the use of comparative analyses, this study confirmed the uniqueness of the dietary patterns at Fort Vermilion I, adding an important body of work concerning the diet of fur traders in Northern Alberta.

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APPENDIX I: HISTORIC RECORDS OF ANIMAL CONSUMPTION

Species/Subspecies	Taxonomic Name	Remarks	Author	Notes
Boreal Woodland Caribou	*Rangifer tarandus caribou*	"…the flesh of those deer [is not] so much esteemed by the Northern Indians, as that of the smaller kind [Barren-ground Caribou]." [1] "They [Nahathaway] were hunting and living on the large species of Deer, the Mathe Moose, the meat was fat and good, they told me the habits of this species are utterly different from the common wandering Rein Deer, it's meat far superior, and in size nearly twice that of the common Deer..." [2]	[1] Samuel Hearne (1911:236) [2] David Thompson's Narrative (1968:148)	Hearne almost exclusively refers to caribou as "deer"; when opportunity allowed, a haggis-like meal was prepared using the stomach, blood, heart, lungs, and the tenderest of flesh (p.171); Thompson notes that the Natives refer to caribou (likely Barren-ground) by "Marthee Teek", or "ugly Deer"; Thompson also describes an animal the Nahathaway call "Mathe Moosewah" (ugly Moose", likely a large form of Woodland Caribou; clearly a difference of opinion between Chipewyan and Nahathaway (Cree) on which species of Caribou was better; Thompson also describes the haggis-like meal mentioned by Hearne: "The Stomach, or Paunch, of the Rein Deer is taken out of the animal, the orifice tied up, and then for three days hung in the smoke, but not near the fire. It is now sour, bits of meat and fat are mixed with the contents, it is then boiled, and all those who have eaten of it say it is an agreeable, hearty meal." (p. 160)
Barren-ground Caribou	*Rangifer tarandus groenlandicus*	"…the flesh of the small Northern deer [Caribou]…is by far more delicious and the finest I have ever eaten…and is of that particular quality, that it never cloys."[1] "It's meat is good, but has something of a peculiar taste; the fat is somewhat like that of mutton; the Tongue in richness and delicacy far exceeds any other deer, and is even superior to the tongue of the Bison. ...The meat at [Spring] is always poor and what is salted is barely eatable; it is only in Autumn and the early part of winter that they are in good condition." [2] "Every part of the animal is eaten, even to the contents of its stomach; and the half-dried tongue, when roasted, is perhaps that greatest delicacy that the fur countries afford. Rein-deer meat, when in the best condition, is not only superior to that of the moose deer and bison, but, in my opinion, it surpasses the best mutton or English-fed venison. When lean, however,...it is neither nutritious nor palatable, the flesh of a poor musk-ox being...alone of inferior quality." [3]	[1] Samuel Hearne (1911:236) [2] David Thompson's Narrative (1968:98-99) [3] John Richardson (1836:499)	

Species/Subspecies	Taxonomic Name	Remarks	Author	Notes
Muskox	*Ovibos moschatus*	"…the flesh of the musk-ox is not only so coarse and tough, but smells and tastes so strong of musk as to make it very disagreeable when raw, though it is tolerable eating when properly cooked...The calves and the heifers are good eating; but the flesh of the bulls both smells and tastes so strong of musk, as to render it very disagreeable..." [1] "...the meat of a well-fed cow is agreeably tasted and juicy; but that of a lean cow and of the bull is strongly impregnated with a disagreeable musky flavour, so as to be palatable only to a very hungry man."[2]	[1] Samuel Hearne (1911:84, 167) [2] John Richardson (1836:501)	Muskox meat used for pemmican at times
Moose	*Alces alces*	"The flesh of the moose is very good, though the grain is but coarse, and it is much tougher than any other kind of venison. The nose is most excellent, as is also the tongue, though by no means so fat and delicate as that of the common deer[caribou?]." [1] "The flesh of a Moose in good condition, contains more nourishment than that of any other Deer; five pounds of this meat being held to be equal in nourishment to seven pounds of any other meat even of the Bison, but for this, it must be killed where it is quietly feeding; when run by Men, Dogs, or Wolves for any distance, it's flesh is altogether changed, becomes weak and watery and when boiled, the juices separates from the meat like small globules of blood, and does not make broth; the change is so so great, one can hardly be persuaded it is the meat of a Moose Deer." [2] "[It] furnishes the best and most juicy meat, with the exception of the rein-deer, the flesh of which, when in season, is more delicate." [3] "When a moose is slaughtered, the tongue, palate, mouffle, and marrowbones are reserved for the white-hunters, while their attendants feast on the flesh. This, though coarse in grain, is, when in good condition, very tender, and rather like beef, with the addition of a slightly gamey flavour; it is largely preserved by means of smoke-drying. The fat...is quite soft, and the layer on the chine, known as the depouillé, is highly esteemed by the trappers and Indians..." [4]	[1] Samuel Hearne (1911:262) [2] David Thompson's Narrative (1968:96) [3] John Richardson (1836:498) [4] William Ross King (1866:66)	Hearne's indigenous companions did not deem either moose or bison to be "substantial" food, due to the ease of digestion (p.262)

Species/Subspecies	Taxonomic Name	Remarks	Author	Notes
Elk (Wapiti)	*Cervus elaphus canadensis*	"Their flesh is tolerable eating; but the fat is as hard as tallow, and if eaten as hot as possible, will yet chill in so short a time, that it clogs the teeth, and sticks to the roof of the mouth, in such a manner as to render it very disagreeable." [1] "The flesh of this deer is considered as much inferior to that of the bison or moose deer..."[2] "The flesh is coarse..." [3]	[1] Samuel Hearne (1911:337) [2] John Richardson (1836:500) [3] William Ross King (1866:87)	Refered to as "red deer" by traders
Wood Bison	*Bison bison athabascae*	"The flesh of the buffalo is exceedingly good eating; and so entirely free from any disagreeable smell or taste, that it resembles beef as nearly as possible : the flesh of the cows, when some time gone with calf, is esteemed the finest ; and the young calves, cut out of their bellies, are reckoned a great delicacy indeed...The tongue is also very delicate." [1]	[1] Samuel Hearne (1911:257-258)	Peter Fidler describes a whole buffalo head being roasted over the fire for 2 days and 2 nights, hair, horns, and all, during his winter with the Chipewyan. (p. 546)
Plains Bison	*Bison bison bison*	"…bull meat is not regarded, it is seldom fat and always tough." [1]	[1] David Thompson's Narrative (1968:431)	
White-tailed Deer	*Odocoileus virginianus*	"The flesh of the Deer, when in season, is tender and well-flavoured, but generally rather lean…" [1]	[1] William Ross King (1866:89)	

