THE UNIVERSITY OF MANITOBA

THE FORT VICTORIA FAUNAL ANALYSIS: CONSIDERATIONS OF SUBSISTENCE CHANGE OF THE FUR TRADE ERA IN NORTH CENTRAL ALBERTA

by

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ABSTRACT

The faunal analysis from Fort Victoria (1864-1897) located 70 miles northeast of Edmonton, Alberta, along the North Saskatchewan River, was undertaken by the author. The historic literature indicates that the fort spanned a critical period when the major food source, the plains bison, disappeared. It was felt that the faunal analysis would allow some insight as to what subsistence alternatives were reverted to during these difficult times. The results indicated that an increased efficiency and intensity of large game animal use took place as well as a use of a large variety of small mammals, birds and fish. The analysis also showed a shift to domestic stock prior to the disappearance of the bison. The Fort Victoria faunal sample was compared to three earlier fur trade and provisioning posts, Fort George, Buckingham House, and Fort White Earth, located on the North Saskatchewan River. Comparisons were limited to faunal distributions, game animal preferences and variety, and butchering patterns.

Overall results of the faunal analysis of historic fur trading posts and the review of the literature, indicates that faunal samples are affected by numerous factors such as off-site butchering, trade of provisions to posts, seasonal game use, and disposal of garbage at sites, which were difficult to control from use of only the archaeological record. A flow chart, similar to Schiffer's (1972) model on disposal patterns was devised to point out these limitations.

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CHAPTER I

INTRODUCTION

Background

Archaeological investigations of the fur trade era in Alberta, especially the area along the North Saskatchewan River, have had a relatively short history. Within the last ten years, research of fur trading posts such as Fort George (1792-1800) (Kidd 1970); Buckingham House (1792-1800) (Nicks n.d.); and Fort White Earth (1810-1813) (Nicks n.d.); have yielded valuable information on the beginnings of the fur trade along the North Saskatchewan River (Fig. 1). While research of these early posts is continuing, no major archaeological project encompassing the latter portion of the fur trade was undertaken prior to 1974.

With this in mind, W. D. Clark, head of the Historic Sites Service of Alberta, proposed that excavations of a Hudson's Bay Company post occupied during the latter period of the fur trade be undertaken. Such a project would provide valuable information on various aspects, such as the artifact content, the construction techniques employed, and the subsistence patterns of the period. The site chosen for excavation was Fort Victoria (1864-1898), a Hudson's Bay Company post, located sixty-five miles east of Edmonton along the North Saskatchewan River. It was felt that this site would provide the information needed because of its long period of occupation.

Preliminary archaeological investigations at Fort Victoria were conducted by K. Arnold (1971), Department of Anthropology, the University

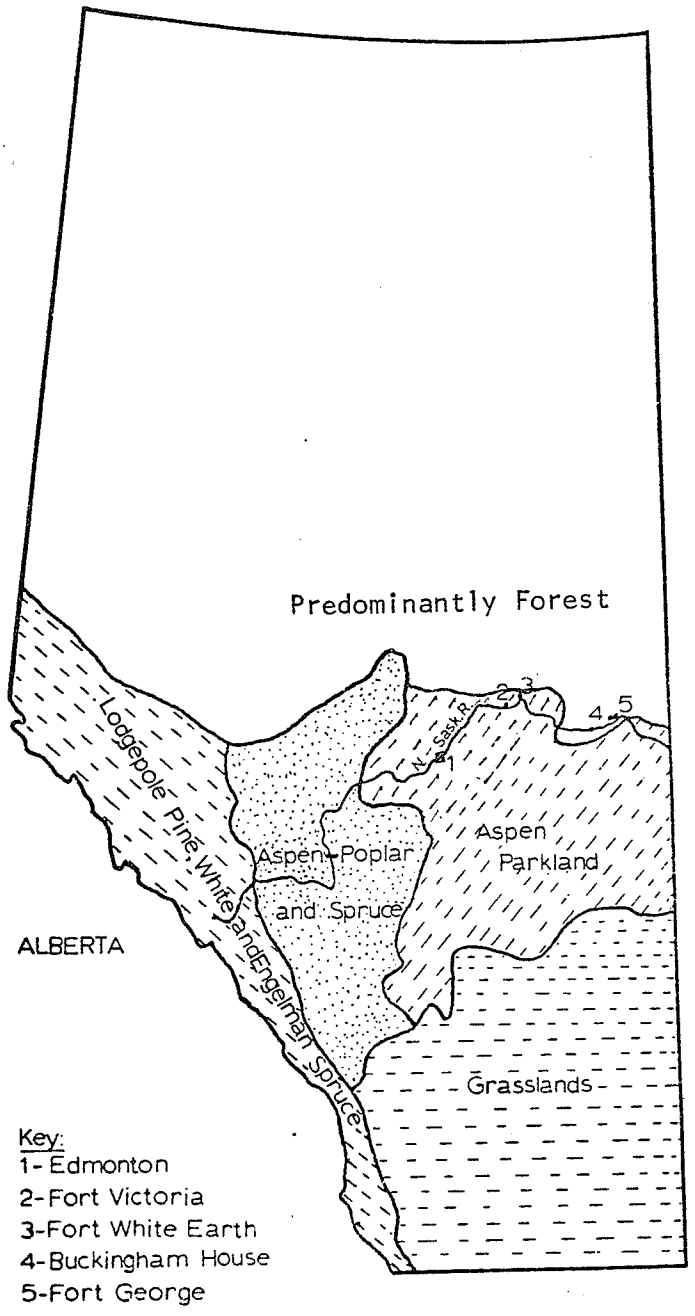


Fig. 1 Location of Fur Trading Posts and Local Vegetation (After Hardy ed. 1975)

of Alberta, who unsuccessfully attempted to determine the location of the fort palisades and boundaries. During that same year W. D. Clark and J. S. Nicks, Historic Sites Service of Alberta, excavated in front of the Factor's House prior to restoration of the original boardwalk. Clark, however, felt that more extensive excavations of the site were required; this field work was conducted during the spring and summer months of 1974, 1975 and 1976, and was directed by T. C. Losey, the Department of Anthropology, the University of Alberta, as an archaeological field school and funded by the Historic Sites Service of Alberta.

The faunal remains recovered during the 1974 field season were analyzed by Losey and Prager (1975) who later presented a research paper at the Canadian Archaeological Association Conference in 1975 on their finds. The major aspect of their research dealt with the demise of the bison on the Northern Plains during the occupation of Fort Victoria, and with the effects of the loss of this food source on the inhabitants of the fort. It was felt that further research and a larger faunal sample would provide valuable insight into the problem.

The author, working as an assistant supervisor on the Fort Victoria Project, undertook the analysis of faunal remains recovered during the 1975 and 1976 field seasons. The faunal samples from the three years of excavations were then combined to form the data for further research on the subsistence patterns of the occupants at Fort Victoria.

The Problem

Adams (1977:131) has defined historical archaeology as the, "...conjunction of historical and archaeological methodologies in the

study of culture; it should not be limited to any geographical, temporal, or cultural area." Schuyler (1970:88) states that:

> Technically Historic Sites Archaeology is a testing ground for methods and approaches used in general archaeology and which on occasion, as in the "new archaeology" arise in part out of anthropological theory.

Binford (1968:21) indicates that, in many cases, ethnographic and ethnohistoric data only partially aid in understanding human subsistence patterns:

> Finally my primary interest was in a class of material-bones - about which historical accounts were mute and even the men who produced the patterns were unaware of their existence and meaning. This was an archaeological problem.

The reason for this discrepancy between the historical and archaeological sample is pointed out by Ferguson (1968:7): "The historical and archaeological records are different analogs of human behavior, and they should not necessarily be expected to coincide." Therefore, in order to more fully understand fur trade subsistence patterns both sources of data must be used.

In many instances, the faunal analyses from fur trading posts are relegated to a few tables in the appendices of reports. It was therefore felt that a more detailed analysis would contribute greatly to our knowledge of the subsistence patterns of the fur traders of Alberta. This study presents an opportunity to not only investigate the lifeways of Fort Victoria inhabitants, but to compare European subsistence patterns throughout the fur trade era. Furthermore, investigation of the Fort Victoria subsistence alternatives is an important historically and archaeologically documented study of culture change and process over a relatively short time period. It outlines how and why articulated

variables within a cultural system shift over time when confronted with a major catastrophe. This subsistence shift in north central Alberta involved the European fur traders and aboriginal peoples and indicates how these two cultures reacted to the loss of a major food source - the plains bison. The study shows some general interrelationships between these two groups and how each attempted to restore the subsistence equilibrium during those critical years when the bison herds were disappearing on the northern plains. Finally, this documented subsistence shift has broader implications and may yield greater insight on culture change in prehistoric societies that underwent similar subsistence changes.

There exist a number of other reasons why the faunal analysis of a site such as Fort Victoria may prove to be of value. Although occupied for a period of thirty years, very few primary documents of its history or the lifeways of its people have survived. Archival research has provided little data; most information consists of scattered references throughout the literature by those who visited it or were concerned with business transactions of the fur trade. However, only a small percentage of this information deals with the subsistence of the people. The faunal analysis will therefore help to provide data on the variety of animals that were utilized, the method of processing for meat and other products, and, in some instances, the time of year they were utilized.

Although very few specific references of the fort exist, there are a considerable number of primary references available pertaining to subsistence patterns of the fur trade in the general area during the time when the site was occupied. The compilation of these data provides a broad basis to which the faunal remains of the site can be compared.

Fort Victoria spans a critical period of history when wild game resources were being replaced by domestic stock and agriculture. Though the historic literature indicates that a change in the subsistence patterns in the area occurred during the late 1870's, it provides no detail on the transitional period - a time which must have been a crucial one for the fur trading posts.

In dealing with a faunal sample such as that from Fort Victoria several problems may become evident. There is a good deal of evidence in the historic literature that the faunal remains cannot totally account for the variety and proportion of animals consumed. Such factors as off-site butchering, and the provisioning of posts with dried meat and pemmican may not be reflected in the faunal record. Schiffer's (1972) discussion of refuse disposal and the processes that create the archaeological sample is important in this regard. A better understanding of these processes would provide greater insight into the subsistence patterns of the Fort Victoria inhabitants: "What is advocated here, and elsewhere . . . . is a concern with explaining how the archaeological record is produced . . ." (Schiffer 1972:156).

Objectives

The objectives of this study may be summarized as follows:

1. To reconstruct the patterns of animal utilization during the occupation of the fort with respect to relative importance of species, their seasonal use and large mammal butchering patterns.

2. To compare this reconstruction with historical accounts of animal use at Victoria and elsewhere during the fur trade in Alberta.

3. To investigate the changes in animal use at the fort, particularly during the decline of the bison in the area.

4. To compare the patterns of use during this decline with those derived from three earlier fur trade posts that date to a period of bison abundance.

In order to achieve these aims, this thesis is organized in the following manner. First, the historical and environmental background of the Edmonton district is presented paying particular attention to Fort Victoria, and the earlier posts of Fort George, Fort White Earth, and Buckingham House. Next, in Chapters Three and Four, historical evidence of hunting, butchering, provisioning, dietary and disposal patterns relating to the fur trade are presented with particular emphasis upon the subsistence changes accompanying the demise of the bison. This historical review outlines the general patterns of animal use expected in the archaeological record, and, more specifically, the changes in faunal remains that should accompany the shift from a bison hunting to an agricultural economy. The latter expectations are detailed in Chapter Five dealing with methodology, and a general discussion of the problems of measuring animal use through faunal remains. Chapter Six summarizes the excavations at Fort Victoria and describes the nature of the deposits and features that contained animal remains. The next two chapters present the results and discuss the faunal analysis in view of the historic evidence presented earlier. A final summary is followed by a brief reiteration of some of the problems of faunal analysis.

CHAPTER II

HISTORICAL AND ENVIRONMENTAL BACKGROUND

General History

The early exploration of Alberta by such men as Anthony Henday, Peter Pond, Alexander Mackenzie, Angus Shaw, Duncan M'Gillivray, Peter Fidler and David Thompson helped to map the basic geography of the west and establish direct European participation in the fur trade of Alberta. These explorations were primarily the result of the competition between the fur trading companies: "Their own restless curiosity drove them forward, but it was the struggle between the fur trading companies that made their explorations possible and necessary." (Hardy 1975:306).

A North West Company explorer, Peter Pond, opened up the Athabasca region during the 1770's. He was followed by Alexander Mackenzie in 1789 who descended the Mackenzie River to the Arctic Ocean; four years later Mackenzie established a post at the present-day Peace River, Alberta (Hardy 1975:305). In 1789, Angus Shaw built a post at Moose Lake, near Bonnyville, Alberta, and by 1792 Fort George was constructed, ". . . the first station on the Alberta side on the North Saskatchewan River." (Hardy 1975:305).

The Hudson's Bay Company, in 1792, established Buckingham House beside the North West Company's Fort George. In 1795, the Hudson's Bay Company moved further west up the Saskatchewan River and established Fort Edmonton, ". . . almost side by side with the Nor'-westers' 1794 Fort Augustus, both of these forts being at the confluence of the Sturgeon and North Saskatchewan Rivers, not far from where Fort

Saskatchewan now stands." (Hardy 1955:41). During the next ten years the posts were frequently being moved and rebuilt along the North Saskatchewan River. After a short occupation of Fort White Earth between 1810-1813, the final move back to Edmonton took place and the two companies constructed another fort on the present legislative grounds.

Following the amalgamation of the two companies in 1821, Fort Edmonton became one of the most important establishments in the Saskatchewan country. The fort not only controlled the fur trade of an extensive area, but also furnished many of the northern posts in the Athabasca country with dried meat and pemmican: ". . . Edmonton was well supplied and contributed heavily to other districts including the North country." (MacDonald 1954:174). The fort had easy access to large numbers of bison that were hunted and processed during the winter and spring months. However, during winters when bison were scarce in the area, the fort was unable to help the northern posts or its own outposts, and great hardships were endured. Presumably these times of feast and famine also occurred in the surrounding area. As with Fort Edmonton, the early posts (Fort George, Buckingham House, and Fort White Earth) controlled a large area of trade during their occupation and had access to a region which previously was untouched. A more detailed discussion on occupation, population and functions will ensue. One aspect of importance to be noted is that Fort George and Buckingham House had the same period of occupation, were located in close proximity to one another and thus had access to similar resources; they therefore provide a means of validating the studies on the game animals that were taken for food and fur during the late 1700's.

Fort George

Fort George, a North West Company post located on the north side of the North Saskatchewan River, was occupied from 1792 to approximately 1800. Kidd (1970:7) states that the main reasons for constructing the fort were for fur trading purposes and as a provisioning post, particularly for the Athabasca River brigades. The fort was situated in an excellent position for obtaining provisions: "The parklands along the southern bank of the Saskatchewan were the wintering ground of the bison, where they were obtained both by the post hunters and by Indian bands." (Kidd 1970:7). The amount of processed and fresh meat intake for one year was considerable. M'Gillivray in 1794 estimated that 10,000 pounds of pounded meat and grease were traded to the fort and that, ". . . by February 19, 413 bison had been brought to the fort by the hunters . . ." (Kidd 1970:7).

Few population estimates for the fort exist, although Kidd (1970:10) indicates that in 1794 the post contained 80 men and approximately the same number of women and children. Fort George was finally abandoned in 1800 due to the rapidly diminishing quantity of furs in the area and the continual westward 'leapfrogging' by the North West and Hudson's Bay Companies.

Archaeological investigations at Fort George were conducted in the summer months of 1965, 1966, 1967 and again for several days in 1970 by Robert S. Kidd of the Provincial Museum of Alberta. An estimate of the fort's enclosures is approximately 200 x 150 feet. The major features excavated at Fort George include palisade trenches, the east enclosures, the Main House, Northwest House, Northeast Structure,

Central Refuse Pit, the Blacksmith's Area, numerous cellar depressions and the West Structures (Kidd 1970:23, Fig. 8). These main features also included numerous sub-features such as cellars, trash pits, etc. It is also evident that the excavation priorities were directed towards the exposure of structural remains, as very few test units outside the fort were opened.

Buckingham House

Buckingham House was constructed by William Tomison in 1792, approximately four hundred yards west of Fort George. The close proximity to the North West Company fort allowed the Hudson's Bay Company to keep an eye on their competition (Nicks 1969:16). No population estimates are given for Buckingham House, although it was probably smaller than Fort George. Like Fort George, Buckingham House was close to the plains and the occupants were able to procure large numbers of bison for the spring outfits. Nicks (1969:21) mentions that: "Sometimes the men made up as much as 1000 pounds in one day."

This fort, like Fort George, was abandoned in 1800, although the reason for abandonment is not clear. Nicks comments that the move, ". . . likely was related to the necessity to keep watch on the North West Company, who had just abandoned Fort George." (Nicks 1969:26).

Archaeological investigations at Buckingham House were conducted during the summer months of 1968, 1972 and 1975 by John Nicks of the Provincial Museum of Alberta. A final publication is not yet available, but a preliminary analysis of the faunal remains has been completed.

Fort White Earth

Fort White Earth was built in 1810 and abandoned by 1813. The post was jointly occupied by the North West and Hudson's Bay Companies who shared a "common stockade" and were only separated by a picket fence (Nicks 1969:28). The post is located about two miles upstream from the mouth of the White Earth Creek in the region of present-day Smoky Lake, and is approximately six miles downstream from Fort Victoria (Fig. 1). Like the other three fur trading posts, White Earth is situated on the north side of the river. The decision to combine the two fur companies within one stockade was apparently due to a number of reasons. Nicks (1969:28) states that operating costs were cut by having only one post, but the main reason may have been one of protection against the Blackfoot Indians trading at the post. The post was abandoned because of the poor trade (ibid:30), and both companies decided to establish a new post at present-day Edmonton. However, the abandonment may also have been due to the lack of large game animals in the area. There is some evidence from the historical journals that the Indians were deliberately driving the bison from the post by burning large areas near the fort. Apparently the fort location was not to their liking (Nicks, personal communication). In 1810, Fort White Earth contained 220 people, the North West Company having 135, while the Hudson's Bay Company had only 85 people. This census consisted of only the summer complement (Coues ed. 1965:603).

Fort Victoria

Local Environment

Fort Victoria is situated on the northern edge of the Aspen

Parkland transition (Fig. 1). The parkland is rich in flora and fauna, having components of both the boreal forest to the north and prairie to the south. Only a brief description of the local vegetation and fauna is warranted here; a more detailed discussion of the vegetation can be found in Bird (1967) and Moss (1955), while Banfield (1974), Salt and Wilk (1958), and Paetz and Nelson (1970) can be consulted for further information about the local fauna.

Vegetation A general description of the Aspen Parkland zone of Alberta is summarized by Bird (1967:292):

> In typical areas aspen groves alternate with grassland, while stands of aspen and willow mingled with conifers increase the range of the woodland along wide stream valleys . . .. Lakes seem to be scattered in careless profusion throughout the parkland, varying from large and shallow waters, as at Beaverhill, Buffalo and Sullivan Lakes, to smaller expanses, usually ringed quite delightfully with trees but often surrounded by alkaline shores. Everywhere, too, are sloughs and marshes circled with willows and aspens.

Four major plant communities dependent upon soil and moisture conditions are found in the parklands zone: 1) fescue prairie; 2) aspen groves and woodland, creeks; 3) river bottom forests; 4) marshes and wet meadows (Hardy ed. 1975:139).

The natural vegetation surrounding the old Victoria settlement has been altered by the gradual increase of land-clearing and subsequent agricultural activities over the past century. Portions of the North Saskatchewan River valley still contain dense aspen stands on both river terraces while an abundance of white spruce and some birch are found on the north facing slopes of the valley. Dense stands of willow grow along both banks of the river. Black spruce and larch are rare in

the immediate vicinity of the site but occur in the poorly drained low lying areas to the north. Pure stands of jack pine are found on sandy uplands three miles east of the fort.

Sources of adequate timber for building construction were apparently scarce in the vicinity of the fort. John McDougall mentions that timber for the Victoria Mission was harvested some thirty-five miles upriver and then rafted downstream (McDougall 1896:91). Pine, used for construction of the palisades, was probably harvested from the jack pine stands three miles east of the fort (Losey et al. n.d.).

A variety of berry-producing species, including chokecherries, saskatoons and pincherries can be found in the Victoria district. Grant, when travelling through the jack pine stands to the east of the fort in 1872, comments on the abundance of berries in that area:

> Another, ten miles broad, near Victoria, was a sandy ridge producing scrub pine, or as the people call it cypress, . . . The ground was literally covered with cranberries, bearberries, the Uva ursi, and other creepers (Grant 1971:172).

Fauna The large variety of mammals, birds and fish found in the area were important resources. Because Fort Victoria was located between the boreal forest and the grasslands, its inhabitants had access to a diversity of food and fur animals. That its position was advantageous is further emphasized by Grant (1971:176) who noted the settlement was well situated, ". . . on account of its advantages of soil, river, lakes abounding in fish and wild fowl, and nearness to the plains where the buffaloes are always found."

The more important large mammals in the northern parkland during fort occupation included bison, moose, elk, mule and whitetailed deer, black bear and grizzly bear (Banfield 1974). The large bison herds

grazed on the northern plains during the spring and summer months and moved into the parkland region in the late fall and winter except in mild winters with little snowfall, herds would remain on the plains. Elk and moose had extensive ranges during the 19th century, but by 1893 they had been restricted to the more isolated areas of their former ranges (Turner 1950:549). Moose were found primarily in the northern lowland lake regions northeast of Victoria.

Mule and whitetailed deer were common throughout the region especially in riverine habitats and also in the jack pine stands: "There were jumping deer that ranged in the heavy Jack Pine bush about four miles east of the home place (Victoria Mission). They were in bunches as high as fifteen to a herd." (Erasmus 1976:164). Pronghorn antelope formerly ranged to the North Saskatchewan River although today the species is only found in the southeastern part of the province (Banfield 1974:404).

Both the grizzly and black bear previously occupied the plains and parklands regions of Alberta. The Plains grizzly was regarded as very dangerous by traders and was hunted only when the hunter's horse was considered fast enough to outrun them (Kane 1925:90). Banfield states that: "Grizzlies once occurred on the prairies as far east as the Red River valley, Manitoba, but they were exterminated along with the bison in the early days of exploitation." (Banfield 1974:311).

A variety of smaller mammals also inhabit the Parklands. Some of the more important fur bearers include beaver, muskrat, mink, ermine, several weasel species and river otter. The latter species is now extinct in the Victoria area (Banfield 1974:342). Other species such

as lynx, fox, coyote and the wolf also roamed the parkland region, and a large variety of smaller rodents including numerous species of mice, voles, shrews and ground squirrels occur. The snowshoe hare was an important food animal especially in years of population peaks about every 10 years. During this peak hares have been known to reach populations of up to 3,400 individuals per square mile (Banfield 1974:82). Jack rabbits are also found in the region but only in relatively small numbers.

The Parkland's extensive sloughs, marshes and lakes support a variety of bird life (Hardy ed. 1975:148). The Canada goose is one of the more important nesting species; Ross's goose and snow geese pass through the area on the way to their northern nesting grounds. Whistling swans and white pelicans are also abundant, and a great variety of ducks nest in the lakes and marshes (Salt and Wilk 1958). Upland game birds include spruce, ruffed and sharp-tailed grouse, and prairie chicken.

A large variety of fish species are found in the North Saskatchewan River and the surrounding lakes. Some of the major food species include northern pike, walleye, sauger, perch and burbot (Paetz and Nelson 1970). The largest river species, lake sturgeon, may have been present in relatively large numbers during fort occupation. Many of the surrounding lakes contained large quantities of lake whitefish which were taken in considerable numbers by both whites and Indians who considered them an important food source (McDougall 1896:116).

History

Relatively few historic records and documents pertaining to the

history of Fort Victoria exist. A few personal records of the chief clerks working at the fort have been found, but references to Victoria by such Chief Factors as Richard Hardisty at Fort Edmonton, are thinly scattered throughout the literature. These records have aided in establishing a general history of the fort. The following brief history of Fort Victoria is a condensed version from the 1974 Fort Victoria preliminary report (Losey et al. 1977).

Victoria settlement, located on the North Saskatchewan River approximately 65 miles northeast of Edmonton, Alberta, (Fig. 1), was established as a Methodist Mission by the Reverend George McDougall in 1863 (Clark 1971:13). McDougall mentions that the establishment was also intended to introduce agriculture to the Native people, as the missionaries anticipated a decrease of wild food sources. The mission was well situated to receive Cree parties journeying to and from the plains. During the spring of 1863, John McDougall, the son of the founder, noted that, ". . . for several weeks we had hundreds of lodges beside us." (McDougall 1896:51).

This large gathering of Indians did not go unnoticed by either the Hudson's Bay Company or the free traders. In order to oppose the free traders in the Victoria area, the Chief Factor at Fort Edmonton, William J. Christie, decided to establish a Hudson's Bay Company post at the mission site. In 1864, after first offering the position to John McDougall, the company sent one of its clerks, Mr. George Flett, to establish a post at Victoria (Losey et al. 1977:4).

Structural Evidence The earliest existing plan of the post was drawn in 1874 by Richard Hardisty, then Chief Factor of Fort Edmonton (Fig. 2). The fort contained seven buildings enclosed by a palisade measuring

134 feet by 220 feet, the long axis being roughly east-west and fronting the North Saskatchewan River. The enclosure was entered by two opposed gates located in the north and south walls. The Factor's House was roughly centered in the compound, a combined Trader's Shop-Press Room was situated to the southwest, while the Dairy and the Stable were located in the northwest quadrant. East of the Factor's House were the General and Provisions Store, the Men's House and the Blacksmith's Forge-Men's House complex.

A number of structural changes occurred at Fort Victoria throughout the years. T. Kanis, who surveyed Victoria Settlement in 1888, drew a small sketch of the fort that showed all of the major buildings present, except for the Northwest Stable (Fig. 3). An extension north of the Factor's House is also shown. A bastion is indicated at the southeast corner of the palisade and a rather indistinct projection at the southwest corner may be another bastion. In 1888, the palisade was torn down and the compound was enclosed by a post and rail fence. When inspecting officer E. K. Beeston drew a plan of the fort in 1889, the northwest stable was not present (Fig. 4). The plan shows the area where the Blacksmith's Shop stood had become a new stable. A photograph taken of the fort in the 1890's indicates that a well had been dug immediately east of the Factor's House.

Trade The trade at Fort Victoria had apparently declined by 1874 as the Council of the Northern Department of Rupert's Land discussed suspending operations there. Chief Factor Richard Hardisty advised against abandonment since the Whitefish Lake Indians traded some furs while passing down to the plains. It was also feared that independent traders

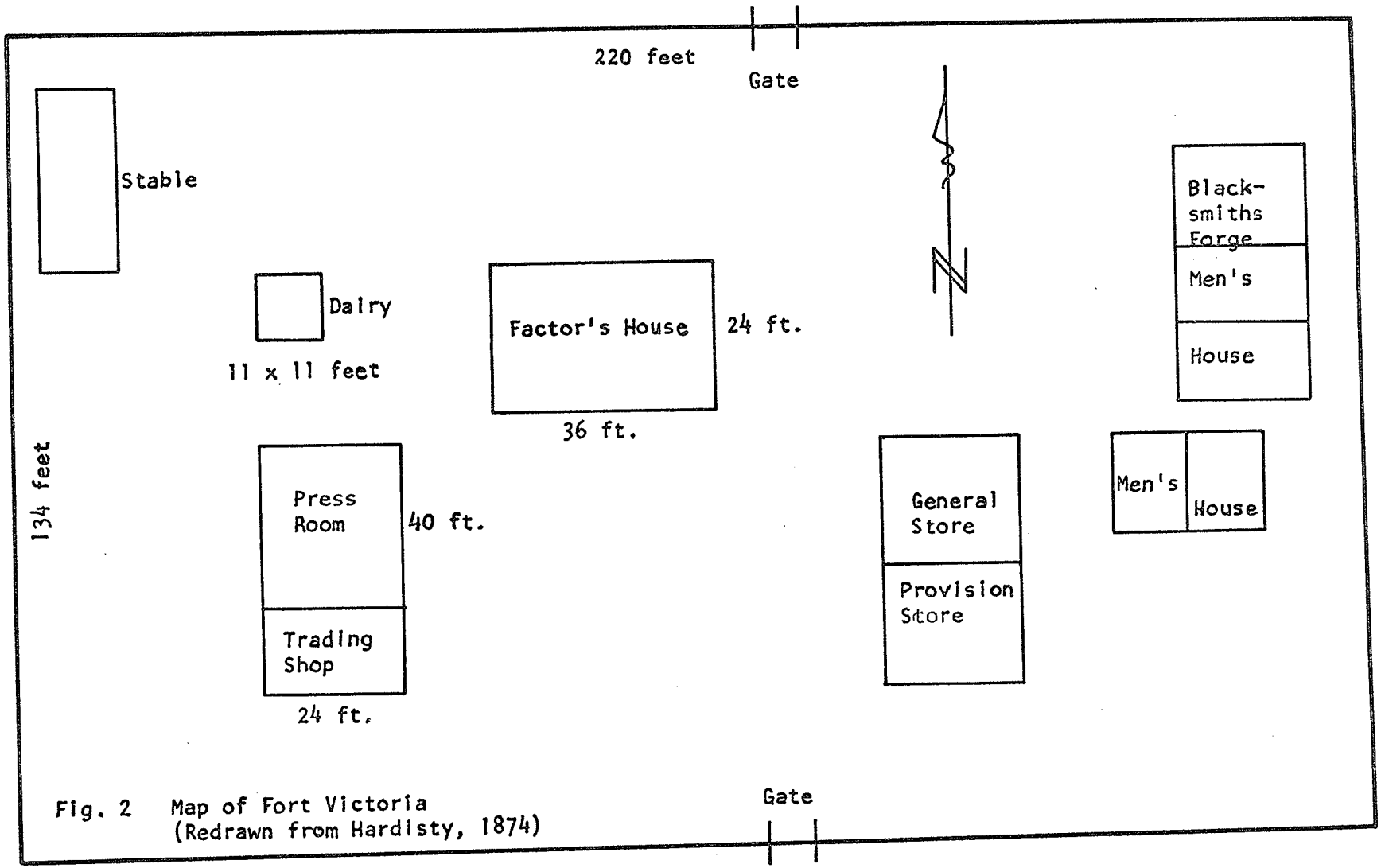


Fig. 2 Map of Fort Victoria
(Redrawn from Hardisty, 1874)

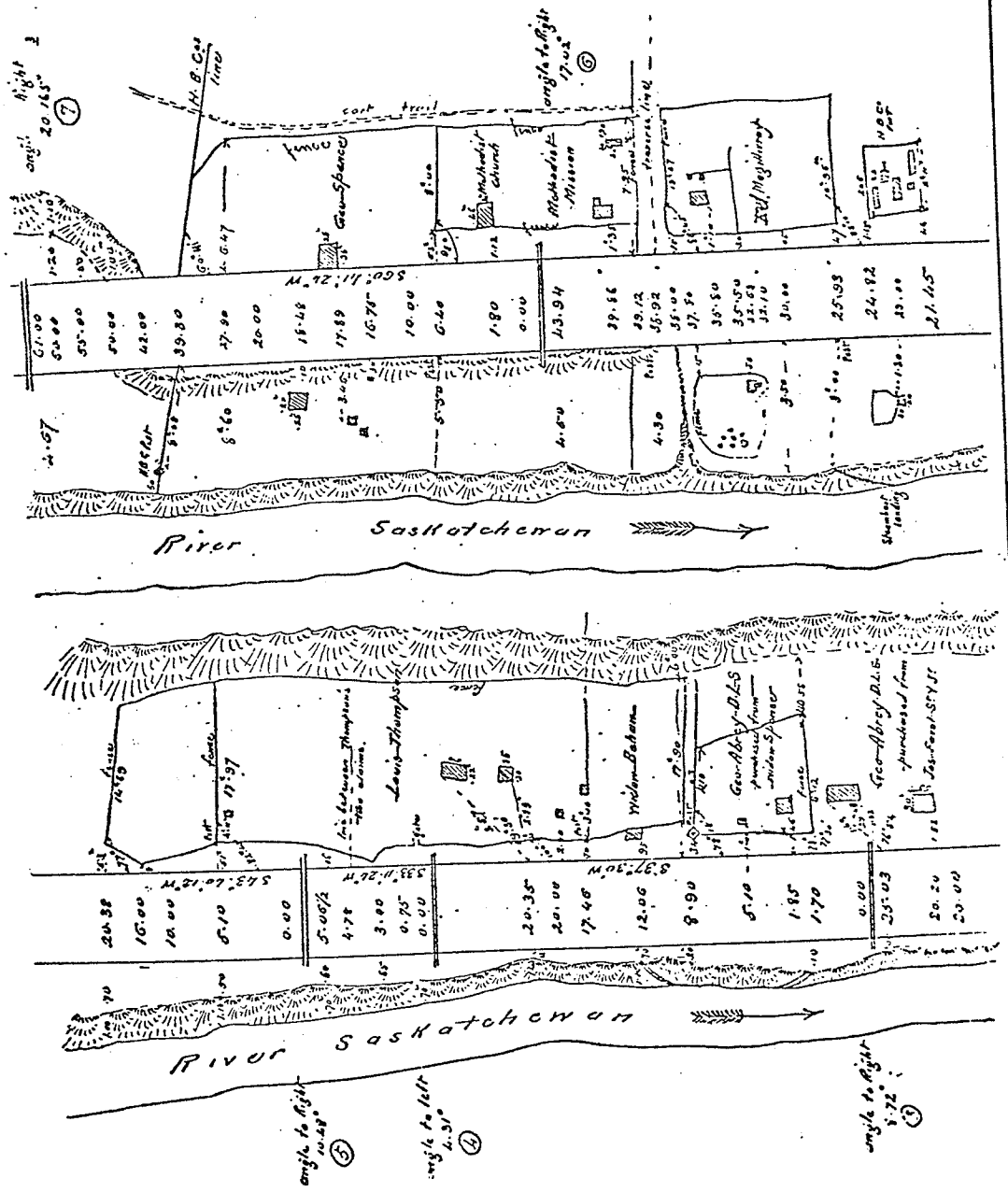


Fig. 3 Drawing of Fort Victoria and Area: Kanis 1888
(From Clark 1971)

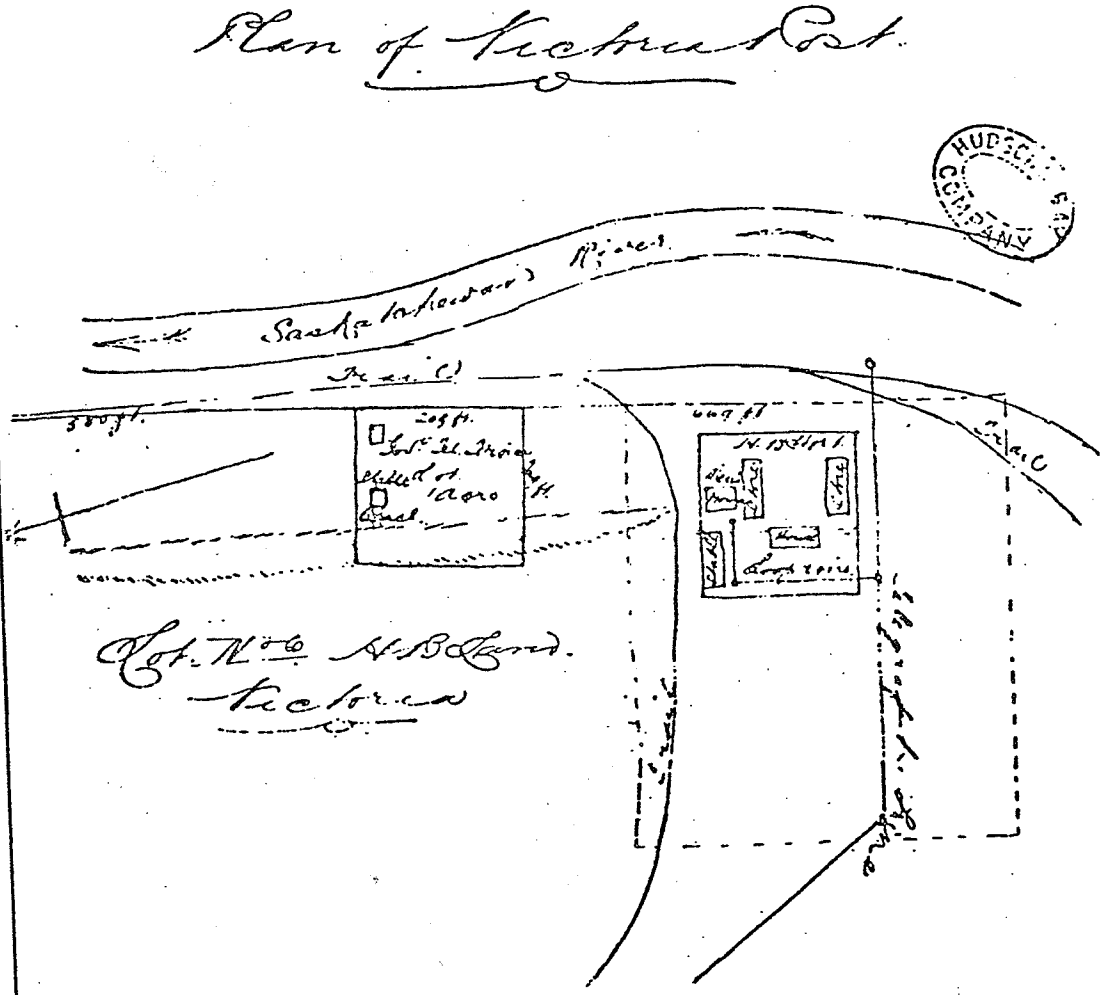


Fig. 4 Sketch of Fort Victoria: Beeston, 1889
(From Clark 1971)

would again establish themselves in the area. The only available fur lists from Victoria (Table 1) for the outfits of 1873, 1874 and 1875 indicate that a variety of fur-bearing animals were being traded to the post (Clark 1971). However, these also suggest a general decrease in the trade of furs by 1875. Buffalo robes decreased from 344 and 700 hides in 1873 and 1874 to 74 in 1875, although the 1875 list is incomplete. It appears that the fur trade at Victoria continued to decline for in 1877, Richard Hardisty, in a letter to Chief Commissioner T. A. Grahame at Fort Garry, commented on the Victoria trade and suggested that the poor trade was not entirely due to the lack of furs in the area but was also hindered by the free traders who were offering higher prices.