Species/Subspecies	Taxonomic Name	Remarks	Author	Notes
Black Bear	*Ursus americanus*	"After the middle of July, when the berries begin to ripen, they are excellent eating, and so continue till January or February following; but late in the Spring they are, by long fasting, very poor and dry eating."[1] "The meat of the Bear feeding on roots and berries becomes very fat and good, and in this condition it enters it's den for the winter; at the end of which the meat is still good, and has some fat, but the very first meal of fish the taste of the meat is changed for the worse, and soon becomes disagreeable." [2] "The fat of the bear resembles hog's lard, and is generally considered a delicacy by the Indians; but its strong flavour is disagreeable to Europeans." [3] "The flesh...is white, devoid of flavour, and rather greasy than fat." [4]	[1] Samuel Hearne (1911:345) [2] David Thompson's Narrative (1968:113-114) [3] John Richardson (1836:487) [4]William Ross King (1866:8)	
Lynx	*Lynx canadensis*	"…seen them killed, and have eaten of their flesh in the neighborhood of York Fort. The flesh is white, and nearly as good as that of a rabbit." [1] "The flesh is white and good, and makes a good roast." [2] "…the Indians eat the flesh, which [is] white and tender [though] would not...be at all appreciated by a European." [3] "...but let someone...fry some cutlets from the ham of a lynx, and fifty to one you will relish it very fine veal and you cannot be convinced to the contrary." [4]	[1] Samuel Hearne (1911:341) [2] David Thompson's Narrative (1968:73) [3] William Ross King (1866:16) [4] Martin Hunter (1907:62)	
Arctic Fox	*Vulpes lagopus*	"The White [Arctic] fox, when killed at any considerable distance from the sea coast are far from being disagreeable eating…on Marble Island…they were equal in flavor to rabbit…but near Churchill River, they are as rank as train oil." [1] "…the flesh of the arctic fox is eaten as readily as that of the hare or white partridge; all other foxes are carrion; even a starving Indian would give them the go-by." [2]	[1] Samuel Hearne (1911:341) [2] Martin Hunter (1907:104)	
Red Fox	*Vulpes vulpes*	"...the flesh of the [Red] fox are never eaten by those people [indigenous companions of Hearne], except when they are in the greatest distress, and then merely to save life." [1]	[1] Samuel Hearne (1911:255)	

Species/Subspecies	Taxonomic Name	Remarks	Author	Notes
Wolverine	*Gulo gulo*	"...the flesh of the...quiquehatch (Wolverine) are never eaten by those people [indigenous companions of Hearne], except when they are in the greatest distress, and then merely to save life." [1] "…shot a Wolverin[e] which we snapped up before it was well warm thro - a delicious morsel!!! but what cannot hungar do..." [2]	[1] Samuel Hearne (1911:255) [2] Peter Fidler (1934:526)	Called quiquihatch by Hearne and his indigenous companions; Peter Fidler's account of eating wolverine comes at a time when his party had been without provisions for several days, hence the voracity with which they ate it
Porcupine	*Erethizon dorstatus*	"The flesh of the porcupine is very delicious, and so much esteemed by the Indians, that they think it the greatest luxury that their country affords." [1] "When they are in good condition, nicer or more juicy meat a hunter cannot put his teeth into." [2]	[1] Samuel Hearne (1911:354) [2] Martin Hunter (1907:62)	
Snowshoe Hare	*Lepus americanus*	"The flesh of those Hares [Snowshoe] is generally more esteemed than that of the former [Arctic]. They [Snowshoe] are seldom sought after in Summer, as in that season they are not esteemed good eating; but as the Fall advances they are, by feeding on berries, most excellent." [1] "...among the country people it [Snowshoe Hare] is not considered fit for food till after the first frost, but that the flesh is, at the best, in poor repute in the cuisine, being hard and dry, and is looked upon with disdain as a dish, except in a potage with plenty of other ingredients." [2]	[1] Samuel Hearne (1911:357) [2] William Ross King (1866:31)	The term "varying hare" and "rabbit" seems to refer to either species; therefore, location will determine which species is being refered to; King's account of snowshoe hare came from "a friend in Canada"
Arctic Hare	*Lepus arcticus*			

Species/Subspecies	Taxonomic Name	Remarks	Author	Notes
Beaver	*Castor canadensis*	"In Winter they are very fat and delicious…very poor during the Summer season, at which time their flesh is but indifferent eating…" [1] "His meat is agreeable to most although fat and oily; the tail is a delicacy." [2] "The flesh is much prized by the natives as an article of diet, - a roasted beaver being the prime dish on their feast days." [3] "The trappers esteem the tail a great delicacy, and the flesh of the young Beaver is really excellent, and very like that of a young pig. The orthodox method of cooking it is to roast the animal in its skin, but as this is worth several dollars, it is not often that a trapper is willing to make the sacrifice." [4]	[1] Samuel Hearne (1911:246) [2]David Thompson's Narrative (1968:199) [3] John Richardson (1836:495) [4] William Ross King (1866:37-38)	
Skunk	*Mephitis mephitis*	"...some Indians that were tenting on the plantation killed two of those animals, and made a feast of them" [1] "…its own flesh is said to be excellent." [2] "A skunk, shot and prepared with care, makes very good eating." [3]	[1] Samuel Hearne (1911:351) [2] William Ross King (1866:18) [3] Martin Hunter (1907:63)	
Raccoon	*Procyon lotor*	"The flesh is said to be excellent." [1] "The racoons are very fat, having dépouilles two or three inches thick, and are excellent eating when stripped of their fat and roasted." [2]	[1] William Ross King (1866:10) [2] Alexander Henry (1965:122)	
Muskrat	*Ondatra zibethicus*	"…when fat are good eating, particularly when nicely singed, scalded, and boiled."[1] "…cut off a quarter of your roast suckling [muskrat], and fall to, and a hundred to one you never ate anything more delicious." [2]	[1] Samuel Hearne (1911:353) [2] Martin Hunter (1907:61)	
Red Squirrel	*Tamiasciurus hudsonicus*	"Though small, and seldom fat, yet they are good eating." [1]	[1] Samuel Hearne (1911:358)	