Hardisty notes that: "Victoria stands no chance against Mr. Traill of Lac la Biche who gives a much higher price for furs than we feel inclined to do. Our Robe trade will be far short of last year as much on account of no buffalo as want of Goods." (MacDonald 1954:177). During the next few years, the trade apparently showed no improvement. Richard Hardisty, in a letter to Chief Commissioner Grahame in 1883 mentions that ". . . as regards the fur trade with them (the Indians) it is not worth keeping up." (Quoted in Ironside and Tomasky 1971:23). A day later, on the 19 June, 1883, Hardisty informed Trade Commissioner Joseph Wrigley in Winnipeg that:

> The Post at Victoria, as agreed upon has been closed, and the buildings are now under the care of Mr. James Pruden. He is to occupy part of the buildings, and take good care of the rest for one year, with the understanding that all furs he becomes possessed of, shall be sold to the company at market rates . . . (Quoted in Clark 1971:4).

TABLE I

COMPARATIVE LIST OF FURS AND PROVISIONS FROM VICTORIA POSTS FOR THE OUTFITS OF 1873, 1874, 1875 AND 1876 (TAKEN FROM CLARK 1971)

1873	1874	1875	1876	
35	35	7	2	Badger
3	9	9	2	Bears, large black
?	6	-	-	Bears, small black
3	1	-	-	Bears, large brown
44	71	181	120	Beaver, assorted
-	-	20 lbs.	-	Castorium
5	9	4	-	Fisher
131	144	7	-	Kit Fox
11	9	4	-	Red Fox
18	18	38	4	Lynx
-	-	17	-	Marten
278	330	280	17	Mink
2,995	3,000	4,940	250	Musquash
-	2	11	12	Skunks
5	2	2	-	Wolverines
42	48	8	-	Wolves
344	700	74	-	Buffalo robes
111	20	-	50	Buffalo dressed skins
-	-	-	200 lbs.	Pounded meat
-	-	-	9	Large moose skins
-	-	-	9	Small moose skins

In 1887, it was decided that Fort Victoria be reopened as an outpost of Edmonton. Francis D. Wilson, the Clerk in charge of Fort Victoria, writing to an Edmonton clerk on 1 June, 1889, noted the condition of the fort:

> On my taking charge of the post last spring (1888), the buildings were in a very bad condition owing to the post having been abandoned for some years previous, nothing having been done to them by the last outfit. With your sanction repairs and improvements have been executed and the buildings are now in good condition. I have exercised the greatest care and economy in effecting this end. . . . a great many of these repairs are not of a strictly permanent nature . . . (Quoted in Clark 1971:4).

Wilson also commented that while the fort was closed the Indians had formed business connections with the free traders in the area and that he had been successful in breaking them off. He felt, however, that the commercial business of the post would never be of much importance.

In this Wilson seems to have been correct because the question of closing Fort Victoria arose again in 1891. W. T. Livock, Chief Factor at Edmonton, advised against it for fear that opposition traders would again establish trade with the Indians.

However, the trade results showed no major improvements and the annual Fur Trade Report for 1897 states that Fort Victoria would be closed because ". . . it does not seem possible to collect sufficient Fur to produce a profitable result." (Clark 1971:5). The fort was therefore closed during the following Outfit of 1897; that is, sometime between June 1, 1897, and May 31, 1898.

Population Statements on the number of people that occupied the fort during the 30 year operation were unobtainable. Major General Selby Smith's reference to Fort Victoria in the mid 1870's suggests that the

population was relatively low: "Fort Pitt and Victoria are little frequented Hudson's Bay posts, occupied by clerks and some retired officials." (Chambers 1906:36). The only other estimate is found in the Edmonton Bulletin (Jan. 31, 1881), which states that the population of Victoria settlement was 46 people, a decrease of 12 people from the previous year (Sibbald 1971:4). Whether this census included the fort occupants is not known. The Bulletin also explains that:

> The apparent decrease in some of the settlements is on account of many who formerly were counted as half breeds taking the treaty, thereby taking rank as Indians. The total population has of course increased much more than is apparent and children are not counted in this census (Sibbald 1974:4).

Today, all that remains of Fort Victoria is the Factor's House which was used as a residence after the abandonment of the site by the Hudson's Bay Company. The Trading Shop was bought by Mr. John A. Mitchell who ran it as a private store until it was sold to Mrs. Lawford in 1921 (Losey et al. 1977:7). The fur press segment of the original Trader's Store was recently located on a farm approximately five miles west of the fort.

CHAPTER III

HUNTING PATTERNS AND FIELD BUTCHERING

The intake of fresh meat by the inhabitants of the fur trading posts was dependent on a number of factors, one restriction being the time of year when hunting took place; thus food preferences were limited by the resources that were available. In many cases the historic references pertaining to the use of food indicate that bison, when available, was the most sought after large game animal in the Saskatchewan River area. Alexander Henry, when leaving Fort Vermilion in 1810, mentions the large amounts of bison meat that were left behind: "At ten, we all mounted and abandoned Fort Vermillion, leaving our icehouse open, containing about 400 limbs of buffalo, still frozen." (Coues ed. 1965:601). The Edmonton House journals show that between 1795 and 1800 bison was the most numerous animal hunted, but that relatively large numbers of moose and elk were also taken for food (Losey and Prager 1975:166). Although the bison was an important food item, other game animals such as fish, waterfowl and small mammals, were also taken throughout the year.

Seasonal Hunting Patterns

The seasonal use of large and small mammals, birds and fish in the Western Parkland region is well documented from numerous journals and historic records. Evidence from the Fort Edmonton journals of 1795 to 1800 (Johnson ed. 1967), provide data on seasonality of game resources. Losey and Prager state that:

> The real value of this [Edmonton] record derives from the fact that the parklands environment at

> this early date may be considered largely undisturbed with regard to its natural fur and game resources. We therefore considered that this record would provide valuable insight into the actual utilization of the parkland resource base (Losey and Prager 1975:165, brackets mine).

Large Mammals

The Edmonton journals indicate that three large mammals were utilized during specific times of the year (ibid:166). Commencing in late August or September and extending into December, the highest number of moose were taken: "This season coincides nicely with the fall rut during which time the animals are a much easier quarry and can also be called." (ibid:165). As with moose, elk were chiefly hunted during the late fall and winter months. Bison, the most important food source, were taken from November to April but primarily during the midwinter months.

This hunting pattern coincides with the seasonal migration of the bison herds to the parklands in the winter months (ibid:165-166). George Sutherland, Chief Factor at Fort Edmonton, states on January 3, 1797, that: "Since the cold weather commenced the buffalo have been plenty near us and hope by this day to have laid in our winter stock." (Johnson ed. 1967:81). During the summer months the bison herds were further south on the plains, making the fresh meat supply somewhat scarce in the parkland region. At this time the Indians traded large quantities of dried meat and pemmican to the traders. McDougall mentions that during the summer of 1863 the "principal food" consisted of pemmican (McDougall 1896:89-90), and at Fort Vermilion, Alexander Henry mentions that:

> The principal occupation of these people is making pounded meat and grease which they barter with us for liquor, tobacco . . ." (Coues ed. 1965:517-18).
>
> The Blackfeet daily bring in enough buffalo meat for our sustenance; otherwise we should be in a sad dilemma . . ." (ibid:544).

The fur trading posts located on the North Saskatchewan River were largely dependent on the seasonal bison migrations to the park-lands. When the bison herds failed to appear, the post occupants suffered: ". . . indeed they complain of not being able to procure sufficient provision for their families, there being a scarcity of buffalo everywhere owing principally to the amazing warmness of the winter." (Johnson ed. 1967:235). These years of near starvation, and those when bison were plentiful in the Edmonton district and at Victoria, are documented by Roe:

> Victoria: 'many herds', south of Whitefish Lake [that is north of the Saskatchewan River], January, 1863; 'far south', December, 1863; 'two days southeast', January, 1864; 'vast herds', second day south from Victoria, spring, 1865; 'far out', south from Victoria, winter, 1865-66; 'far out', spring 1866; 'far out', 1866-67; 'close up', winter, 1869-70; 'far out', Christmas, 1870; 'plenty', November, 1872; 'far out', 1874-75; 'none north of the Saskatchewan River, after 1874' (Roe 1951:593).

Nix comments further on the hardship that the people faced during the winter of 1866-67:

> The winter 1866-67 was a time of near starvation all over the Saskatchewan country. The buffalo were far south on the plains and the crops were still insufficient to sustain the missions. At Victoria mission all that could be offered for food was potatoes and milk (Nix 1960:38).

This bad winter may have necessitated the shipment of provisions to

Edmonton from the Red River settlement:

> In 1867, according to Father Lacombe, one hundred and fourteen carts passed through his Metis settlement at St. Paul de Cris carrying supplies to the Hudson Bay post at Edmonton (Russell 1955:14).

These irregular winters not only affected the seasonal hunting of the bison but necessitated hunting other game animals or procuring large quantities of dried meat and pemmican from the south. Furthermore, Roe's research suggests that even during a severely cold winter (1866-67), the herds remained far to the south (Roe 1951:593).

Small Mammals

The intensity of small mammal use probably varied with the abundance of large game in the immediate area. Snowshoe hare was probably a food supplement throughout the year; although it was considerably easier to hunt or trap during the late fall and winter months when hare runs are visible in the snow. Alexander Henry mentions that large numbers of rabbits were taken during October:

> Mr. Roque shot 20 rabbits, brown, gray and white. The boys belonging to the fort daily shoot rabbits in the hummocks, and kill great numbers at this season, when they are easily traced (Coues ed. 1965:559).

The frequency of hare that was taken during these months would also depend on their population levels. Kane (1925:256) mentions that large numbers of hare were present in the Edmonton area in 1847. Macoun (1882:352) states that hare were abundant in 1872 and 1875 in the Edmonton area, but by about 1880 they were seldom found.

Documentation on the seasonal use of other small mammals is relatively poor. The fur bearers were trapped during the winter and early spring when the fur was considered to be in its prime. Rogers

(1973) who studied the Mistassini Cree of the eastern boreal forest regions of Canada, found that the people considered beaver meat to be best in November when it was high in fat content, and that mink and marten were also eaten in the early winter months when they were the fattest. Muskrats were hunted during the fall and, more intensively, in the late spring when they were fat and in their prime (ibid:54). Macfarlane notes that beaver meat was very palatable and easy to digest except when lean (Mair 1908:253), suggesting early winter use. Samuel Hearne also states that beaver flesh was excellent but only during the winter months (Glover ed. 1962:146).

Waterfowl

Waterfowl and other migratory game birds were numerous in the parkland during the spring, summer and fall. At Victoria mission in 1863 bison was the principal food source during that summer, but they varied their diet with ducks and duck's eggs (McDougall 1896:56).

During the summer moulting period, waterfowl were easily hunted in large quantities; this is suggested by the White Earth journals which note that the Crees were trading a variety of ducks to the traders in mid-summer (Coues ed. 1965:11:607). Also at Edmonton House on April 27 the traders were, ". . . receiving ducks, geese and swanskins from Indians . . ." (Johnson ed. 1967:164). McTavish's York Factory journals indicate that ducks and geese were hunted during their spring and fall migrations (McTavish 1963:93, 95). Roger's (1973:58) research shows that the northern Cree were hunting: "Ducks, geese and loons . . .

during the early fall and intensively during the spring." Although no specific references to the hunting of upland game birds were found, it may be suggested that these birds were taken occasionally throughout the year but most intensively during the late fall-early winter months when they were in their prime.

Fish

The Saskatchewan posts also utilized fish. The Edmonton House journals (Johnson ed. 1967) point out that lake sturgeon was a primary source of food during the summer months; a total of 53 individuals were netted between July and September of 1795 (Losey and Prager 1975:166). Hind stresses the importance of lake sturgeon while at Cumberland House in 1858:

> This excellent fish abounds in many parts of the Saskatchewan, and it is one of the chief articles of food in the country. The Indians as well as those in charge of the posts, have frequently nothing else to live upon for months, and the failure of sturgeon fishing is often the cause of much distress and starvation (Hind 1971:451).

Although Cumberland House is situated further north in the boreal forest zone, and thus may have been more dependent on fish, the Edmonton House journals strongly indicate the use of sturgeon during the summer months when an adequate supply of fresh meat was lacking. More direct evidence of sturgeon fishing is found in the Edmonton Bulletin (June 10, 1882) which states that many sturgeon and other fish were caught at Victoria, presumably from the North Saskatchewan River.

Large numbers of whitefish were also caught throughout the year although the major portions were taken during the late fall. McTavish at York Factory states that whitefish were caught during the fall and

that large amounts were used for dog food:

> When the fall was nearly over, and the air presaged the coming of cold weather, preparations were made for laying in a winter's supply of river whitefish for our dogs (McTavish 1963:40).

Fort Edmonton also utilized enormous quantities of whitefish as mentioned by MacDonald (1959:79), ". . . but the 40,000 whitefish at about four lbs. each caught during each season at times helps out." The Victoria mission established a fishery at Saddle Lake where large numbers of whitefish were netted during the late fall and dried and frozen for winter use by both humans and dogs (McDougall 1896:105). Other river fish were presumably netted during the spring and summer months of the year, but probably were not taken in any great numbers.

The use of fish occurred primarily during those periods of the year when the availability of other fresh meat was scarce in the parklands. This usually happened during the spring and summer months when the bison herds were south on the plains. Certain food animals, especially seasonally, may have been important at Fort Victoria throughout its occupation. This selectivity should, to a certain extent, be reflected in the faunal sample recovered from the site. The comparison of the Victoria sample to those of earlier fur trading posts in the Saskatchewan area should point out any changes in the subsistence base which occurred during the time interval between the forts' occupation.

In summary, the records provide adequate information on the importance (Table 2) and seasonal use of some of the major food animals in the Saskatchewan area and from this information a projected seasonal

TABLE 2

RELATIVE IMPORTANCE OF WILD GAME ANIMALS
USED DURING THE FUR TRADE IN ALBERTA

Species	Documented for Fort Victoria Area	Documented for Other Alberta Posts
Large Mammal		
Bison	3	3
Elk	1	1
Moose	2	2
Bear	1	1
Small Mammal		
Beaver	1	3
Muskrat	2	1-2
Hare	3	1
Birds		
Upland Game Birds	2	1
Duck	3	2-3
Geese	2	2-3
Swan	1	3
Fish		
Whitefish	3	?
Sturgeon	2	2-3
Pike	2	?
Walleye	1	?
Goldeye	1	?

Scale: 1-3, increasing importance

subsistence base has been devised (Fig. 5). The chart is designed to show the time periods of most intensive utilization of some of the major food species of the area and is based on the numerous historic accounts concerning this subject; some variation in the seasonal use of these species undoubtedly occurred.

Butchering Techniques

General

The historic references pertaining to large mammal butchering exhibit a number of similarities to the prehistoric butchering analysis by White (1953), Gilbert (1968), Frison (1970), Kehoe (1967) and Wheat (1972). The analysis of prehistoric kill sites provides information on what bones might have been taken away from a kill site. These similarities in butchering techniques during prehistoric and historic times may be explained by the fact that the fur trading posts commissioned Indian or Metis hunters to furnish them with fresh meat and large quantities of dried meat or pemmican; dried meat and pemmican were also traded to the posts by the Indians: "From them [Stoneys] we secured four splendid loads of dried provisions and grease . . ." (McDougall 1896:118, brackets mine).

Although similarities existed, there is variability in butchering and meat processing practices. This was affected by factors such as the size of game populations, the distance of kill sites from the forts, and the prospective uses of the meat; that is, whether it was for immediate consumption or to be stored for later pemmican production.

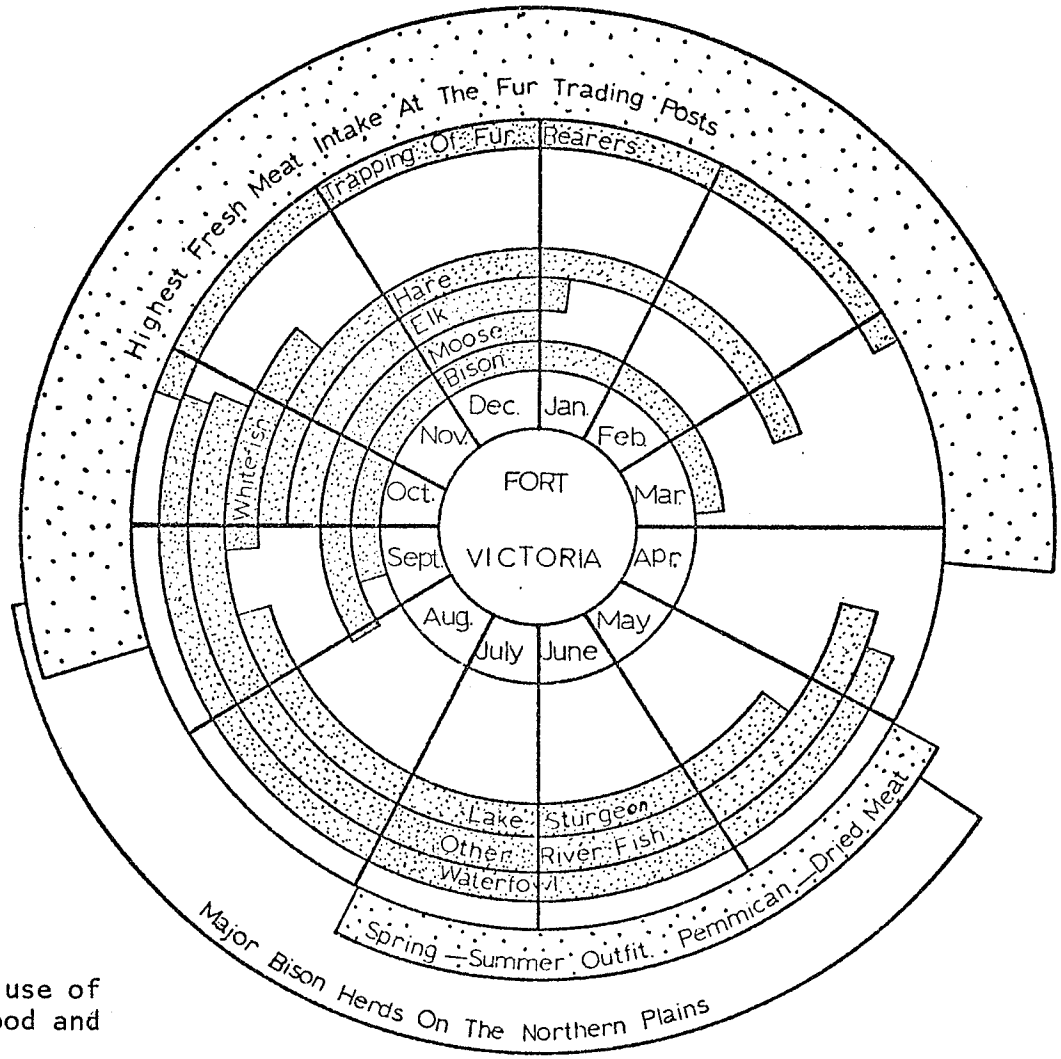


Fig. 5 The seasonal use of some major food and fur animals

Prehistoric Butchering

The following summary of prehistoric butchering techniques is limited to a number of basic butchering processes including the disarticulation of the animal, marrow extraction, degreasing of certain elements and disposal of certain portions of the animals. It will also consider historic butchering methods of large mammals, particularly of bison, for comparison with prehistoric methods. Particular attention is paid to the portions of the animals that were brought back to the trading posts and the factors which influenced variability of butchering methods.

Analyses of prehistoric kill and habitation sites (White 1953, Kehoe 1967, Gilbert 1968, Frison 1970, and Wheat 1972), show a number of major similarities. Wissler's (1910) ethnographic accounts of Blackfoot butchering practices are also included. The following description is a synthesis of data from the previously mentioned sources. The inferences concerning several basic methods of disarticulation of bison are as follows. Both Wheat and Frison agree that the first major cut used to skin bison usually occurred down the back of the animal. The animal was skinned along the legs, usually to the astragalus or metapodials, where cut marks around these bones may occur. Frison notes encircling marks on the metapodials and interprets these as being skinning marks. His analysis indicates that the head was completely skinned.

The head was severed by cutting through the atlas or axis, and further processing included the removal of the tongue. This was done in a number of ways: ". . . to remove the tongue, the neck was opened just below the jaw and the tongue attachment cut. Then the tongue

could be pulled out without breaking the jaw." (Gilbert 1968:291). Alternatively, the tongue could be removed by breaking the mandible at the ascending ramus or at the mandibular condyle. Techniques of brain removal were variable. Either the frontal bones were smashed, or the skull was broken at the base of the foramen magnum, and the foramen enlarged. The maxilla was often split, exposing the nasal tissue which was also utilized. Wheat states that crania found at the Olsen-Chubbuck site did not display crushed frontal bones, suggesting that the brain was not removed. The horns were usually chopped off and the cores were left at the kill site. In most cases skull remnants were also left behind.

The disarticulation of the forelimb also varied. In most instances the foreleg, including the scapula, was removed, the meat stripped from the bones and the metacarpals and phalanges removed from the forelimb. White and Kehoe suggest two alternatives for removal of the forelimb: the forelimb and shoulder were separated and removed as a unit or,

> . . . it is relatively easy to strip the meat from a scapula and discard the bone. Presumably this was the procedure unless the animal was killed very close to the village or retrieved from the river. If the meat had to be transported any distance the removal of the scapula would materially lighten the load in the case of the bison . . . (White 1953:255).

White's analysis also indicates that the metacarpals and phalanges were left at the kill site. Frison's analysis like Wheat's, shows that the muscles were stripped from the foreleg and these bones were then discarded while still articulated.

The hindlimb was removed at the femur head or acetabulum. The

pelvis was stripped of meat and in most cases discarded. Another method was ". . . to cut the illium just back of the sacral attachment and split the pelvis at the symphysis . . ." (White 1953:256). The lower foot bones were severed from the hindlimb and discarded. Frison states that the femur and tibia were also separated, as evidenced by butchering marks on the proximal tibae and distal condyles of the femora.

The vertebral column was usually severed at the 12th or 13th thoracic vertebra. The ribs were broken close to the vertebral column and removed with the side meat. An alternative method was merely to strip the meat from the ribs and vertebral column.

Frison believes that the ribs were broken near the vertebral column for the removal of the internal organs, while the ribs on the opposite side were removed still attached to the thoracic vertebrae.

One of the most important portions, the hump meat, was removed by either of two methods. The axial muscles could be cut away from the spinous processes of the thoracic vertebrae; this could leave butchering scars on the spinous processes. Also, Frison found evidence that the hump was often removed by breaking the spinous processes at the bases and leaving them within the hump.

Marrow was extracted from the femur and humerus. Wheat states that his evidence shows some marrow grease was obtained although this processing did not seem exhaustive. Gilbert also believes that marrow extraction occurred using the femora of those animals butchered near the village. Kehoe mentions that marrow bones would not likely be recovered because of the high degree of bone fragmentation. Frison's analysis shows that femora had the lowest frequency suggesting that these bones were taken away for marrow extraction.

The above summary of butchering techniques confirms the fact that variation in butchering took place and was, to a large extent, dependent upon the number of animals killed, their sex, age, intensity of use, and the distance of the kill site from the camp. Frison (1970:8) states: "The evidence suggests stylized butchering techniques with some variation probably from size, age and the numbers of animals obtained." The heaviest, non-meaty bones, (the skull, most of the vertebral column, metapodials, phalanges and the pelvic girdle), were left at the kill site if the meat was to be transported a considerable distance (Kehoe 1967:72). Marrow extraction occurred either at the kill or at the occupation site, depending on the distance between the two or the intensity of butchering. The ethnographic sources on butchering techniques suggest similar methods during the prehistoric period. Wissler's accounts of Blackfoot butchering concur with the more basic aspects of prehistoric techniques inferred from the above analyses.

Historic Butchering

Numerous historic butchering accounts show that the butchering techniques utilized by the Indians, Metis, and hunters employed by the fur trading posts were rather variable and depended on a number of factors, some similar to the prehistoric patterns. A discussion of the historic butchering and provisioning of the company posts is intended to point out this variability, which in turn may help the interpretation of faunal remains recovered at Fort Victoria.

By the early 1820's (Ray 1974:206), the Metis hunters of the Red River settlement conducted seasonal bison hunts and supplied the Hudson's Bay Company with large quantities of fresh and processed meat

(Russell 1955:18). Belcourt (1944:16), while on one of these hunts, gives an account of a Metis bison hunt south of the Red River settlement and provides a detailed description of bison butchering and processing in the field. Belcourt's account indicates that few bones were brought back from the kill site, and that the majority of the meat was made into pemmican at the kill site. The cuts of meat are as follows:

1. Depouilles, two layers of flesh along the ribs, extending from shoulder to rump. They are separated by a thin skin or cartilage from another layer of meat which lies below them.

2. Filets, sinewy muscles which connect the shoulder blades to the haunches.

3. Bricoles, two bands of fat which descend from over the shoulder to the under part of the neck.

4. Petits filets du cou, small sinewy muscles found near the extremities of the filets.

5. Dessus de croupe, parts immediately above the flanks.

6. Epaules, the shoulders.

7. Dessous d'epaule, the layers of flesh lying between ribs and shoulders.

8. Pis, fatty layer extending under the belly and up the flanks. The udder is included in it.

9. Ventre, muscular band of flesh which supports the intestines and extends under the belly from ribs on one side to ribs on opposite side.

10. Panse, the stomach, which is considered by the half-breeds to be something of a delicacy.

11. Grosse bosse, the hump, which is highest immediately between the shoulder blades. It is composed of a number of broad, thin bones, inclined to the rear and very similar in conformation to the spines on a fish bone. This morsel has a delicious taste.

12. Gras or Suif, the suet from the interior of the carcass.

13. Plats-cotes, or cutlets.

14. Croupe, the rump.

15. Brochet, meat which covers the stomach.

16. Langue, the tongue.

All else is left to the wolves. (Belcourt 1944:16).

This meat was immediately cut into strips and dried on large racks made specifically for that purpose. The dried meat was then: ". . . rolled up and the choicer pieces packed into bundles weighing sixty or seventy pounds each." (Belcourt 1944:16). The rest of the meat was dried over a fire, pounded into a powder and made into pemmican (Belcourt 1944:16). Belcourt also mentions that: "In order to illustrate by how much this process reduces the weight of the meat, I would mention that a cow buffalo furnishes only sufficient pemmican for half a taureau [45 pounds of pemmican] and three-quarters of a bundle of jerked meat." (Belcourt 1944:16, brackets mine). Marrow extraction was also completed immediately in the field, and was ". . . stored in the animals' bladders, and the marrow from two cows is needed to fill a bladder, weighing about twelve pounds." (Belcourt 1944:16).

Belcourt's description of the bison hunt and subsequent butchering of the animals indicates that the meat brought back from the kill was in dried form, pemmican and marrow fat, as well as some choice pieces of fresh meat. This type of processing is also discussed by interpreter-hunter, Peter Erasmus: "I was pleased to see that the women all joined in helping my wife prepare pemmican and dried meat . . . . In less than two weeks we were successful in obtaining all the meat we could pack home." (Erasmus 1976:183). Obviously more meat could be transported back to the settlements in a processed state. "The most

experienced hunters reckon that eight or ten cows are required to make up a cart load." (Belcourt 1944:16). MacEwan also points out that much meat processing was done in the field:

> The curing of hides and drying of meat for pemmican had to be done in the field, and this required days. Then, if fat from the recently slaughtered animals was rendered and at hand and if saskatoon berries were available in the area, it was possible to make pemmican and pack it in buffalo stomach bags . . . (MacEwan 1968:53).

Other methods of butchering are mentioned by Harmon:

> The natives generally cut up the body of an animal into eleven pieces, to prepare it for transportation to their tents, or to our forts. These pieces are four limbs, the two sides of the ribs, the two sinews on each side of the back bone, the brisket, the croup, and the back bone (Harmon 1957:210).

The above method is somewhat similar to the previously presented evidence of cutting up the animal with the exception that the 'back bone' or vertebral column was also taken. Henry states that his butchers cut the bison into 20 pieces:

> Buffalo are cut up into the following twenty pieces by the hunter: 1 grosse bosse (hump); one petite bosse; 2 depouilles; 2 shoulders; 2 lourdes epaulettes (shoulder pieces); 2 fillets; 2 thighs; 2 sides; 1 belly; 1 heart; 1 brisket; 1 backbone; 1 neck. The tongue generally belongs to the hunter (Coues ed. 1965:446).

It appears that a great deal of variability took place in quartering the animals, as is suggested by Henry's comments: "Laid meat in icehouse - 550 thighs and 330 shoulders" (Coues ed. 1965:582). There is no mention whether the ribs, hump or brisket were brought back although it is probable that they were but immediately consumed, while the meat stored in the ice houses was processed into pemmican during

the spring. Paul Kane also comments on the quartering of bison at Fort Edmonton: "The head and feet of the buffalo, when killed, are cut off, and the carcase, without being skinned is divided into quarters, and piled in layers in the pit as brought in until it is filled up." (MacGregor 1949:89-90). Again in 1848, Kane refers to a large number of bison quarters stored at Edmonton, accounting for between 700-800 animals (Roe 1951:854); De Smet in 1846, refers to the 500 buffalo that were stored at Edmonton (Roe 1951:854).

Although the more specific details of quartering are somewhat obscure, these may have been similar to the prehistoric method:

> This was done by either cutting through the scapula-humerus joint or cutting off the scapula with the foreleg, and by chopping through the pelvis so that the acetabulum remained with the hindleg. The backbone was chopped through the lumbar region or through the sacrum, perhaps to facilitate removal of the prized back-fat. The meat was stripped off the ribs and "bosse ribs" (thoracic spines)." (Kehoe and Kehoe 1960:422).

The 'back fats' were very important for processing pemmican, since they were melted down and mixed with the pounded meat (Johnson ed. 1967:283).

The extraction of marrow or marrow fat from the longbones may have been done immediately at the kill site or, if the animals were brought back in portions such as the fore and hind quarter, at the living site. Wheat (1972:102) states that, "The "marrow bones" might be any long bones, but for the most part those of the rear legs were preferred." Since the front leg bones carried the most weight, they had very small marrow cavities. Bone grease was made from a large variety of bones although the leg bones were preferred. Harmon states that grease was made by ". . . cutting the joints of the bones, which

they boil for a considerable time, and then skim off the top, which is excellent to eat with their dried meat." (Harmon 1957:207). Marrow may also have been produced at the kill site or at the home site. Belcourt (1944:16) also mentions that, during the Metis buffalo hunts, women processed a major part of the kill, and that the men cracked and boiled the bones to extract the grease. Evidence for marrow extraction and bone degreasing at Fort Victoria may indicate that Indian or Metis people were employed at the fort as they often were at other posts. This was evidently the case at Victoria mission where, "In lieu of butter they used marrow fat which was plentiful and easily obtained when the buffalo were killed and the meat taken off the bones to be dried, the Indian women chopped the buffalo bones and removed the marrow." (Kells 1934:19).

It therefore appears that marrow extraction took place at Fort Victoria. However, there is no evidence from the historic journals that degreasing occurred at the post, or at any other trading posts. If degreasing took place, it may have some implications on the background of the Victoria occupants. In many instances, the workers at the posts had Indian or Metis women living with them, as was evidenced at Fort Vermilion in 1809:

> Each man must also raise buffalo hides enough to make 20 pemmican bags (taureaux), for which purpose their women generally go with them to make their quart de loge, as they then get the tallow and other offals, which are of great service in their menage (Coues ed. 1965:574).

The historic accounts of the various butchering techniques reaffirm that various methods were employed:

> . . . the techniques chosen depended on a number

> of equally variable factors - the time of year, whether meat was for immediate use or for laying in a supply, the distance from the camp, the use made of the hides . . . (Wheat 1972:98).

Sometimes only pemmican, dried meat, and tongues were brought back to the posts, while at other times the animals were quartered or portioned, brought back to the posts and stored for later use.

Difficulties were involved in bringing back game which had been killed considerable distances from the posts. At times this task involved abandoning the larger portions of the animal: ". . . killed three buffalo but at so great a distance they could bring but little of the flesh." (Johnson ed. 1967:151). Tomison also mentions the difficulty of obtaining fresh meat at Fort Edmonton: "In the evening Mr. Pruden and his party returned from hunting, brought the flesh of two buffalo; no buffalo to be seen within seventy miles of this place." (Johnson ed. 1967:151).

Summary

The discussion of prehistoric and historic butchering indicates that variability in methods existed. When bison were abundant and nearby, the choice parts; tongue, hump meat, ribs and marrow bones, were brought back and the animals were quartered and stored for later use. If bison were scarce, then the animals were more heavily processed and as much meat as possible was returned.

If only "light" butchering (Wheat 1972:100) took place, the bone elements brought back probably included the spinous processes from the hump meat, hyoids with the tongue, and rib shafts bearing the rib meat. Marrow bones could have been processed at the kill site or taken to the posts.

If "heavier" techniques were used, a greater percentage of bone elements would be returned. These might include fore and hind leg elements, (excluding the metapodials and phalanges), thoracic vertebrae, and rib shafts. The scapula could either be left at the kill site or taken and the pelvis may have been split down the symphysis and taken with the hind quarter or broken at the acetabulum and abandoned at the kill site. During times when there were few bison, but when they were close to the forts, an even more intensive utilization of the animal may have occurred; thus a greater proportion of elements were taken back. These elements may have been stripped of their meat and then processed for bone grease. If animals were processed at the kill site and pemmican, dried meat and marrow fat were the end products, no bones would have been taken back to the fur trading posts.