Species/Subspecies	Taxonomic Name	Remarks	Author	Notes
Fox Squirrel	*Sciurus niger*	"The flesh of this kind, especially after the hickory nuts come in, is not to be despised, being white and very tender, and of delicate flavour. I have occasionally killed them when on commons, and consider the flesh, either stewed or made into a curry, as equal to rabbit, and have passed it off as such; on one occasion eliciting the highest commendations of a brother officer, who had often expressed his disgust at the idea of eating squirrel." [1]	[1] William Ross King (1866:32)	
Arctic Ground Squirrel	*Urocitellus parryii*	"…are for the most part exceedingly fat and good eating." [1]	[1] Samuel Hearne (1911:359)	
American Marten	*Martes americana*	"…[as] their flesh and fur [is] good, they are trapped by the Natives and Men of the Factories…"[1]	[1] David Thompson's Narrative (1968:70)	
American Mink	*Neovison vison*	"Their flesh is oily, black, and highly flavoured…" [1]	[1] Martin Hunter (1907:63)	Hunter notes that he, along with very few Indians, could ever stomach either animal; in fact, he states that "the Indians as a rule look down with contempt on a fellow Indian who eats otter or mink…" (p.63); this is in reference to eastern populations of First Nations groups, from Ontario to Labrador
Otter	*Lontra canadensis*	"Their flesh is oily, black, and highly flavoured…" [1]	[1] Martin Hunter (1907:63)	
Horse	*Equus caballus*	"…we found the meat of the tame Horse, better than that of the wild Horse, the fat was not so oily…" [1]	[1] David Thompson's Narrative (1968:377)	
Dog	*Canis familiaris*	"…the French eat it when they are at [the Mi'kmaq] feasts… they like it better than mutton" [1] "My people prefer to purchase fat dogs from the Indians rather than to live on lean buffalo meat"[2]	[1] Father Chrestien LeClercq (2009:18) [2] Alexander Henry (1965:654)	Numerous accounts of men eating dogs, either due to starvation, or, in the case of the NWC, to terrorize rival HBC posts, wherein NWC men would steal and eat the fattest dogs from an HBC fort to dissuade them from staying in the area.
Puma/Cougar/Mountain Lion	*Puma concolor concolor*	"…the flesh was white and good, in quantity equal to the antelope, the Liver was rich…" [1]	[1] David Thompson's Narrative (1968:387)	

Species/Subspecies	Taxonomic Name	Remarks	Author	Notes
Bald Eagle	*Haliaeetus leucocephalus*	"The flesh of the Eagle is usually eaten by most of the Indians, but is always black, hard, and fishy; even the young one, when in a callow state, though the flesh is delicate white, are so rank as to render them very unpleasant to some persons, except in time of necessity." [1] "...the inside fat is purgative, and when they feed on trout, highly so: their flesh is eaten by the Natives, as being more fat and juicy, and [they] prefer them to Grouse..." [2]	[1] Samuel Hearne (1911:370) [2] David Thompson's Narrative (1968:63)	Often referred to as "white-headed eagle"; Thompson (p. 151) recounts a time when he and another companion ate the yellow fat from several young bald eagles, only to suffer "violent" dysentery the next day. Their native companion told them that this was "always the effect from eating the inside fat of the bald eagle, as well as most birds of prey that live on fish."
Ruffed Grouse	*Bonasa umbellus*	"Their flesh is delicately white and firm, and though they are seldom fat, they are always good eating, and are generally esteemed best when larded and roasted, or nicely boiled with a bit of bacon." [1]	[1] Samuel Hearne (1911:376)	
Sharp-tailed Grouse	*Tympanuchus phasianellus*	"…though the flesh is dark, yet it is juicy, and always esteemed good eating, particularly when larded and roasted." [1] "Its flesh, though superior to [Spruce Grouse and ptarmigan], is not so tender as that of the Ruffed Grouse." [2]	[1] Samuel Hearne (1911:377) [2] John Richardson (1836:507)	Noted as "pheasants" by Thompson
Spruce Grouse	*Falcipennis canadensis*	"In Winter their flesh is black, hard and bitter, probably owing to the resinous quality of their food during that season…" [1] "…it's flesh tastes of the pine on which it feeds…It is only eaten for want of better…" [2] "The leaves of the spruce form its food, which gives its dark-couloured flesh a stong resinous taste."[3] "The flesh, which is dark, is very like that of the common grouse, but more bitter, and in the [winter] has a considerable flavour of turpentine." [4]	[1] Samuel Hearne (1911:378) [2] David Thompson's Narrative (1968:47) [3] John Richardson (1836:506) [4] William Ross King (1866:143)	
Willow Ptarmigan	*Lagopus lagopus*	"…every one that has had an opportunity of tasting those large partridges [males], will readily allow that they excel the common sort as much in flavour as they do in size." [1]	[1] Samuel Hearne (1911:380)	Called "willow partridge" by Hearne, "willow grouse" by Thompson

Species/Subspecies	Taxonomic Name	Remarks	Author	Notes
Rock Ptarmigan	*Lagopus muta*	"…their flesh is by no means so good [as Willow Ptarmigan], being black, hard, and bitter." [1]	[1] Samuel Hearne (1911:381)	Called "rock grouse" by Thompson
Gyrfalcon	*Falco rusticolus*	"Their flesh is always eaten by the Indians, and sometimes by the English; but it is always black, hard, and tough, and sometimes has a bitter taste." [1]	[1] Samuel Hearne (1911:370)	
Snowy Owl	*Bubo scandiacus*	" In Winter they are frequently very fat, their flesh delicately white, and generally esteemed good eating, both by English and Indians." [1] "The meat of the Owl is good, and well tasted to hunters." [2] "…gives as fine a flavoured flesh, and the same in colour and appearance as a fat capon [rooster]...the flesh is most toothsome." [3]	[1] Samuel Hearne (1911:371) [2] David Thompson's Narrative (1968:64) [3] Martin Hunter (1907:62)	
Great Horned Owl	*Bubo virginianus*	" …their flesh is delicately white, and nearly as good as a barn-door fowl; of course it is much esteemed both by the English and Indians." [1] "The meat of the Owl is good, and well tasted to hunters." [2]	[1] Samuel Hearne (1911:372) [2] David Thompson's Narrative (1968:64)	
Northern Hawk Owl	*Surnia ulula*	"They are never fat, and their flesh is eaten only by the Indians." [1]	[1] Samuel Hearne (1911:372)	
Raven	*Corvus corax*	"At those times [eating of rotten carcasses left from fur removal] they are very fat, and the flesh of the young ones is delicately white, and good eating." [1]	[1] Samuel Hearne (1911:373)	
American Robin	*Turdus migratorius*	"…they are never sought after as an article of food, but when killed by the Indian boys, are esteemed good eating, though they always feed on worms and insects." [1]	[1] Samuel Hearne (1911:385)	Called "red-breasted thrush" by Hearne
Snow Bunting	*Plectrophenax nivalis*	"make their appearance…at the latter end of May, or beginning of April, when they are very fat, and not inferior in flavour to an ortolan [popular French songbird dish]" [1] "…they are a delicacy for the table." [2]	[1] Samuel Hearne (1911:385-386) [2] David Thompson's Narrative (1968:48)	

Species/Subspecies	Taxonomic Name	Remarks	Author	Notes
Whooping Crane	*Grus americana*	"…esteemed good eating." [1]	[1] Samuel Hearne (1911:388)	Hearne notes that the "wing-bones of this bird are so long and large, that I have known them made into flutes with tolerable success." (p.389)
Sandhill Crane	*Grus canadensis*	"They are generally esteemed good eating…" [1] "They are good eating, fleshy, but not fat. They make the best of broth..." [2]	[1] Samuel Hearne (1911:389) [2] David Thompson's Narrative (1968:38)	Called "brown crane" by Hearne
American Bittern	*Botaurus lentiginosus*	"…though seldom fat, they are generally good eating." [1] "…it takes it's name from having on each breast a narrow stripe about two inches in length, of rough, raised, yellow skin, which is very bitter, and must be taken off, otherwise, this well tasted bird is too bitter to be eaten." [2] "It is generally used by settlers for making soup; but when in proper condition is considered excellent eating." [3]	[1] Samuel Hearne (1911:390) [2] David Thompson's Narrative (1968:66) [3] William Ross King (1866:168)	
Whimbrel/Hudsonian Curlew	*Numenius phaeopus*	"…at times are delicious eating." [1]	[1] Samuel Hearne (1911:390)	
Eskimo Curlew	*Numenius borealis*	"The flesh of this bird is generally more esteemed that that of the former [Wimbrel], but they are by no means so numerous." [1]	[1] Samuel Hearne (1911:390)	
Jack Snipe	*Lymnocryptes minimus*	"Their flesh is by no means so delicate as that of the English Snipe." [1]	[1] Samuel Hearne (1911:391)	
Hudsonian Godwit	*Limosa haemastica*	"Near Churchill River they are seldom fat, though tolerably fleshy, and are generally good eating." [1]	[1] Samuel Hearne (1911:391)	Called "red godwait" by Heanre
Greater Yellowlegs	*Tringa* melanoleuca	"…at which time [late October] they are in the greatest perfection, and most delicious eating, more particularly so when put into a bit of paste and boiled like an apple-dumpling; for in fact they are generally too fat at that season to be eaten either roasted or boiled." [1]	[1] Samuel Hearne (1911:392)	Called "yellow godwait" by Hearne

Species/Subspecies	Taxonomic Name	Remarks	Author	Notes
Ruddy Turnstone	*Arenaria interpres*	"…they are usually very fat, but even when first killed they smell and taste so much like train-oil as to render them by no means pleasing to the palate, yet they are frequently eaten by the Company's servants." [1]	[1] Samuel Hearne (1911:392)	
American Golden Plover	*Pluvialis dominica*	"…at Albany Fort, several barrels of them are annually salted for Winter use, and are esteemed good eating." [1]	[1] Samuel Hearne (1911:393)	
Semipalmated Plover	*Charadrius semipalmatus*	"…is most excellent eating…" [1]	[1] William Ross King (1866:168)	
Killdeer	*Charadrius vociferus*	"…its flesh is not esteemed." [1]	[1] William Ross King (1866:169)	
Black Guillemot	*Cepphus grylle*	"…lay two white eggs, which are delicate eating…" [1]	[1] Samuel Hearne (1911:394)	
Common Loon	*Gavia immer*	"Their flesh is always black, hard, and fishy, yet it is generally eaten by the Indians." [1] "…it lays only three eggs, when boiled, the inside appears streaked black and yellow, and [they] are so ill tasted they cannot be eaten, it's flesh is also bad...they live wholly on fish, which gives their flesh so stong a taste that few can eat them, especially if they feed on trout, those that live on Carp, White Fish, Pickerel and Pike have a better taste, but always bad" [2]	[1] Samuel Hearne (1911:394) [2] David Thompson's Narrative (1968:67, 153)	Called "northern diver" by Hearne
Yellow-Billed Loon	*Gavia adamsii*	"Their flesh is equally black and fishy with the former [Common Loon], but it is always eaten by the Indians." [1]	[1] Samuel Hearne (1911:394)	Called "black-throated diver" by Hearne
Red-Throated Loon	*Gavia stellata*	"…only lay two eggs, which, though very rank and fishy, are always eaten by Indians and English." [1]	[1] Samuel Hearne (1911:395)	Called "red-throated diver" by Hearne
Herring Gull	*Larus argentatus*	"Their eggs are generally esteemed good eating, as well as the flesh of those in the interior parts of the country, though they feed on fish and carrion." [1] "…the eggs of which are nearly as good as those of our common Fowls." [2]	[1] Samuel Hearne (1911:396) [2] David Thompson's Narrative (1968:182)	Called "white gulls" by Hearne; he also talks about "grey gulls", which, according to E.B. Treble (who annotated 1911 version), are likely the young of the white gulls; they are also deemed "good eating" by Hearne

Species/Subspecies	Taxonomic Name	Remarks	Author	Notes
Arctic Skua	*Stercorarius parasiticus*	"Their eggs are always eaten, both by the Indians and English; but the bird itself is generally rejected, except when other provisions are very scarce." [1]	[1] Samuel Hearne (1911:396)	
Arctic Tern	*Sterna paradisaea*	"Their eggs are very delicate eating, the yolks being equal to that of a young pullet, and the whites of a semi-transparent azure, but the bird istelf is always fishy." [1]	[1] Samuel Hearne (1911:397)	
American White Pelican	*Pelecanus erythrorhynchos*	"The flesh of the young Pelican is frequently eaten by the Indians; and as they are always very fat, great quantities of it is melted down and preserved in bladders for Winter use, to mix with pounded flesh; but by keeping, it grows very rank." [1]	[1] Samuel Hearne (1911:397-398)	
Red-breasted Merganser	*Mergus serrator*	"In the Fall of the year they are very fat, and though they always feed on fish, yet their flesh at that season is very good…" [1]	[1] Samuel Hearne (1911:398-399)	Called "gooseanders" or "Shelldrakes" by Hearne
Common Merganser	*Mergus merganser*	"…has no culinary qualifications, the flesh being lean and fishy." [1]	[1] William Ross King (1866:239)	
King Eider	*Somateria spectabilis*	"…their flesh is by no means esteemed good, though their eggs are not disagreeable." [1]	[1] Samuel Hearne (1911:408)	
Common Eider	*Somateria mollissima*	"Their eggs, when found, are exceeding good eating; and in the Fall of the year the flesh is by no means unpleasnt, though they are notoriously known to feed on fish." [1]	[1] Samuel Hearne (1911:407)	Called "Dunter Goose" around Hudson's Bay, though Hearne identifies it as the Eider Duck
American Black Duck	*Anas rubripes*	"…their flesh is by no means esteemed good, though their eggs are not disagreeable." [1] "…their flesh is considered very good." [2]	[1] Samuel Hearne (1911:408) [2] William Ross King (1866:202)	