CHAPTER IV

PROVISIONING, DIETARY AND DISPOSAL PATTERNS

General

The provisioning and dietary patterns in the Alberta fur trade remained relatively stable up until the 1870's. The primary source of food were wild game animals obtained by either the fort inhabitants or by Indian hunters who were commissioned during the fall and winter months by the traders. During the spring and summer months they depended on the Indians for large amounts of provisions in the form of pemmican or dried meat and fish. There was relatively little trade of food products east of Alberta and the use of domestic stock and agricultural goods was minimal. Alexander Henry did have two domestic chickens and a garden at Fort White Earth (Coues ed. 1965) though these products were hardly sufficient to support the 90-100 inhabitants.

There are numerous references to the trade of meat and pemmican to the posts by the Indians, and this was an important factor to the livelihood of the factories. There is some evidence that Fort Victoria traded in dried provisions during the initial period of occupation. A bill of sale from Victoria (Table 3), dated 1873, shows that 110 pounds of pemmican were bought from the Company, suggesting that the post had an ample supply on hand. It remains unknown whether the post processed its own pemmican or bought it from the Indians. Indeed the latter may have occurred for Company policy stated that no one other than the Hudson's Bay Company could trade in provisions with the Indians:

TABLE 3

REVEREND MR. STEINHAUER'S ACCOUNT AT VICTORIA: OUTFIT OF 1873 (FROM CLARK 1971)

DATE	GOODS	PRICE
1873		
May 7	2 common shirts	$ 2.50
" "	2 lbs. tobacco	2.00
" "	4 china pipes	1.00
" "	1 common Indian Sun	15.00
" "	95 lbs. of pemmican	17.00
" "	1 Indian Capot	3.75
" "	3 lbs. tobacco	3.00
May 15	15 lbs. of pemmican	2.70

> The matter of exchange for Indian women's help in preserving our hunt did not in any way become an obstacle to the minister's work, a matter I did not refer to in any conversation after the first time at Smoking Lake when I had pointed out the Company rule about missionaries not trading with the Indians. His solution of this problem was very simple -- he just ignored the problem until such time as the Company brought the matter to his attention (Erasmus 1976:178).

Another record states that on October 5, 1876, 200 pounds of meat had been traded to the fort, presumably by the Indians. This date of acquisition of pounded meat is of interest, because according to Roe (1951), bison were scarce in the Victoria area after 1874; this would thus necessitate the procurement of dried provisions from other sources: "Much of their (Indians) harvest of pemmican and hides was exchanged with the traders for the commodities which the latter had to barter." (Russell 1965:18). Alexander Henry (Coues ed. 1965:544) mentions that trade of food items by the Indians was one of ultimate importance: "The Blackfeet daily bring in enough buffalo meat for our sustenance; otherwise we should be in a sad dilemma, . . ."

The Subsistence Shift

Demise of the Bison

The extermination of the large bison herds in western Canada by the late 1870's resulted in starvation among many of the Plains Indians, and necessitated a subsistence shift at the trading posts in the Saskatchewan country. No longer could the forts depend on wild game as their major food source. A brief summary of the demise of the bison on the northern plains is warranted here in order to present a basis for determining the subsequent subsistence base that was utilized

by the settlers and fur trading posts. This shift should, to some extent, be reflected in the faunal sample recovered from Victoria, for this post was occupied prior to and after the demise of the bison herds.

Considerable numbers of bison were still present in the Edmonton-Victoria area in 1874-75 as McDougall states that the Indians were subsisting on bison in 1875 (McDougall, in Roe 1951:469-470). Other historic sources also indicate that Edmonton was well supplied with fresh bison meat during the winter of 1874-75 (Steele, in Roe 1951:470). However, Peter Erasmus states otherwise:

> Ten years ago, on my first hunt, there had been a herd of more than three hundred animals less than ten miles from the Saskatchewan River. Now we had to travel more than thirty miles further south before we spotted buffalo . . . (Erasmus 1976:182).

By 1876, the northern herd was rapidly being depleted (Losey and Prager 1975:168) and by the year 1878 ". . . in the Edmonton district and along the North Saskatchewan they [bison] were also scarce, and on the eastern flanks of their former habitat they were seldom seen." (Turner 1950:414, brackets mine). By 1880 the northern herds were nearly totally depleted and in 1883:

> Contrary to the belief held by the hide hunters that the great Northern Herd had merely moved north into Canada during the 1883, extermination of the bison in this country had already taken place at least two to three years earlier (Losey and Prager 1975:168).

Also, in the winter of 1883, there is evidence that some hardship occurred due to the lack of bison at Victoria settlement. The Edmonton Bulletin (March 24, 1883) states that the only food remaining consisted of 120 fish and there was no beef, no storegoods and little money. However, the supply of potatoes and barley held out. Earlier, in 1881, a soup

kitchen was opened at Victoria mission for the Indians and Metis of the area who had little means of subsistence and in both January and June 6,000 pounds of beef was brought to Victoria to feed the people. (Edmonton Bulletin, December 30, 1881).

Not only had the bison herds suffered depletion but many other game animals were becoming scarce with the increase in population and the clearing of land in the area. Elk and beaver suffered considerably at the hands of settlement. This increasing scarcity made hunting more difficult at Fort Victoria. Farley (1925:201) notes that elk populations were still relatively high in the Victoria area, as well as elsewhere in this period:

> The Dumonts claimed that many elk were killed there [Little Beaver Lake] until 1880. At the present time, elk are not uncommon in a strip of country near the old settlement of Victoria north of the Saskatchewan River, but they have disappeared from the south side of the river (Farley 1925:201, brackets mine).

Beaver populations decreased considerably around Fort Victoria:

> The country in those early years was overflowing with animals and lakes teeming with a variety of fish to satisfy any man's appetite . . . There were lynx and foxes but no beaver, although their old dams crisscrossed the area in every direction where there was any water flow. Beavers had been over-trapped as the demand for their pelts by the Hudson's Bay Company was high and hunters had made no provision to allow for their natural increase (Erasmus 1976:125).

This may have reduced the local beaver populations. However, the only remaining fur lists that survive from Fort Victoria show an increase of beaver (Table 1). These lists of 1873, 1874 and 1875 have recorded beaver pelts of 44, 71 and 180 (plus 100 expected to come in) respectively.

The Introduction of Domestic Stock

A review of the historic literature from the Edmonton district reveals that domestic stock, mainly cattle and pigs, was already appearing by the mid-1870's. Their steady increase appears to coincide roughly with the reduction of the northern bison herds and that of other game animals. It is apparent that the shift to domestic stock by the fur trading posts and settlers was a gradual one and that by the 1880's sufficient cattle herds existed to feed the local populations. Of course, other wild game animals, fish and birds were still utilized.

The first cattle herd was brought into Alberta by 1874 before the extermination of the bison (Turner 1950:211). Oxen were occasionally used as food prior to this date at Fort Victoria. Grant, in 1872, while at Fort Victoria mentions that:

> They returned after dark with beef, bread, and milk. Mr. Tait the Hudson's Bay agent, had no fresh meat; but hearing of our arrival, he with oriental hospitality had ordered a young ox to be killed and a quarter sent over for our use (Grant 1971:175).

During the autumn of 1874 the North West Mounted Police stopped at Fort Victoria on their journey west bringing with them their own cattle (Turner 1950:177). By 1876-77, as the bison herds were rapidly decreasing, cattle were replacing them and thus prevented serious famines (MacEwan 1962:36). Further evidence that cattle were rapidly replacing wild animals is discussed by Richard Hardisty at Fort Edmonton in 1877:

> I enquired of Mr. McKay his reasons for purchasing those cattle, he said that on account of the scarcity of Pemmican he tried to get some Beef from the settlers around, but they asked such exhorbitant prices he was induced to purchase cattle from Mr. Shaw (MacDonald 1959:176).

Reference to the establishment of a cattle market at Edmonton is documented as early as 1874 but whether the market became a permanent one is unknown: "The first to be marketed were brought in by a man named Shaw, who looked for a good sale at Edmonton, but who wintered with the McDougalls and disposed of some of his herd to them." (Turner 1950:211). Further south, at Fort Macleod, in 1878, "considerable butcher stock" was brought in from the south, ". . . and domestic beef gradually took the place of buffalo meat." (Turner 1950:420).

There is also some evidence that Fort Victoria may have been supplied with beef by local settlers: ". . . the Cree Indians here and there [along the North Saskatchewan River] had already made considerable progress in cultivating the soil, . . . Some had also acquired a number of cattle, . . ." (Turner 1950:478, brackets mine). MacInnis (1930:237) states that by 1881 the cattle population in Alberta was approximately five thousand six hundred and ninety animals, and during that same year the Indian Department delivered 7,000 pounds of beef to Victoria mission, probably for the soup kitchen (Edmonton Bulletin, December 24, 1881).

The first reference to pigs in the Edmonton district is by Young (1966:22) who recalls that Fort Edmonton ran a large herd of pigs as early as 1870. Macoun (1882:210), while in the Edmonton district in 1880, mentions that the district had sufficient crops, cattle and pigs. Very few references to sheep herding exist, suggesting that these animals were not viewed as alternatives to wild game animals, cattle or pigs. MacInnis (1930:237) estimates that by 1881 the sheep population for the whole North West Territories, or that area west of Red River Settlement, was only 346.

To summarize, the historic sources clearly emphasize that domestic

stock replaced wild game animals. The shift was a gradual one which began by the mid-1870's and had become more or less complete by the time of the first closure of Fort Victoria in 1883 (Fig. 6). This subsistence shift was an important one to the occupants of the fur trading posts on the North Saskatchewan River because for them it terminated a way of subsistence which had prevailed in Alberta for roughly ninety years. Coinciding with the shift to domestic stock was the increasing use of agricultural goods during and after the mid-1870's in the Edmonton district.

The Development of Agriculture

The increase of agricultural produce in the people's diet and subsequent decreased use of meat, was especially important after the loss of the bison. A complete shift to an agricultural base is considered by Losey and Prager (1975:172) to be a realistic option for many fur trading posts, particularly Fort Victoria.

Many of the fur trading posts had experimented with agriculture prior to the overall decrease of wild game animals in the Saskatchewan country. In 1847 Paul Kane describes the garden products at Fort Edmonton as: ". . . plenty of good potatoes, turnips and flour." (Kane 1925:256). MacDonald comments in 1874:

> . . . the company works a large farm at Edmonton with a success that is encouraging, they have raised wheat over thirty years with only two or three failures. Barley, turnips, and potatoes are sure crops, a thousand bushels of wheat are usual from 100 sowing, last year 250 eight-gallon kegs of potatoes were planted from which 5,000 were dug . . . (MacDonald 1959:118).

At the Victoria settlement:

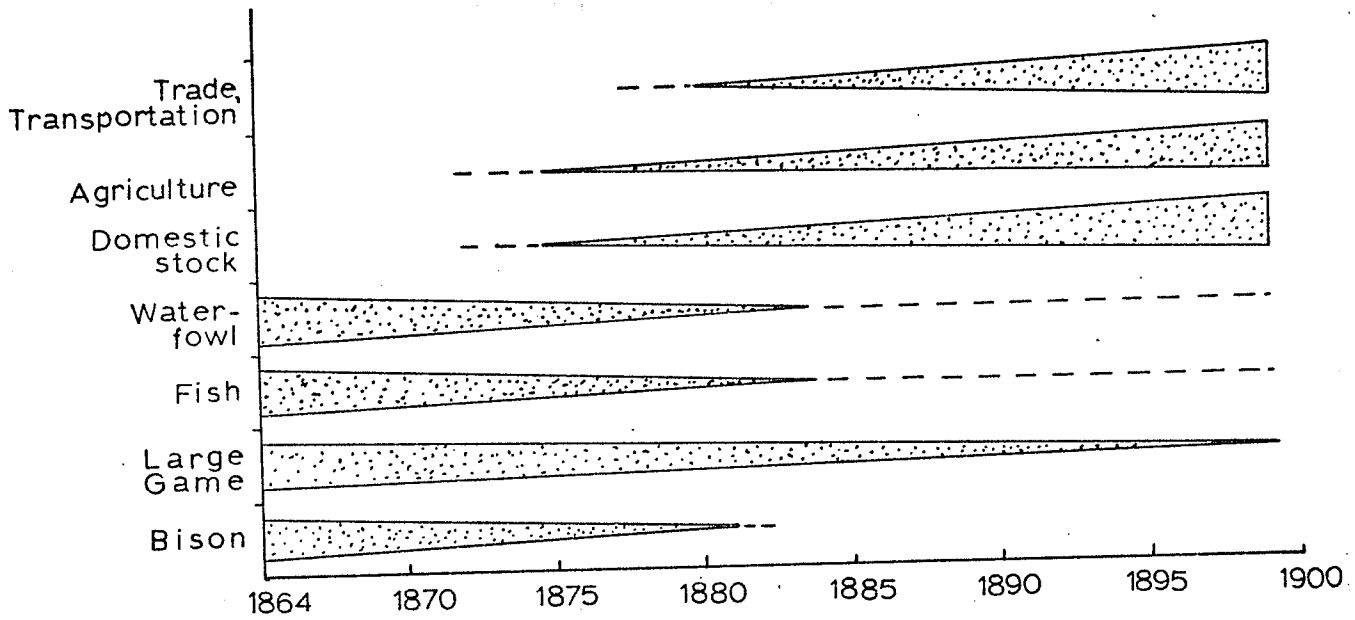


Fig. 6 Postulated Subsistence Shift: Fort Victoria

> . . . initially little cultivation was practised either at the mission or by the Metis freemen. Yet, because of the decline in the number of buffalo killed by 1870, it became necessary to supplement the meat diet through cultivating garden and field crops (Ironside and Tomasky 1971:21).

Grant's (1971:178) comments on the agriculture at Victoria in 1872 suggest that farming was limited and that during this period the people still preferred "hunting buffalo, fishing, and freighting for the Company." Victoria did have agricultural potential: "At Victoria wheat has been sowed for seven successive years, and was a failure only once . . ." (Grant 1971:178). The North West Mounted Police, on their trip west in 1874, received a few bushels of barley and ten bags of barley bran at Victoria (Chambers 1906:33) indicating that at least minimal commercial quantities were then available.

Probably one initial reason for the introduction of agriculture at the posts was difficulty in obtaining winter game. Grant (1971:521) states that the major reason for an expansion of cultivation was the increasing difficulty of obtaining winter food supplies from bison and game. As the bison declined, farming apparently increased. Superintendent Jarvis (1973iii:8) in his statement concerning the Edmonton district in 1880, clearly emphasizes this fact: "Farming is rapidly increasing; and next year flour can be purchased for the force here at a reasonable rate." More specific evidence comes from the Edmonton Bulletin which states that on March 21, 1881, 900 pounds of flour were shipped to Victoria and that by October 28, 1882, the grist mill at Victoria was running.

Diet

It is evident from historic accounts that, in the early days, the

fur traders subsisted almost entirely on meat. This large meat intake appears to be due to a lack of vegetable staples. With the increased availability of agricultural goods during the mid-1870's and 1880's, meat intake decreased drastically. Sutherland comments on the enormous quantities of meat consumed at the forts prior to agricultural production:

> The ordinary ration, under these circumstances [no flour or vegetables] at any of the Hudson Bay Company posts is either three large white fish, or three rabbits, or two pounds of pemmican, or three pounds of dried meat, or eight pounds of fresh buffalo meat per day per man (Sutherland 1888:111, brackets mine).

Cowie's description of the daily allowances of meat at Fort Qu'Appelle suggests that an even greater amount of meat was eaten, each man receiving 12 pounds of fresh meat, six rabbits, six prairie chickens, six ducks, or three large whitefish (Cowie 1913:212). Furthermore, Cowie estimates that:

> Daily requirements for the fort - approx. 20 men, 11 women, 19 children, 36 train dogs. Of fresh buffalo meat - the tongues, bosses, ribs and fore and hind quarters of 3 animals. The head, neck, shanks and inside were not considered worth freighting from the Plains to the fort (Cowie 1913:215).

John Franklin (MacGregor 1949:158) also mentions the fact that large quantities of meat were eaten by the occupants of Fort Carlton and that this large intake was partially due to the lack of staples such as potatoes or rice.

Further evidence that the meat intake declined is evident from the North West Mounted Police ration lists of the period in 1875:

> The men of the future Fort Saskatchewan were not close enough to the buffalo herds to enjoy the same quantities of fresh meat as their comrades

> at Fort Macleod, but of other food there was no lack. In addition to buffalo pemmican, a good supply of moose meat was always available . . . . Tasty fish were procurable from the Saskatchewan; wild duck eggs were gathered from the many little lakes near the Beaver Hills to the south, and as a special tidbit, roast beaver was not amiss (Turner 1950:206).

There is no mention of any vegetable use in the above account but by 1878, the police posts were keeping domestic stock and using greater quantities of vegetables; the amount of meat rationed to each man per day had been significantly reduced:

Beef	1 1/2 lbs. when procurable.
Pork	1 lb. in lieu of beef.
Flour and biscuit	1 lb. 4 oz. when on patrol, or
Bread	1 1/2 lbs.
Dried apples	2 oz.
Potatoes	1 lb. when procurable, or
Rice	1 oz., or
Beans	3 oz.
Tea	1/2 oz.
Coffee	1/2 oz.
Sugar	3 oz.
Pepper	1/36 oz.
Salt	1/4 oz.

(Turner 1950:422).

Griesbach (1946:35) also mentions that pemmican and dried buffalo meat were included in food rations up to 1880.

In summary, by the late 1870's a subsistence shift towards a greater use of domestic stock and agricultural products was well underway in the Saskatchewan district, and the daily meat consumption was being reduced. Innis (1956:359) speaking about this shift in the Saskatchewan district, states that: "Decline and violent fluctuations in the supply of country produce especially pemmican and larger game animals necessitated an increasing dependence on agriculture."

The Development of Transportation

With the demise of the bison and introduction of larger numbers of domestic stock, together with the increase of agriculture, a more efficient transportation system developed. This system helped the fur trading posts considerably by providing them with much needed supplies to ensure their survival.