Species/Subspecies	Taxonomic Name	Remarks	Author	Notes
Mallard Duck	*Anas platyrhynchos*	"At their first arrival on the sea-coast, they are exceeding good eating; but when in a moulting state, though very fat, they are in general so rank that few Europeans are fond of them. At those seasons the difference in flavour is easily known by the color of the fat; for when that is white, the flesh is most assuredly good; but when it is yellow, or of an orange colour, it is very rank and fishy [only for coastal species]...in the interior parts...their flesh was very good; and the young Mallard Duck before it can fly is very fat, and most delicate eating." [1]	[1] Samuel Hearne (1911:409)	
Northern Pintail	*Anas acuta*	"The same [Mallard's description] may be said of the Long-tailed Duck." [1] "…is remarkable for its flavour and excellence…" [2]	[1] Samuel Hearne (1911:409) [2] William Ross King (1866:207)	
American Widgeon	*Anas americana*	"Their flesh is generally esteemed…" [1]	[1] Samuel Hearne (1911:409)	
Green-winged Teal	*Anas crecca*	"At their first arrival [along the coast] they are but poor, though generally esteemed good eating…At that time [late October, along interior rivers] they are entirely involved in fat, but delicately white, and may truly be called a great luxury." [1]	[1] Samuel Hearne (1911:409-410)	
Shoveler	*Anas clypeata*	"…its flesh is deservedly very high-esteemed…there is no question as to the exceedingly delicate and tender nature of its flesh." [1]	[1] William Ross King (1866:203)	
Gadwall	*Anas strepera*	"…excellence of its flesh…" [1]	[1] William Ross King (1866:206)	
Greater Scaup	*Aythya marila*	"…its flesh is held in small esteem, on account of its coarseness and indifferent flavour." [1]	[1] William Ross King (1866:219)	
Ring-necked Duck	*Aythya collaris*	"…the flesh is very tender and excellent." [1]	[1] William Ross King (1866:221)	
Canvasback	*Aythya valisineria*	"…excellence of flesh…" [1]	[1] William Ross King (1866:221)	

Species/Subspecies	Taxonomic Name	Remarks	Author	Notes
Bufflehead	*Bucephala albeola*	"…the flesh is not remarkable for excellence…" [1]	[1] William Ross King (1866:227)	
Harlequin Duck	*Histrionicus histrionicus*	"…of excellent flesh…" [1]	[1] William Ross King (1866:230)	
American Scoter	*Melanitta americana*	"The Scoters…are rank and oily in flavour, and almost uneatable when killed. So strong is the flesh of the common [American] Scoter that Yarrell says it is allowed by the Roman Catholics to be eaten in Lent, as being so completely identified with fish." [1]	[1] William Ross King (1860:232)	
White-winged/Velvet Scoter	*Melanitta fusca*			
Surf Scoter	*Melanitta perspicillata*			
Tundra/Whistling Swan	*Cygnus columbianus*	"…the eggs of the larger species [Trumpeter Swan] are so big, that one of them is a sufficient meal for a moderate man, without bread or any other addition…The flesh of both are excellent eating, and when roasted, is equal in flavour to young heifer-beef, and the cygnets are very delicate." [1] "...when fat they are good eating, but when poor the flesh is hard and dry." [2] "...the carcase [of the Trumpeter] even after undergoing that operation [skinning] is very good to eat, being nearly equal to that of a goose." [3]	[1] Samuel Hearne (1911:399) [2] David Thompson's Narrative (1968:64) [3] John Richardson (1836:512)	
Trumpeter Swan	*Cygnus buccinator*			
Canada Goose	*Branta canadensis*	"The flesh of the Canada goose is extremely nutritious and well flavoured…" [1]	[1] William Ross King (1866:195)	Called "Common Grey Goose" by Hearne
Cackling Goose	*Branta hutchinsii*	"…the flesh [is] much whiter, [and] more esteemed [than the Canada Goose]." [1] "…its flesh has a most exquisite flavour." [2]	[1] Samuel Hearne (1911:402) [2] John Richardson (1836:517)	A subspecies of Canada Goose, but recently designated new taxonomic name; called Canada Goose in Hearne's journal
Giant Canada Goose	*Branta canadensis maxima*	"Their flesh is by no means unpleasant, though always hard and tough…" [1]	[1] Samuel Hearne (1911:406)	Another subspieces of Canada Goose, the largest of all subspecies

Species/Subspecies	Taxonomic Name	Remarks	Author	Notes
Snow/Blue Goose	*Chen caerulescens*	"…they are universally thought good eating, and will, if proper care be taken in curing them, continue good for eighteen months or two years...the skin is of a dark lead-colour, and the flesh is excellent eating, eitther fresh or salt." [1] "…of richer meat [than the Canada or Brent Goose]." [2] "...when fat is a very excellent bird, vieing with the laughing [Greater White-fronted] goose in its qualities as an article of diet." [3] "...the flesh is extremely delicate." [4]	[1] Samuel Hearne (1911:402-404) [2] David Thompson's Narrative (1968:34) [3] John Richardson (1836:517) [4] William Ross King (1866:191)	Though classified by Hearne as two different species, the Blue Goose is actually the same species as the Snow Goose, just a seasonal plumage colour variation
Ross's Goose	*Chen rossi*	"The flesh of this bird is exceedingly delicate; but they are small, that when I was on my journey to the North I eat two of them one night for supper." [1]	[1] Samuel Hearne (1911:405)	
Greater White-fronted Goose	*Anser albifrons*	"…their skins, when stripped of their feathers, are delicately white, and the flesh excellent." [1] "Its flesh is superior to that of the Canada goose." [2] "Its flesh is excellent." [3]	[1] Samuel Hearne (1911:405) [2] John Richardson (1836:516) [3] William Ross King (1866:190)	
Brent Goose	*Branta bernicla*	"…though their flesh appears delicate to the eye, it is not much esteemed." [1]	[1] Samuel Hearne (1911:407)	
Double-crested Cormorant	*Phalacrocorax auritus*	"…their flesh and Eggs are almost as bad as those of the Loon…" [1] "…we took some eggs of the Crow duck…but to our great surprise we could not boil them hard and instead of white they had a kind of green jelly the yolk was the same as other eggs [and] we thought them very fine eating." [2]	[1] David Thompson's Narrative (1968:68) [2] Philip Turnor (1934:476)	Turnor (p. 476) describes these birds as "Crow ducks"