The efficient transport of provisions to the more isolated trading posts of the Saskatchewan district was not well developed until the 1870's. Prior to this time, supplies from the Red River colony were transported by ox carts along the old Carlton trail, a very long and tedious journey. By the late 1870's steamboats were making their way up the North Saskatchewan River as far as Fort Edmonton. In June, 1879, the steamboat Lily arrived at Edmonton and took back with her the winter furs from the north (Peel 1972:52). These river steamers also stopped at Fort Victoria as early as 1882: "At Edmonton she [Northcote] debarked 103,415 pounds of freight for the Hudson's Bay Company. Her return cargo . . . in addition (contained) shingles for Victoria . . ." (Peel 1972:98, brackets mine).

The main functions of the riverboats were to take furs back east, as well as furnishing the west with much needed provisions: ". . . oats for livestock, wheat for milling, and lumber for building were exchanged between Edmonton, Battleford and Prince Albert." (Peel 1972:61). In 1883, the Edmonton district was receiving bacon brought from Winnipeg by the steamer Northwest (Peel 1972:144), in 1886 the river steamers were provisioning a number of fur trading posts situated along the North Saskatchewan River, including Fort Victoria, which at this time, ". . . sailed from Grand Rapids on the 18th with a cargo of 250 tons. She

landed 50 tons at Carlton, 15 at Battleford, 40 at Pitt, 40 at Victoria, and 100 tons at Edmonton." (Peel 1972:195). The specific items landed at Victoria were not mentioned but may have consisted of processed goods such as flour from Battleford and meat products from Winnipeg. On returning east in 1887, the Northcote took back furs from the various posts, including 37 packs from Fort Victoria, indicating that the fort was at least somewhat operational.

Steamship travel on the North Saskatchewan River occurred at a rather critical period:

> As the white and Metis population increased, and particularly during the steamboat period which followed the York boats and canoes, and coincided with the still greater consumer market and the falling off and disappearance of the buffalo, flour was a considerable item of transport into this neighbourhood . . . (MacDonald 1954:186).

Certainly this form of transportation was not only essential to the settlers but also to the Hudson's Bay Company, which underwent major changes after 1880:

> No great portion of accommodation and luxury was required by the fur trade, but the Hudson's Bay Company were heavily interested; supplies to the posts went in and furs were taken out by the boats (MacDonald 1954:188).

It is therefore reasonable to assume that the permanent subsistence shift by the Hudson's Bay Company was not only directed toward a greater use of the local domestic stock and agricultural goods, but also depended upon the transport of processed goods from the east. The Edmonton-Calgary freight trail also supplied the Edmonton district with provisions during the 1880's including, ". . . grains, bacon, coal oil, whiskey . . ." (Belanger 1973:10). By 1884, the Canadian Pacific

Railway had reached Calgary and would have provided the Edmonton district with faster access to provisions shipped from the east.

Disposal Patterns

Historic documentation on the disposal patterns employed by the fur traders is sparse; however, the importance of the disposal of refuse becomes apparent when viewed in an archaeological context. Of major importance here is the discarding of food related materials, especially that material, such as faunal remains, which will be present in the archaeological sample.

From the historic references pertaining to butchering, it is evident that a large portion of bone refuse would not find its way back to the posts. In other instances fresh meat was brought back to the forts and the bone was discarded following consumption of the meat. Garbage heaps, middens, and trash pits are common occurrences at archaeological sites, and this is also the case for fur trading posts where large middens occur outside of the fort boundaries.

Historical references to exactly where the garbage was being dumped are rare. A historic account of the men cleaning the compound at Fort White Earth is reported by Alexander Henry: ". . . the fort was cleaned out and swept for the first time." (Coues ed. 1965:627-28). The disposal of the refuse from this cleanup may have resulted in a sheet midden at the north side of the fort or near the two gates:

> Concentrations of bone in and around each excavated gate suggest that disposal of some midden material, at least, was somewhat casual. Presumably the inhabitants of the fort threw the bone outside the gate and it is apparent they went no further than necessary (Nicks 1969:63).

Similar accounts of a general cleanup are recorded by William Tomison at Fort Edmonton in 1796: "The men cleaning rubbish out of the house and yard." (Johnson ed. 1967:38). Again, the refuse may have been disposed of outside the palisades or in trash pits specifically dug for that purpose. Another important factor in garbage disposal comes from the same fort, and indicates that the fort's main icehouse was not located within the compound but near the riverbank (MacEwan 1968:36). The icehouse served the purpose of storing bison quarters during the winter months for pemmican making in the spring. Tomison, on March 28, 1798, states that the men, ". . . made 3800 lbs. of pemmican for the journey down." (Johnson ed. 1967:115). It is quite conceivable that the secondary butchering of the bison quarters occurred by the river and thus the bones would be left there, while the pemmican was made near or within the fort compound.

Two other important factors must be taken into consideration in the discussion on refuse disposal, either during or after a post occupation. They are the redistribution and destruction of food related refuse by scavengers, especially dogs, and the cleanup of posts by later occupants after their abandonment.

Bonnichsen, in his experiments on bone destruction by carnivores, explains that ". . . animals attack bones at the epiphyseal ends, since the compact bone is thinnest in this area and the nutrious spongy bone tissue is close to the surface." (Bonnichsen 1973:14). His tests, however, showed that destruction of large bovid bones was minimal (ibid:16). The destruction of the more fragile small mammal, bird, and fish bones would probably have occurred.

One reference to the number of dogs kept by the Hudson's Bay Company posts is by Paul Kane (MacGregor 1949:172) who believed that there were at least two or three hundred dogs at Fort Edmonton. This estimate is roughly similar to McDougall's estimate of 150 dogs at the same post (Bredin 1972:83). Presumably Fort Victoria kept some sled dogs for transportation during the winter months, but likely much fewer than a large post such as Fort Edmonton. These dogs would have probably destroyed many smaller mammal bones while they would have affected large mammal bones minimally. However, the effect that they had on the redistribution of all faunal remains may have been considerable.

The other possible factor for the redistribution of garbage may have been a general cleanup of the area during the reoccupation of the site and the subsequent settlement of Pakan. By 1915 the Canadian National Railway had reached Smoky Lake, Alberta, located eight miles to the north of Victoria, and this may have prompted collection of bison bones for making fertilizer. This practice is well documented by McCreight (1950) for the United States, and it is known that a similar situation occurred in Canada. Surface bones at Carlton House were collected by the local settlers during the early 1900's and shipped east (Nicks, personal communication).

CHAPTER V

METHODOLOGY

The foregoing review of the historical evidence indicates that provisioning and subsistence patterns remained relatively stable as late as the mid-1870's. The evidence also suggests the nature of subsistence after the demise of the bison at ca. 1881, although there is little data concerning the adjustments of the inhabitants of Fort Victoria to the decline of the bison. Several expectations concerning the nature of faunal evidence during this bison decline are presented after a brief discussion of the value of faunal analysis.

Measuring Past Animal Utilization

Faunal remains provide evidence of past animal resources and their uses. The variety and relative abundance in the archaeological record presumably reflects resource availability and use. Similarly, patterns of butchering, meat and bone processing should be revealed by the differential treatment of skeletal elements. The questions remain: how accurate is this reflection? To what extent do various factors serve to complicate the record of animal utilization? It is clear from other studies that there may exist significant discrepancies between the historically known subsistence pattern and the recovered faunal data.

Guilday (1966), in his analysis of faunal remains from Fort Lagonier, Pennsylvania, is confronted with the problem of justifying subsistence patterns at that site. The fort's occupation span (1758-66), population, and the number and types of animals used, were recorded.

However, Guilday is unable to reconstruct the historic use of meat at the fort from the faunal analysis. His conclusions are relevant to this study:

> The major portion of meat ration (salt pork) left no archaeological trace, troops were not on full rations at all times, the sample recovered is but a portion of the full archaeological sample at the site, and the facilities for garbage disposal in the creek, where it would be lost to the archaeologist, were excellent. Any attempt to assess length of intensity of occupation from this sample alone would have been futile (Guilday 1966:186).

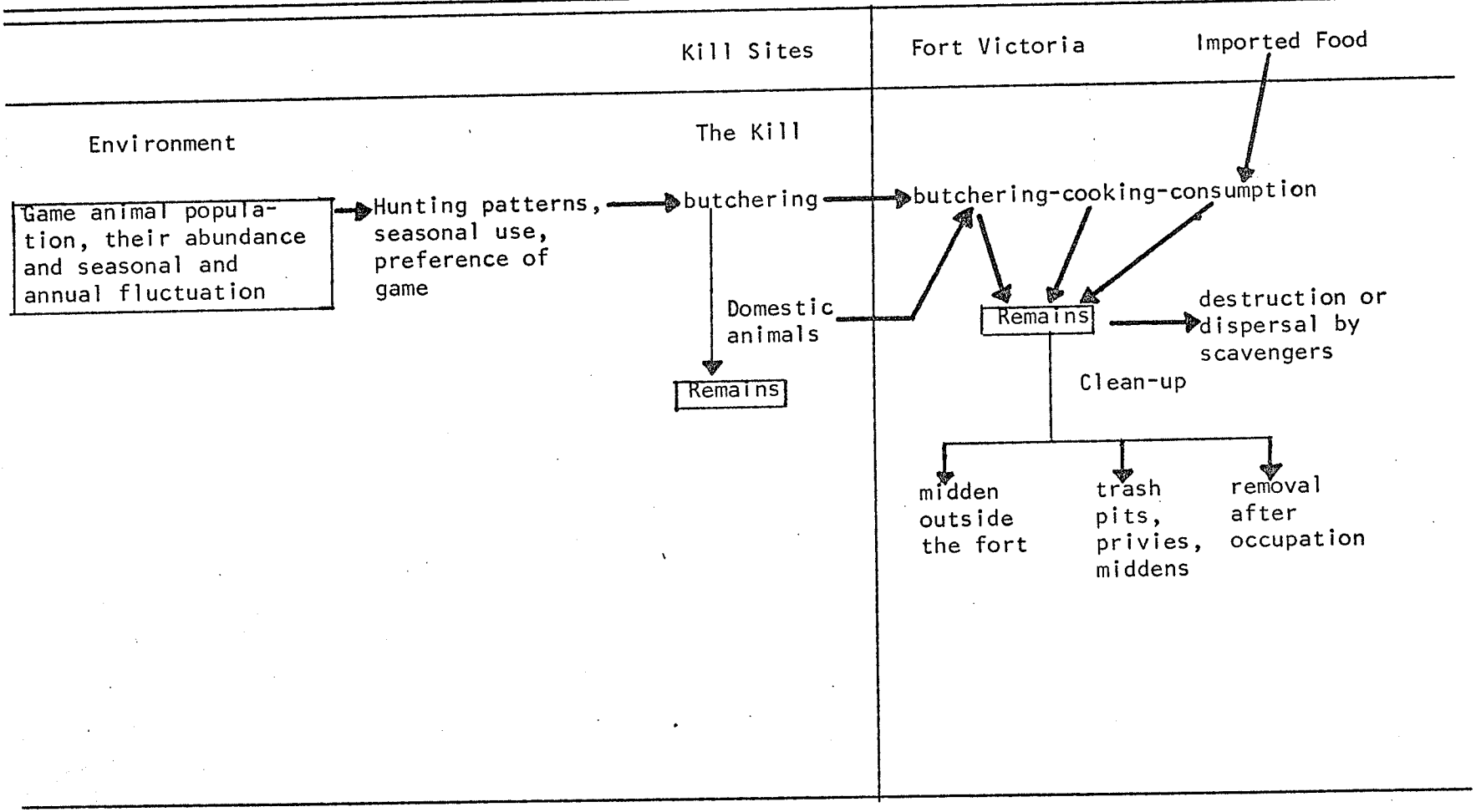
The reasons for these discrepancies are various and can productively be investigated by considering how animal resources are acquired, processed, used and incorporated into the archaeological record. It is therefore important to consider the historical records on subsistence in the Fort Victoria area. From the time that an animal is killed until its remains are collected, a number of variables come into effect, such as seasonal hunting differences, a variability in game preferences, and butchering of game animals.

In order to more fully understand this variability in the procurement of meat and the eventual disposal of bones, a flow chart has been devised (Table 4). The chart is based on Schiffer's (1972:156-165) flow model illustrating the types of refuse disposal that may occur at archaeological sites. The flow chart for Fort Victoria is intended to demonstrate that the data derived from the faunal analysis is sometimes incomplete and difficult to interpret.

The historical evidence presented in the previous chapter suggests that after remains were brought to the posts, there were at least three important factors which bias the sample of bone recovered: periodic cleanup and removal of bone and other refuse from the fort

TABLE 4

FLOW CHART ON SUBSISTENCE AND DISPOSAL PATTERNS



compound; destruction and dispersal of bone by scavengers; and the removal of bone after fort occupation. Without further information regarding these factors it can only be assumed that they operated equally at all of the posts under consideration. It is further assumed that the bones of species within an animal group (large mammal, small mammal, bird, fish) suffered a similar fate after deposition. It cannot be assumed, however, that the remains of different groups would be equally biased. For example, the butchering of larger animals produces a proportionately larger number of fragments than the butchering of smaller animals whose bones may be discarded in a more complete state (Yellen 1974:55). Furthermore, most fish cleaning may have taken place on the riverbank or lake shore, leaving few remains within the fort. Fish bones, being relatively fragile, may have been more readily consumed by scavengers. It is thus expected that there will be certain discrepancies between historically documented utilization and recovered fauna.

Comparisons

In keeping with the major goals of this analysis, the Fort Victoria faunal remains will be compared to those from Fort George, Buckingham House, and Fort White Earth. Terms of reference include the types of butchering patterns employed, the game animals most preferred, and the variety of game animals that were taken. It is assumed that the patterns of animal use and butchering revealed in the faunal remains from the three earlier posts is typical of the period of bison abundance. Detailed comparisons between these posts and Victoria are not feasible as differing population sizes and lengths of occupation, variation in the excavated portion of the sites, and the fact

that the three earlier posts processed quantities of meat for the fur brigades as well as for their own consumption, make these sites "unequal" for such analytical purposes.

Finally, through the analysis of the fauna an attempt will be made to determine the changes that took place in the Fort Victoria subsistence patterns over a thirty year period of occupation. The decrease of bison and other large game animal populations in the 1870's necessitated a number of subsistence changes in the Fort Victoria area. This decline of the bison is summarized as follows:

1. 1864-1875: Bison plentiful.
2. 1875-1876: Bison movements becoming unpredictable.
3. 1876-1878: Bison rapidly diminishing.
4. 1878-1880: Bison almost totally depleted.
5. 1881-1883: Disappearance of Bison on the Northern Plains.

The historic data show that a permanent shift to domestic stock and a greater reliance on agricultural goods took place, although the specific nature of this shift (the variety and preferred domestic species) at Fort Victoria is not discussed. Possible adjustments to the decline of the bison herds are:

1. 1864-1875: Bison are predominantly utilized, as well as other game animals, during certain times of the year. Some provisions obtained from the Indians.
2. 1875-1876: Bison are hunted when they are in the area; an increased use of other game animals and provisions from Indians.
3. 1876-1878: Bison and other game animals are more efficiently used. Probable use of domestic stock and other provisions. Few provisions are received from the Indians, who are also experiencing hardships.
4. 1878-1880: More intensive utilization of bison, other game animals and domestic stock, if present. No provisioning by Indians.

5. 1881-1883: Use of wild game, other than bison, and heavy utilization of domestic stock. Trade of agricultural goods from the eastern provinces.

6. 1884-1898: Predominant use of domestic stock (cattle, pigs and chickens) and agricultural goods; wild animals still hunted to some extent.

The major features of these changes in animal use are discussed by Losey and Prager (1975:172) who suggest the following propositions:

1. Increased utilization of large game animals:

> With the onset of the bison slaughter and a subsequent recognition of its increasing scarcity, we would expect to find that more and more of the animal would be finding its way back to the forts. Also, ... a lessening in the discriminatory use of particular cuts of meat and a more intense use of fat, internal organs, and of the skeleton.

2. A temporary shift to small game animals, birds and fish

> because, . . . there was certainly no permanent replacement for the tremendous biomass represented by bison in the plains and parklands region (Losey and Prager 1975:172).

3. A permanent shift to the use of domestic animals.

In investigating the above propositions several implications can be outlined as suggested by Losey and Prager. These implications apply to the period of fort occupation prior to the disappearance of bison, ca. 1881.

1. a. Increased use implies that a greater proportion of the skeleton of bison, and probably other large game animals, would be found at the fort. Specifically, those bones with little meat such as those of the lower legs (metapodials, phalanges) and perhaps the skull and vertebrae should be better represented at Fort Victoria than at the earlier posts.

1. b. If the bones brought back to the fort were also more intensively used for marrow and bone grease, we would expect to find a higher incidence of bone fragmentation. A higher proportion of major marrow and grease bones (humerus, femur, tibia, radius, vertebrae and ribs) would thus be expected to have remained intact at the other posts.

2. The temporary subsistence shift might be expressed as either

an increase in the frequency of one or more other game species, a greater variety of other species, or both, when compared to the faunal inventory at the other forts.

3. According to the historic records the shift to domestic animals was a gradual one. This gradual change should be apparent in the faunal remains. The records also show that cattle, pigs and chickens were the primary replacements and that cattle were by far the most important. Based on evidence for continued lack of meat it is further probable that domestic cattle were used as intensively as the bison was during its decline. This too may be evident from the faunal remains.

CHAPTER VI

EXCAVATIONS AT FORT VICTORIA

Introduction

Only a brief discussion of the archaeological investigations conducted at Fort Victoria will be given to familiarize the reader with the structural remains that were found, the methods of excavation, and a general plan of the excavation units. A more detailed account of those features (trash pits, privies, midden, and cellar fill) that are of importance for dating, will also be presented. The following description is a summary of the 1974, 1975, and 1976 Fort Victoria preliminary reports (Losey 1977, No. 2, 1977, No. 3, 1976, n.d.).