Species/Subspecies	Taxonomic Name	Remarks	Author	Notes
Pike	*Essox lucius*	"They are as rich as meat." [1] "…is very good when made into a kind of forcemeat balls with the inside fatt of the Moose or Buffalo…" [2]	[1] David Thompson's Narrative (1968:60) [2] Philip Turnor (1934:456)	
Lake Trout	*Salvelinus namaycush*	"…the fish caught alive are better than those drowned…they are very rich fish, make a nutritious broth, and pound for pound are equal to good beef." [1] "…some of them are very good [though] they do not eat well after they have been froze a few days [as they] have a strong oily flavour." [2]	[1] David Thompson's Narrative (1968:158) [2] Philip Turnor (1934:441)	
Whitefish	*Coregonus clupeaformis*	"They are delicate eating; being nearly as firm as a perch, and generally very fat." [1] "It is a rich well tasted, nourishing food; but in shoal muddy Lakes it is poor and not well tasted." [2] "…a rich, agreeable, and very wholesome fish, that never palls the appetite; and is preferable, even when lean, for a daily article of diet, to any other fish of this country." [3]	[1] Samuel Hearne (1911:114) [2] David Thompson's Narrative (1968:111) [3] John Richardson (1836:519)	Refered to as "tittemeg", "tittmeg" or "tittameg" in Hearne's account
Burbot	*Lota lota*	No specific dietary description, but caught in Great Slave Lake		Called "methy" by Hearne
Inconnu	*Stenodus leucichthys*	"Their flesh, though delicately white, is very soft, and has so rank a taste, that many of the Indians, except they are in absolute want, will not eat it." [1] "…are said to be very good eating when fatt but very bad when poor…" [2]	[1] Samuel Hearne (1911:254) [2] Philip Turnor (1934:416)	Great Slave Lake, at least in Hearne's writings, is called "Athapuskow Lake"; Turnor notes that the Chipewyan call the inconnu "Beg-goo-hoo-la", or "No Teeth"
Longnose Sucker	*Catostomus catostomus*	"…is a tolerable fish… good fish though weak food." [1]	[1] David Thompson's Narrative (1968:60, 112)	Thompson refers to both species as "carp"
Shorthead Redhorse	*Moxostoma macrolepidotum*	"…is so full of small bones, only the head and shoulders are eaten." [1]	[1] David Thompson's Narrative (1968:60)	
Lake Sturgeon	*Acipenser fulvescens*	"…neither the trout or Sturgeon are good after they have been froze…" [1]	[1] Philip Turnor (1934:455)	

APPENDIX II: ELEMENT FREQUENCY BY SPECIES

Artiodactyla					
Element	**Count**	**Element**	**Count**	**Element**	**Count**
Rib	234	Radius	9	Skull	2
LBF	121	Tooth, molar	7	Tooth, premolar	2
Tooth	63	Cervical vertebra	6	Ulna	2
Vertebra	38	Humerus	5	Astragalus	1
Scapula	31	Mandible	5	Cartilage	1
Thoracic vertebra	22	Tooth, incisor	5	First Phalanx	1
Femur	18	Hyoid	3	Sacrum	1
Pelvis	17	UID	3	Cuneiform Pes	1
Tibia	17	Metatarsal	2	Sternum	1
Lumbar vertebra	17	Patella	2	Manus V	1

Cervidae					
Element	**Count**	**Element**	**Count**	**Element**	**Count**
Rib	27	Lumbar vertebra	4	Atlas	1
Tooth, premolar	10	Femur	2	Carpal	1
Sacrum	7	Pelvis	2	Radius	1
Thoracic vertebra	7	Skull	2	Tooth	1
Scapula	4	Tooth, incisor	2	Ulna	1
Tooth, molar	4	Sternum	2		

Bison bison					
Element	**Count**	**Element**	**Count**	**Element**	**Count**
Rib	55	LBF	3	Atlas	1
Vertebra	24	Radius	3	Fibula	1
Femur	12	Axis	2	Sacrum	1
Lumbar vertebra	10	Humerus	2	Tooth, incisor	1
Tibia	9	Mandible	2	Tooth, molar	1
Ulna	9	Patella	2	Unciform	1
Thoracic vertebra	9	Scapula	2	Pez	1
Pelvis	8	Skull	2	Sternum	1
Metatarsal	5	Cervical vertebra	2	Maxilla	1
Caudal vertebra	4				

Alces alces					
Element	**Count**	**Element**	**Count**	**Element**	**Count**
Tibia	28	Vertebra	10	Pisiform	3
Skull	25	Metatarsal	7	Vestigial Metatarsal	3
Femur	24	Third Phalanx	7	Navicular cuboid	2
Pelvis	24	Astragalus	6	Tooth, incisor	2
Radius	23	Tooth, molar	6	Caudal vertebra	2
Lumbar vertebra	22	Cuneiform	6	Magnum	2
Scapula	21	First Phalanx	5	Manus V	2
Ulna	16	Lunate	5	Calcaneum	1
Mandible	15	Atlas	4	Metapodial	1
Sacrum	15	Patella	4	Cuneiform Pes	1
Thoracic vertebra	14	Sesamoid	4	First Tarsal	1
Humerus	12	Lateral Malleolus	4	Pez	1
Cervical vertebra	12	Axis	3	Maxilla	1
Hyoid	10	Metacarpal	3	Vestigial Metacarpal	1
Second Phalanx	10	Tooth, premolar	3		

Cervus elaphus					
Element	**Count**	**Element**	**Count**	**Element**	**Count**
Rib	7	Sternum	2	Tibia	1
Ulna	7	Femur	1	Tooth	1
Scapula	6	Metatarsal	1	Tooth, incisor	1
Pelvis	5	Navicular cuboid	1	Vertebra	1
Radius	3	Skull	1	Lateral Malleolus	1

Alces alces/Cervus elaphus				*Odocoileus*	
Element	**Count**	**Element**	**Count**	**Element**	**Count**
Third Phalanx	1	Rib	1	Scapula	1

Odocoileus virginianus				*Odocoileus hemionus*	
Element	**Count**	**Element**	**Count**	**Element**	**Count**
Rib	3	Phalanx	1	Pelvis	1
Thoracic vertebra	2	Scapula	1	Scapula	1
Femur	1	Vertebra	1	Tooth, incisor	1
Humerus	1	Lumbar vertebra	1	Vertebra	1
Pelvis	1	Vestigial Metatarsal	1		

Castor canadensis					
Element	**Count**	**Element**	**Count**	**Element**	**Count**
Rib	138	Phalanx	16	Pez	3
Ulna	70	Tooth	15	Atlas	2
Femur	69	Clavicle	13	Axis	2
Caudal vertebra	61	Metatarsal IV	13	Tarsal	2
Mandible	58	Metapodial	11	Tooth, premolar	2
Humerus	55	Metatarsal V	8		1
First Phalanx	51	Calcaneum	5	LBF	1
Radius	51	Carpal	5	Metacarpal	1
Tibia	47	Maxilla	5	Patella	1
Scapula	40	Metatarsal I	5	Sacrum	1
Skull	36	Metatarsal II	5	Sesamoid	1
Vertebra	36	Metatarsal III	5	Pisiform	1
Pelvis	32	Cuboid	5	Sternum	1
Second Phalanx	31	Navicular	5	Metacarpal II	1
Fibula	29	Astragalus	4	Metacarpal III	1
Third Phalanx	29	Thoracic vertebra	4	Metacarpal V	1
Lumbar vertebra	28	Metacarpal IV	4	First Cuneiform	1
Tooth, incisor	23	Cervical vertebra	3	Scapholunar	1
Tooth, molar	19	Cuneiform	3	Occipital	1
Metatarsal	16				

Canidae		*Canis latrans*		*Canis familiaris*	
Element	**Count**	**Element**	**Count**	**Element**	**Count**
Metapodial	2	Tooth, molar	2	Rib	1
Tooth	2	Rib	1		

Canis lupus		*Canis latrans/familiaris*	
Element	**Count**	**Element**	**Count**
Scapula	3	Tooth, molar	5
Vertebra	2	Rib	2
Astragalus	1	Mandible	1
Femur	1	Third Phalanx	1
Rib	1	Tooth, canine	1
Ulna	1		

Lepus americanus					
Element	**Count**	**Element**	**Count**	**Element**	**Count**
Tibia	11	Cervical vertebra	4	Calcaneum	1
Mandible	10	Atlas	3	Metatarsal	1
Femur	9	Radius	3	Second Phalanx	1
Pelvis	7	Rib	3	Tooth	1
Scapula	7	Thoracic vertebra	3	Tooth, molar	1
Humerus	6	Metacarpal II	3	Caudal vertebra	1
Vertebra	6	Astragalus	2	Lumbar vertebra	1
Skull	4	First Phalanx	2	Metatarsal III	1
Ulna	4	Metatarsal II	2	Metatarsal IV	1

Lepus		*Lepus americanus/townsendii*		*Lynx canadensis*	
Element	**Count**	**Element**	**Count**	**Element**	**Count**
LBF	1	Rib	1	Calcaneum	1
Vertebra	1	Scapula	1	Third Phalanx	1
UID	2	Vertebra	1	Rib	1

Martes		*Martes americana*		*Martes pennanti*	
Element	**Count**	**Element**	**Count**	**Element**	**Count**
Humerus	1	Tooth, molar	1	Tooth	1

Rodentia		*Microtus ochrogaster*		*Ondatra zibethicus*	
Element	**Count**	**Element**	**Count**	**Element**	**Count**
Mandible	1	Mandible	2	Pelvis	1
Skull	2	Skull	1	Tibia	1
Tooth	1	Vertebra	2		
Tooth, incisor	1	Maxilla	1		
Tooth, molar	2				

Sciuridae		*Sciurius vulgaris*		*Ursus americanus*	
Element	**Count**	**Element**	**Count**	**Element**	**Count**
Femur	1	Scapula	1	Rib	1
Humerus	1			Lumbar vertebra	1
Mandible	1				
Pelvis	1				
Scapula	1				
Skull	1				

Anas				**Anatidae**	
Element	**Count**	**Element**	**Count**	**Element**	**Count**
Rib	26	Scapula	3	First Phalanx	4
Vertebra	18	Carpometacarpus	3	Tarsometatarsus	4
Tibiotarsus	11	Tarsometatarsus	4	Pelvis	3
Phalanx	10	Quadrate	3	Second Phalanx	3
Second Phalanx	6	LBF	2	Phalanx	2
Ulna	5	Sternum	2	Third Phalanx	2
Coracoid	5	Fibula	1	Skull	2
Femur	4	First Phalanx	1	Tibiotarsus	2
Mandible	4	Sacrum	1	Humerus	1
Cervical vertebra	4	Skull	1	Radius	1
Humerus	3	Furcula	1	Tracheal Ring	1
Radius	3				

Anas platyrhynchos				*Anas acuta*	
Element	**Count**	**Element**	**Count**	**Element**	**Count**
Cervical vertebra	20	Humerus	3	Ulna	8
Rib	5	First Phalanx	3	Humerus	3
Ulna	5	Scapula	3	Femur	2
Thoracic vertebra	5	Vertebra	3	Radius	2
Tibiotarsus	5	Furcula	3	Carpometacarpus	2
Tarsometatarsus	5	Coracoid	3	Tibiotarsus	2
Radius	4	Carpometacarpus	3	Fibula	1
Quadrate	4	Sternum	2	Furcula	1
Femur	3				

Aix sponsa		*Anas acuta/Anas strepera*		*Anas americana*	
Element	**Count**	**Element**	**Count**	**Element**	**Count**
Tibiotarsus	1	Ulna	1	Femur	1

Aythya affinis		*Bucephala albeola*		*Gavia immer*	
Element	**Count**	**Element**	**Count**	**Element**	**Count**
Tibiotarsus	1	Coracoid	1	Carpal	1

Anas strepera			
Element	**Count**	**Element**	**Count**
Cervical vertebra	3	Furcula	1
Humerus	2	Coracoid	1
Femur	1	Rib	1
Ulna	1	Tibiotarsus	1

Anas clypeata	
Element	**Count**
Coracoid	2
Tibiotarsus	1

Branta canadensis			
Element	**Count**	**Element**	**Count**
Rib	8	Tibiotarsus	2
Radius	4	Femur	1
Ulna	4	Humerus	1
Fibula	3	Skull	1
Scapula	3	Sternum	1
Mandible	2	Furcula	1
Pelvis	2	Coracoid	1
First Phalanx	2		

Melanitta fusca	
Element	**Count**
Femur	1
Scapula	1
Skull	1
Carpometacarpus	1

Cygnus	
Element	**Count**
Rib	11
Second Phalanx	3
Pelvis	2
Radius	2
Cervical vertebra	2
Sternum	2
Humerus	1
Hyoid	1
LBF	1
First Phalanx	1
Carpometacarpus	1
Tibiotarsus	1

Cygnus columbianus	
Element	**Count**
Ulna	6
Tibiotarsus	6
Rib	3
Skull	2
Fibula	1
Humerus	1
Radius	1
Scapula	1
Furcula	1
Carpometacarpus	1
Tarsometatarsus	1

Cygnus buccinator	
Element	**Count**
Humerus	3
Skull	2
Hyoid	1
Scapula	1
Ulna	1
Cervical vertebra	1
Cuneiform	1
Sternum	1

Bubo virginianus		Accipitridae		Strigidae	
Element	Count	Element	Count	Element	Count
First Phalanx	2	Radius	2	Skull	1
Second Phalanx	3	Ulna	1		
Tarsometatarsus	1	Lumbar vertebra	1		

Grus americana		*Falcipennis canadensis*	
Element	Count	Element	Count
Ulna	1	Maxilla	1
Coracoid	1		