In the spring of 1974 portions of the Trader's Shop-Press Room (R2M6), the Dairy (R2M7), and the southwest corner of the Palisade (R2M14 and 15) were excavated (Fig. 7). During the 1975 field season, investigations were directed towards locating the General and Provisions Store (R2M9), the Men's House (R2M10), and the southeast corner of the Palisade (R2M13 and 14). The South Gate (R2M14), the Blacksmith's Forge-Men's House complex (R2M11) and the midden deposit located outside the north Palisade (R2M12) were also tested. The major objectives during the 1976 field season consisted of more intensive investigations of a greater area of the Men's House (R2M10), the Blacksmith's Forge-Men's House complex (R2M11), the northeast corner of the Palisade (R2M12 and 13), the North Gate (R2M12), and to conduct tests on a smaller midden (R2M12N) located immediately northeast of the North Gate. A test unit was placed immediately north of the Factor's House to investigate

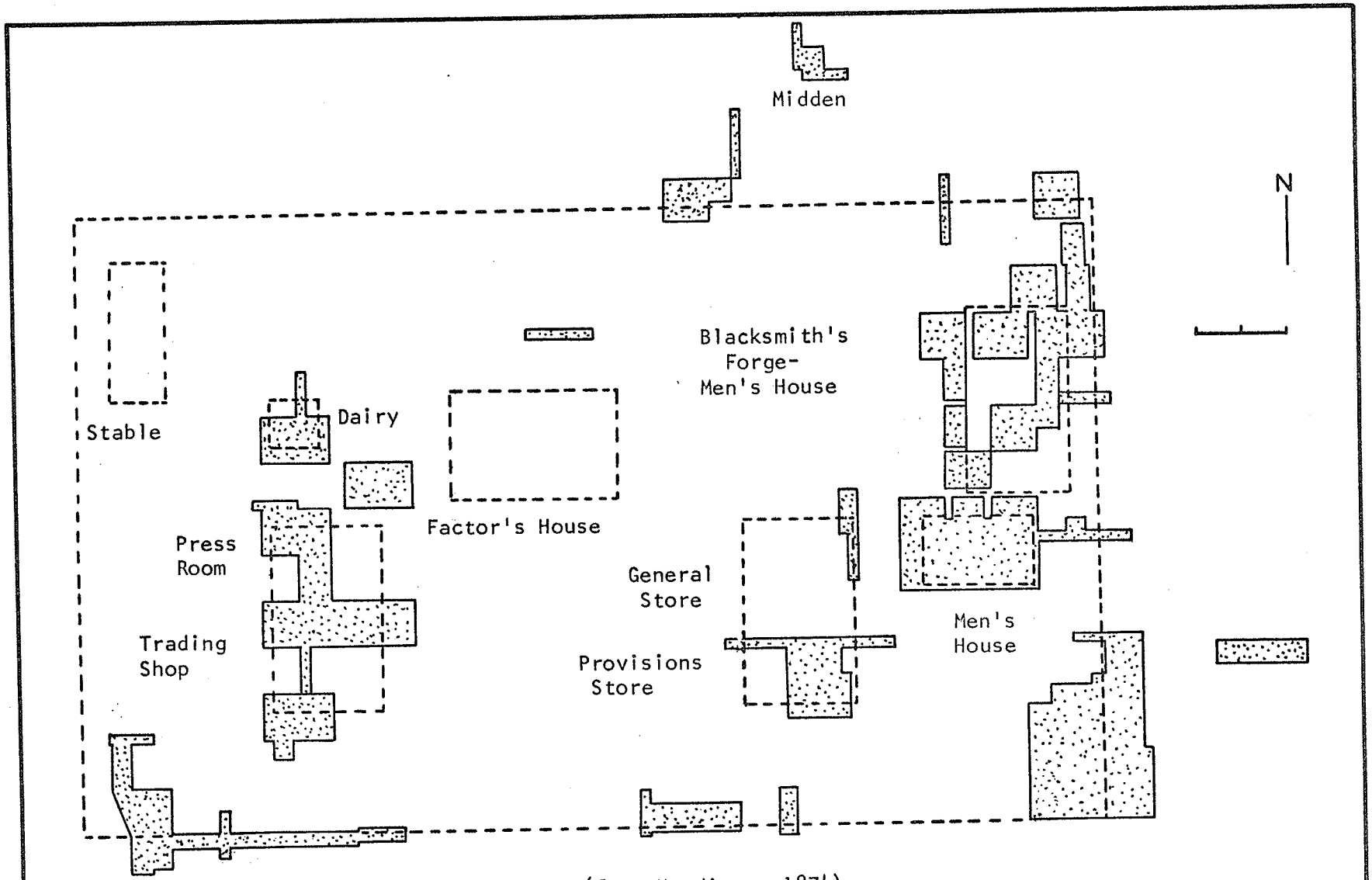


Fig. 7 Excavation Plan: Fort Victoria (from Hardisty, 1874)

the kitchen addition (R2M5). Also, due to the danger of fire at the site, two fireguards approximately 36 feet in width were plowed along the north and east boundaries of the site; these areas were surface collected using a grid control system.

A considerable amount of disturbance of the site area occurred after the abandonment of Fort Victoria by the Hudson's Bay Company, complicating the archaeological investigations. All areas with the exception of the Trader's Shop-Press Room were plowed to a depth of roughly 10 to 12 inches. The removal of all Hudson's Bay Company buildings from the site except the Factor's House, has also disturbed the artifacts and faunal remains, as has the subsequent addition of buildings such as the Pakan General Store and garage.

Excavation Methods

The designation system employed at Fort Victoria is a site-operation-suboperation-lot scheme which was adapted from the National Historic Sites system by E. Frank Korvemaker (1974) of the Alberta Historic Sites Service. The northeast corner stake in each unit provided vertical and horizontal control. The elevation of each of these stakes was recorded in relation to the central datum point, the Historic Sites Service marker cairn, so that vertical control was easily maintained. Because all structural features were built in feet and inches, excavation units were measured in this system.

Individual artifacts and faunal remains were not ordinarily mapped as to their exact location in a particular unit but control was maintained by designating new lot numbers to various strata or fill, within the unit. Excavation methods consisted of shovel-shaving the upper,

disturbed areas until features were exposed; thereafter trowels were used. All matrix that had been shovelled, as well as the majority of trowelled matrix, was screened using a one-quarter inch mesh, manual screen, ensuring that smaller remains were recovered. In a number of instances, when concentrations of beads or small microtine remains were exposed, the matrix was screened with a screen of one millimeter mesh, and in other cases flotation and wet screening through smaller mesh screens was improvised.

Structural Features

Palisades

A large area of palisade footer trench was excavated, and included the southwest, southeast and northwest stockade corners. The footer trench measured roughly two and one-half feet in width and had an average depth of four feet. Evidence of bastions located in the southwest and southeast corners was investigated. The excavations revealed little information concerning a bastion in the southwest corner while complex features were exposed in the southeast corner.

When the fort was constructed, one of the first tasks would have been to build a stockade surrounding the fort. Construction probably occurred during the spring and summer months of 1864, thus all artifacts recovered in the footer trench fill can be safely dated to that year. During excavations, all matrix above the footer trench, which had been disturbed by plowing, was separated from the original footer trench fill, thereby ensuring that artifacts of the two matrices were not mixed.

Gates

Two gates, located opposite one another, are situated centrally along the south and north stockade walls and are approximately eight feet wide. Investigations of the north gate revealed that the upper matrix was disturbed, thus excavation units were divided into "upper" and "lower" categories. An ash layer was exposed, being roughly two inches in width and running a north-south direction; this layer runs into the north palisade footer trench from the north and runs to the exterior of the footer trench. The stockades were taken down in 1888 and a smaller picket fence was constructed during the same year. It is therefore suggested here that those artifacts below the ash layer were deposited before 1888.

Picket Fence Trench

A smaller footer trench running roughly parallel to the main palisade footer trench along the north, east, and south walls was exposed, and contained small pickets roughly three and four inches in diameter. This feature was the picket fence enclosure, shown on Beeston's map (Fig. 4), that was erected in 1888 after the old palisade was torn down. Since the fort was closed from 1883-1887, all features transected by this fence predate 1883, and all artifacts and faunal remains recovered from the trench fill can be dated to 1888.

Fur Trader's Shop-Press Room and Dairy

The excavations of the Fur Trader's Shop-Press Room exposed the sills and joists of all four walls which were embedded in an alluvial matrix that probably came from the cellar situated beneath the building. The original cellar has been capped by 20th century garbage while the

remainder of the matrix was filled as a single sequence; thus no relative chronology of the fill could be compiled.

The Dairy, located immediately north of the Trader's Shop-Press Room is shown on Kanis' survey map of 1888 (Fig. 3), but Beeston in 1889 makes no mention of the building, suggesting that it was removed with the reopening of the fort in 1888. Excavations exposed a large cellar beneath this structure which was approximately eight feet deep. The fill consists of a number of major layers and minor lenses. It is thought that the upper layers composed of cinder and ash are primarily redeposited trash middens. The cellar was filled as a single event which may have been done by Wilson in 1888.

General-Provisions Store and Men's House

Very little structural evidence of the General-Provisions Store remains, due to extensive plowing. Only sill and joist fragments of the Men's House north wall were located. However, two large cellars were later exposed which were filled with a number of layers and lenses that were useful for dating purposes.

The Men's House east cellar contained a number of distinct fill sequences: A top plow zone of mixed matrix; a fill which was dumped into the cellar after the building was removed in the 20th century; beneath this two other fills represent the 1888 reoccupation debris and the initial occupation debris dating from 1864-1888. The east cellar was approximately seven feet deep, having a circular outline roughly seven feet in diameter on the surface that tapered approximately three feet below surface to a square shape, six feet by six feet.

The west cellar has dimensions of seven feet by four feet and is

roughly four and one-half feet in depth. Two trash pits intersect this feature and obscure any chronology in the upper layers. Like the east cellar, no evidence of cellar cribbing or flooring existed. A number of fills were also recognized in the west cellar and are defined by both position and artifactual content. The lowest layer roughly correlates with the lowest fill in the east cellar and can be termed as the initial occupation layer dating from 1864-1888. The remaining fill can only be defined as a combination of the reoccupation and post-building removal deposits.

Blacksmith's Forge-Men's House Complex

The northeast area of the compound originally contained the Blacksmith's Forge complex, which was apparently removed by 1889 and replaced by a stable, as shown on Beeston's 1889 map. This area was also plowed, thus destroying any major structural evidence. However, a rectangular cellar, located in what was the south portion of the Blacksmith's Shop, was exposed approximately one foot below the surface. This feature was about six feet in depth, being wider at the bottom than the top. The fill consists of a number of sand and ash lenses and some large sandstone slabs with a reddish oxidized surface which may have been part of the basal structure of the Blacksmith's Forge. It is suggested that this fill was deposited during the reoccupation of the fort in 1888.

Trash Pits

The southeast corner of the fort enclosure contained a number of shallow trash pits. The first pit is approximately four feet in diameter, three feet eight inches deep and is:

> Composed of many thin layers, many of ash and sphagnum moss, the pit was probably used as a daily trash depository until full. The presence of sherds from a single platter within several layers suggest the pit was used over a relatively short period (Losey et al. 1977, No. 3:16).

A relative chronology of this feature was determined from several maker's marks of the ceramics recovered from the pit which suggest that the trash could have been deposited somewhere between 1850-1881.

Two other trash pits were exposed in the southeast portion of the compound; their exact dimensions are unknown because they were only partially excavated. Their stratigraphy suggests that the layers were composed of deposits of sphagnum moss, then capped by a more or less uniform sterile soil. Very few artifacts were recovered from these trash deposits and the pits can only be dated between 1864-1888.

Privies

Immediately east of the Men's House a rectangular pit was exposed beneath the plow zone. This has dimensions of five feet by two feet and was dug roughly five and one-half feet deep. It is suggested here that this was the Men's House privy:

> The lower ca. 1 1/2 feet of fill consists of a brown matrix which, although more or less homogenous, show textural distinctions on a roughly horizontal axis. Above are layers of trash and ash. The ash layer is particularly interesting since it begins ca. 1 foot below surface and slopes steeply to ca. 4 feet below surface. The thickness of the ash along the wall, ca. 5 inches, and the slope of the stratum, an angle of ca. 75°, suggest that the ash layer was slumped considerably.
>
> Extensive layers of sphagnum moss occur throughout the pit. It appears that upon termination of the pits' use as a privy, the moss was capped with ash and several sandstone slabs (Losey et al. 1977, No. 3:14).

The privy was transected by the 1888 picket fence trench and therefore predates it. Another possible privy was exposed in the southwest corner of the Men's House.

Midden

A large midden deposit situated approximately 40 feet from the north palisade and northeast of the north gate was initially tested with an auger to determine its composition and artifactual content. Auger tests showed that a higher concentration of artifactual material existed immediately beneath the sod layer. Two, two foot by 10 foot test trenches and a five foot by five foot unit between these two trenches were excavated. Excavation and stratigraphic control of the midden was very difficult as the deposit was composed of at least 17 layers and a number of lenses. The suggested sequence of these layers is summarized as follows: A 1915 Canadian 5 cent piece was recovered from the second highest stratum and indicates that the upper levels post date fort occupation. The presence of rimfire rather than centerfire cartridge cases in the lowest stratum suggests the lowest levels date from the later period of Company occupation.

A smaller midden, south of the main midden, abutted the north palisade wall and was tested by a two foot by 10 foot unit. The midden fill was similar in morphology to the main midden and was divided into two chronological sections consisting of an upper, post-1888 section and a pre-1888 section, separated by the ash layer which runs into the north palisade footer trench (Fig. 8). Also, ornamental rim fragments from kerosene lamps were recovered both above and below the ash lens; these artifacts have relative chronologies ranging between 1870 and

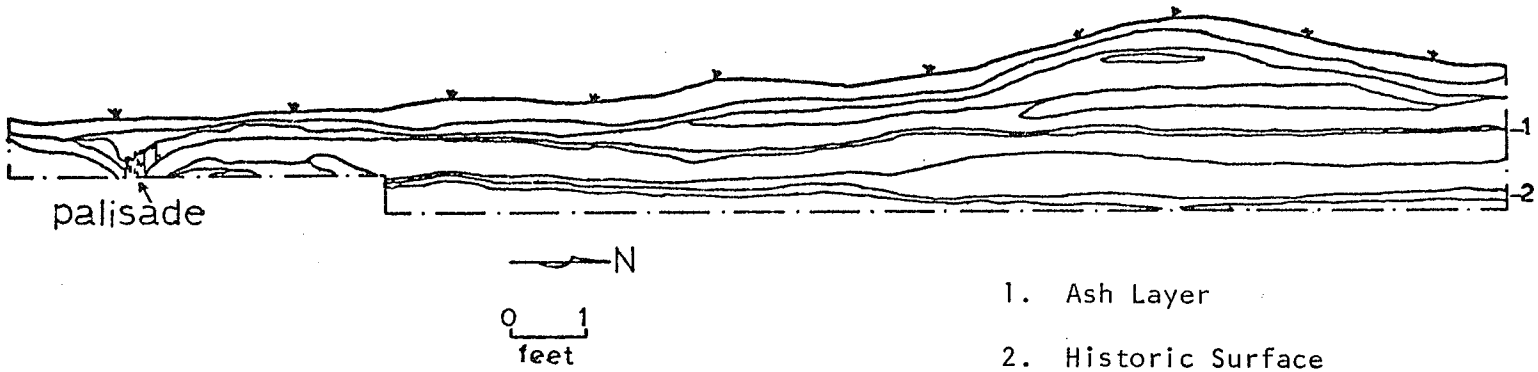


Fig. 8 Profile of Midden and North Palisade: Fort Victoria

1885. It is suggested that the area immediately above the ash predates 1888.

Fire Guards

The north and east fire guards run parallel to the north and east palisades, both being roughly 36 feet wide. The fire guards were divided into 18 foot by 18 foot squares and all visible artifacts were surface collected after each plowing; the north fire guard was surface collected three times while only two samples were recovered from the east fire guard. Collections taken after each plowing from the same square were kept separate in order to determine approximately what percentage of the sample has been recovered. This percentage is based on the assumption that after each plowing the sample should become smaller until only a small number of artifacts and fauna remained.

The description of the structural features at Fort Victoria, although very general, has been aimed at reviewing the more essential data concerning structural remains and their chronologies which are important for the interpretation of the faunal sample recovered from the site. The artifactual information has only been discussed where it has a direct bearing on the dating of the fills and features.

CHAPTER VII

ANALYSIS OF THE FORT VICTORIA FAUNA

The three seasons of excavation yielded 66.5 kilograms of mammal, bird and fish remains representing a minimum of 149 individuals and 48 species. For various reasons the sample was not as large or as well dated as desired although it is deemed adequate for outlining major patterns of animal utilization and providing evidence of the subsistence shift from bison to domestic and other animals during the occupation of the fort.

Techniques

The total sample recovered from Fort Victoria over the three years was used in the analysis. The bulk of washing, sorting and cataloguing of the faunal remains was completed at the site, and identification took place after the completion of the field season.

The faunal remains were classified into five major categories: large mammal, small mammal, bird, fish, and a miscellaneous category consisting of mollusc and egg shell fragments. These categories were divided into identifiable and unidentifiable groups. The identifiable fauna was taken to the lowest possible taxonomic category and classified to element, to portion, to side and to degree of maturity.

The unidentifiable segment was that material which could not be placed in a taxonomic category smaller than order, but whenever possible, the element, portion and side were noted. Bird bone was examined for the occurrence of medullary bone, as suggested by Rick (1975). Medullary bone is a calcium build-up in the medullary cavities of elements which occurs in female birds prior to the spring egg-laying season and is the

direct source of the eggshell material. The fish remains recovered were also identified to the genus or family level, following the techniques outlined by Casteel (1972). All bone was weighed in the above major categories and all butchering marks were recorded. The distribution of the major categories was also tabulated.

Preservation

Bone was generally well preserved at the fort, even those of the smaller and more fragile species. The site even yielded a number of leather artifacts albeit poorly preserved. The site is situated on an alluvial terrace with adequate drainage and a sandy matrix which is almost neutral in pH.

The Dating of Deposits

From the description of the archaeological remains and discussion of the data, it is evident that the absolute dating of deposits and features at Fort Victoria has met with minimal success. The dates of some of the more important features and deposits are presented in Table 5 and the faunal remains from these deposits are assumed to be of the same age. With the exception of the palisade and picket fence footer trenches, many of the deposits have a wide time range.