Bonasa umbellus		*Tympanuchus phasianellus*	
Element	Count	Element	Count
Clavicle	1	Humerus	1
Sternum	2	First Phalanx	1
Coracoid	1		
Tibiotarsus	1		

Coregonus clupeaformis				*Hiodon alosoides*	
Element	Count	Element	Count	Element	Count
Scale	125	Urohyal	2	Scale	174
Rib	67	Cleithrum	2	Cleithrum	15
Preopercle	12	Precaudal Vertebra	2	Opercle	11
Opercle	9	Vertebra	1	Hyomandibular	11
Frontal	8	Parasphenoid	1	Dentary	5
Caudal vertebra	3	Maxilla	1	Supraoccipital	3
Dentary	3	Retroarticular	1	Subopercle	3
Ectopterygoid	3	Branchiostegal Ray	1	Supracleithrum	2
Supracleithrum	3	Metapterygoid	1	Lingual Plate	2
Thoracic vertebra	2	Posttemporal	1	Scapula	1
Vomer	2	Quadrate	1	Palatine	1
Premaxilla	2				

Lota lota					
Element	**Count**	**Element**	**Count**	**Element**	**Count**
Vertebra	54	Caudal vertebra	3	Rib	1
Thoracic vertebra	6	Vomer	3	Basioccipital	1
Branchiostegal Ray	6	Parasphenoid	3	Prootic	1
Quadrate	6	Frontal	3	Retroarticular	1
Cleithrum	6	Dentary	3	Supramaxilla	1
Opercle	5	UID	2	Interopercle	1
Maxilla	4	Ceratohyal	2	Supracleithrum	1
Hyomandibular	4				

Sander vitreus				*Esox lucius*	
Element	**Count**	**Element**	**Count**	**Element**	**Count**
Scale	1195	Opercle	2	Dentary	1
Cleithrum	7	LBF	1	Supracleithrum	1
Maxilla	6	Scapula	1	Cleithrum	1
Supracleithrum	5	Frontal	1	Expanded Neural Spine	1
Dentary	4	Hyomandibular	1		
Angular	4	Precaudal Vertebra	1		
Preopercle	3	Lingual Plate	1		
Rib	2	Ceratohyal	1		
Basioccipital	2				

Lota lota/Salmo gairdneri		*Prosopium wiliamsoni*		*Oncorhynchus*	
Element	**Count**	**Element**	**Count**	**Element**	**Count**
Preopercle	3	Vertebra	2	Preopercle	2

Pyganodon grandis		*Lasmigona complanata*		**Mollusca**	
Element	**Count**	**Element**	**Count**	**Element**	**Count**
Shell	2	Shell	3	Shell	31

APPENDIX III: FAUNAL DENSITY BY UNIT

Unit	Count	Unit	Count	Unit	Count
1	12	11	102	21	2772
2	268	12	117	22	75
3	403	13	314	23	297
4	326	14	173	24	45
5	34	15	258	25	42
6	168	16	514	26	1297
7	438	17	885	27	661
8	571	18	51	28	43
9	101	19	20	29	375
10	221	20	1653	30	184

Unit	Count	Unit	Count	Unit	Count
31	503	41	18	51	13
32	662	42	1	52	1
33	364	43	19	53	263
34	161	44	13	60	25
35	47	45	37		
36	58	46	56		
37	41	47	1		
38	131	49	3		
39	188	50	9		
40	51				

Unit	Count	Unit	Count	Unit	Count
61	2	71	820	81	48
62	45	72	561	82	765
63	15	73	82	87	27
64	34	74	57	88	517
65	3	75	75	89	477
66	97	76	160	90	348
67	10	77	62		
68	6	78	581		
69	2	79	809		
70	1861	80	6		

Unit	Count	Unit	Count	Unit	Count
91	55	101	75	111	346
92	22	102	63	112	266
93	38	103	40	113	358
94	76	104	381	114	193
95	59	105	365	115	409
96	255	106	5983	116	117
97	757	107	282	117	2875
98	2	108	234	118	1749
99	14	109	576	119	66
100	237	110	1271	120	59

Unit	Count	Unit	Count
121	913	131	483
122	581	132	695
123	242	133	143
124	1374	134	551
125	474	135	265
126	156	136	260
127	1616	137	116
128	364	138	140
129	405		
130	211		

APPENDIX IV: SAMPLE CATALOGUE SHEET FOR 2014/2016 DATA

Fort Vermilion (IaQf-1) Fauna

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Cat No	Unit	In Situ	Quad	Datum	Datum Height	Lvl	Depth Min	Depth Max	Depth Exact	Context	Artic	Count	Weight	Element	Bone Unit	Side	Age	Preserv	Mods	Order/ Family	Species	Comments

APPENDIX V: WEIGHT OF BONE BY SPECIES

Species	NISP	Weight (kg)	Species	NISP	Weight (kg)
Aix sponsa	1	1.1	*Esox lucius*	4	2.0
Alces alces	467	26716.4	*Falcipennis canadensis*	1	0.1
Alces alces/Cervus elaphus	2	9.0	*Gavia immer*	1	0.2
Anas acuta	20	10.7	*Grus americana*	2	10.3
Anas acuta/Anas strepera	1	0.4	*Hiodon alosoides*	228	11.5
Anas americana	1	0.5	*Lasmigona complanata*	3	5.0
Anas clypeata	3	1.4	*Lepus americanus*	96	65.2
Anas platyrhynchos	77	39.3	*Lepus americanus/townsendii*	3	0.3
Anas strepera	10	6.1	*Lota lota*	117	33.9
Aythya affinis	1	0.6	*Lota lota/Salmo gairdneri*	3	0.8
Bison bison	165	6875.0	*Lynx canadensis*	3	3.0
Bonasa umbellus	5	2.8	*Martes americana*	1	0.2
Branta canadensis	34	40.2	*Martes pennanti*	1	1.2
Bubo virginianus	6	3.2	*Melanitta fusca*	4	2.5
Bucephala albeola	1	0.1	*Microtus ochrogaster*	6	1.3
Canis familiaris	1	2.1	*Odocoileus hemionus*	4	8.1
Canis latrans	3	1.2	*Odocoileus virginianus*	13	71.0
Canis latrans/familiaris	10	35.0	*Ondatra zibethicus*	2	2.0
Canis lupus	6	47.2	*Prosopium wiliamsoni*	2	0.7
Castor canadensis	1056	4197.7	*Pyganodon grandis*	1	12.6
Cervus elaphus	37	880.4	*Sander vitreus*	1236	31.7
Coregonus clupeaformis	252	13.7	*Sciurius vulgaris*	1	0.1
Cygnus buccinator	11	81.3	*Tympanuchus phasianellus*	2	2.3
Cygnus columbianus	24	90.2	*Ursus americanus*	2	4.9