Disturbance

Difficulties encountered in dating many of the deposits are due to the fact that approximately 50 percent of the area inside the compound as well as the area outside, had been plowed after the abandonment of Fort Victoria. It is therefore uncertain what portion of the faunal

TABLE 5

DATES OF STRUCTURES AND FEATURES: FORT VICTORIA

Feature	Date
Palisade Footer Trenches	1865 (Summer?)
Picket Fence Trench Fill	1888
Trading Store - Upper	Mixed matrix
- Lower	1865-1898
Fur Press Room - Upper	Mixed Matrix
- Lower	1865-1898?
Trader's Store Cellar Fill	1865-1883
North Shed - Upper	Mixed matrix
- Lower	1865-83
Privy	1865-83
Trash Pit 1	?
Trash Pit 2	?
Trash Pit 2-3	1865-98
Trash Pit 3	1865-98
Trash Pit 4	1867-81 Maker's mark on ceramic
Front Gate - Upper	Mixed matrix
- Lower	1865-83?
S. E. Palisade Corner - Upper	Mixed matrix
- Lower	1864-98
Men's House - Plow Zone	Mixed matrix
- East Cellar - post bldg. removal	?
- reoccupation fill	1888
- occupation debris	1864-83
- West Cellar - reoccupation and post bldg. removal	1888
- occupation debris	1865-83
Blacksmith's Shop - Plow Zone	Mixed matrix
- Cellar -	1888 fill
occupation debris	1865-1883
North Gate - Upper	Mixed matrix
- Lower	1865-1883
Midden - Upper	1888-1900
- Lower	1865-1883

sample in the plow zone is contemporaneous with fort occupation. For example, a total of 62.0 percent identifiable large mammal elements, 32.0 percent small mammal, and 49.0 percent identifiable bird elements were recovered from a plowed matrix (Table 6).

Bison and lake sturgeon are presumably contemporaneous with fort occupation even when recovered from a disturbed matrix in the fort compound. This assumption is based on the fact that both species were nonexistent in the area after Fort Victoria was closed. The remains probably belong to the top portions of the various refuse pits and privies in the compound that were scattered when the site was plowed. However, the bison and sturgeon remains recovered from the fireguard could either be contemporaneous with the fort or perhaps be the remains from earlier camps. Considering the fact that the few non-European remains encountered were 50 inches below the surface, it is unlikely the faunal material in the plow zone can be attributed to a pre-fort occupation.

The faunal remains from the fireguard tend to occur in lesser concentrations in those units which were furthest from the palisade walls, and on this basis it is proposed that the majority of this sample is contemporaneous to Fort Victoria. This dispersal of trash is similar to the other fur trading posts, which also have sheet middens occurring on the north sides of the fort, and reinforces the above proposal.

To summarize, the low faunal frequencies recovered in the general compound, the high bone frequencies recovered in the various fills within the compound, and the remains which are dispersed immediately surrounding the compound, are generally similar in distribution to Fort George, Buckingham House, Fort White Earth, and Fort Vermilion (Fig. 9).

TABLE 6

LARGE MAMMALS RECOVERED FROM DATED AND PLOWED MATRICES: FORT VICTORIA

GENERA	PLOWED MATRIX	DATED TO FORT OCCUPATION	TOTAL
Bison bison	47	46	93
Alces	15	4	19
Cervus	3	2	5
Odocoileus	17	8	25
Ursus	5	0	5
Bos-Bison	46	12	58
Bos	71	28	99
Equus	24	7	31
Sus	25	22	47
Total Elements	253(66.2%)	129(33.8%)	382

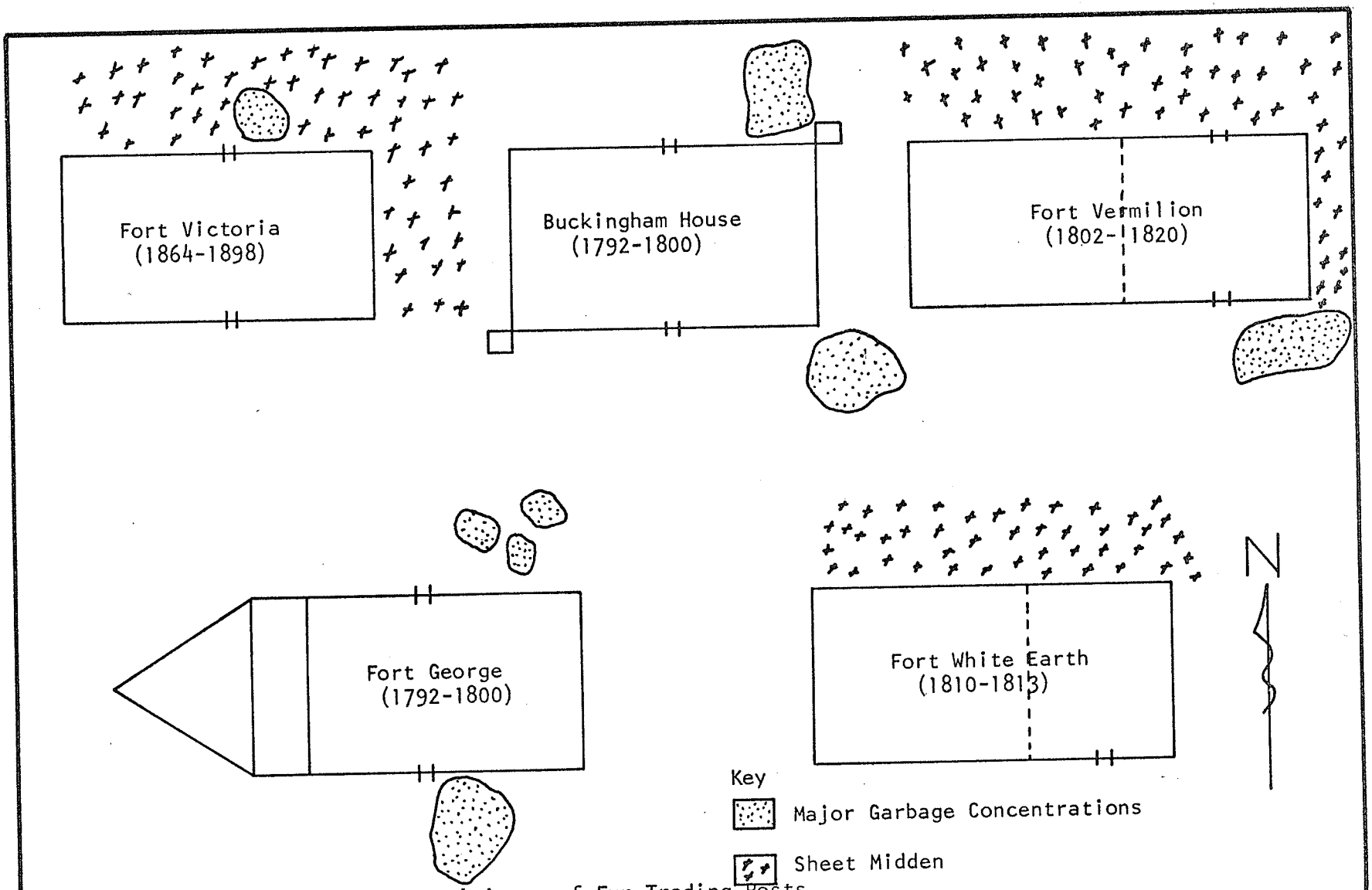
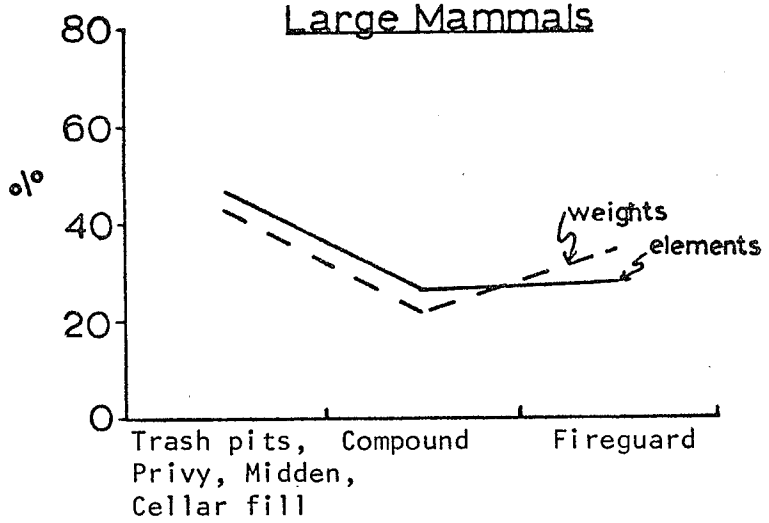


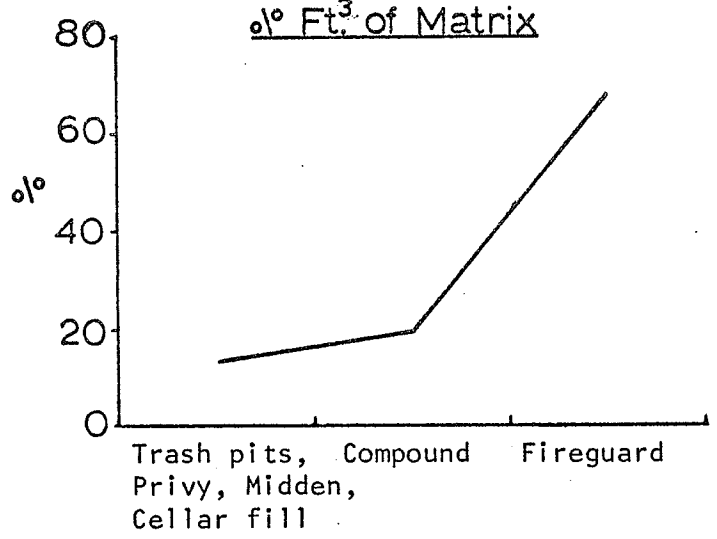
Fig. 9 Major Garbage Disposal Areas of Fur Trading Posts

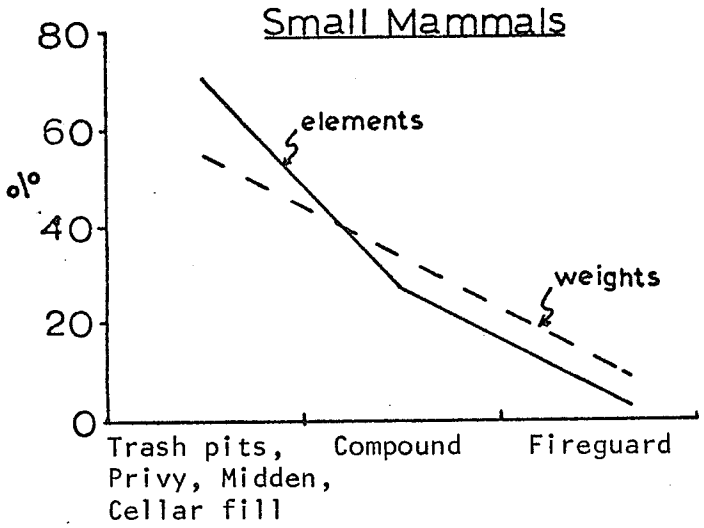
Distribution

The distribution of the identifiable elements and weights of the major faunal types was divided into: 1) trash pits, privies, and cellar fills; 2) general compound, and; 3) fireguard (Fig. 10). The results indicate that the various faunal frequencies were not related to the amount of matrix excavated but show an inverse relationship between the volume of matrix and the distribution of faunal remains. The largest bone concentrations, with the exception of the fireguard, occurred in those areas having relatively low volumes of excavated matrix. Areas such as the trash pits, privies, middens, and numerous cellar fills contained the greatest amount of identifiable elements and weights of bone.

A large amount of fauna was recovered from the fireguard by surface collecting. The sample recovered from the fireguard is incomplete and would obviously have yielded a greater amount of material had it been excavated. The North Fireguard was sampled three times, once after each plowing, and the East Fireguard was sampled twice. A total of 15,700 grams of large mammal bone was recovered from the North Fireguard and 4,800 grams from the East Fireguard. The first recovery from the North Fireguard yielded 7,100 grams, the second 5,800 grams and the third sample consists of 2,500 grams. It has been estimated that roughly 14 percent of the total large mammal sample was not recovered (Table 7) from the North Fireguard. Therefore a total of 2,500 grams of the large mammal elements still remain. Unfortunately, only two samples from the East Fireguard were obtained and the percentage remaining could not be calculated. It should be noted that the majority of faunal material present in the East Fireguard was probably collected.







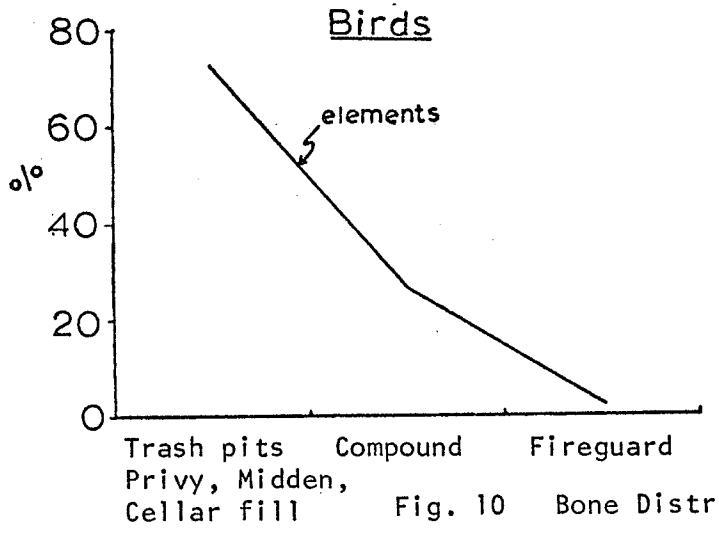


Fig. 10 Bone Distribution

TABLE 7

NORTH FIREGUARD SAMPLE
(LARGE MAMMAL WEIGHTS): FORT VICTORIA

1st Recovery =	7,095.1 grams
2nd Recovery =	5,796.5 grams
3rd Recovery =	2,482.0 grams
Total	15,373.6 grams

The basic assumption is that the % recovery of the third sample is equal to the % recovery of the second, then:

$$= \frac{b}{b + c + x} = \frac{c}{c + x}$$

$$= \frac{5796.5}{8279.5 + x} = \frac{2482.0}{2482.0 + x}$$

where: a = % recovery on first
b = % recovery on second
c = % recovery on third
d = % remaining
x = grams remaining

$= 8279.5 - 2482.0 = 5796.5 - 2482.0$

$= 5797.5 - 3314.5$

$= x = 5797.5 - 3314.5$

$= x = 2483.0$ g.

Then a = 39.7% b = 32.5% c = 13.9% d = 13.9%

Therefore, 14.0%, or 2,500 grams of large mammal bone still remain in the fireguard.

The Fauna

Large Mammals

From a total of 66.0 kilograms of large mammal remains, 25.0 kilograms (37 percent) were identifiable to the genus level. Eight genera of large mammals were recovered and include five wild game animals: deer (Odocoileus), elk (Cervus), moose (Alces), bear (Ursus), and bison (Bison bison), and three domestic large mammals: pig (Sus), horse (Equus), and cattle (Bos) (Appendix 1, Table 25). A Bos-Bison category was also included because of the difficulties involved in distinguishing between the two genera (Olsen 1960). With the possible exception of horse (Equus) these genera are considered to be the major large animal food sources of the fort occupants.

In determining the minimum number of individual large mammals, the total sample from both the undisturbed and disturbed matrix was used. Even when the total sample is considered, the minimum numbers are relatively low (Table 8). Bison is represented by 10 individuals; the minimum number was obtained by measuring the five right and five left distal humerii; only two humerii matched (Appendix 1, Table 26), thus giving nine mature individuals and one immature bison. Minimum number of individuals for all other large mammals were determined from the most frequent element, and occurred in relatively small numbers (Table 8). The distribution of elements showed that high frequencies were recovered from the fireguard, as well as trash pits, cellar fill and privies (Appendix 1, Tables 27, 30). The relative frequencies of large mammals when compared to the minimum number of individuals indicated

TABLE 8

SUMMARY OF MINIMUM NUMBERS OF
LARGE MAMMALS: FORT VICTORIA

GENERA	SPECIMENS	MIND	BASED ON
Ursus	5	1	L. mandible
Sus	47	4	R. ulna
Equus	31	4	L. R. carpal and I. R. pelvis
Bos spp.	98	5	R. scapula and I. R. ulna
Bison bison	93	10	L. & R. humerii and I. R. tibia
Bos or *Bison bison*	58	3	R. tibia and I. R. radius
Odocoileus	22	2	L. ulna
Cervus	7	2	L. humerus
Alces	19	3	L. R. carpal and I. L. tibia
Total	380	30	

that the ranked order was similar for both categories (Fig. 11).

Small Mammals

From a total of one kilogram of small mammal remains, 0.3 (61 percent) were identifiable to genus, with twenty different genera identified from 563 identifiable elements (Appendix I, Table 25). The species with by far the greatest representation was snowshoe hare, Lepus americanus (Appendix I, Table 29, Fig. 15), followed by vole species (Microtus), muskrat (Ondatra zibethicus), and domestic cats (Felis catus), while the remaining small mammals occurred in low numbers (Table 9). The distribution of the small mammal sample was somewhat different from the large mammal remains; the majority of bone was recovered from trash pits, privies, the midden and cellar fill while remains from the fireguard were low (Appendix I, Tables 30, 31). The small mammal element frequencies and minimum number of individuals indicates that no major differences in ranked order occur (Fig. 12).

Birds

A total of 0.3 kilograms of bird remains was recovered, of which 0.2 kilograms (58.0 percent) was identifiable. The 314 identifiable elements recovered were divided into 15 taxonomic categories which include six species, four genera, three families, one order and one category of 'other domestic fowl' (Appendix I, Table 32). Waterfowl was the most numerous group and contained ten individuals with mallard duck (Anas platyrhyncos) and Canada goose (Branta canadensis) being the most frequent individuals. Domestic chicken (Gallus) had the highest minimum number of individuals, while the remaining categories had a low representation (Table 10). The element charts of the various taxa are pre-

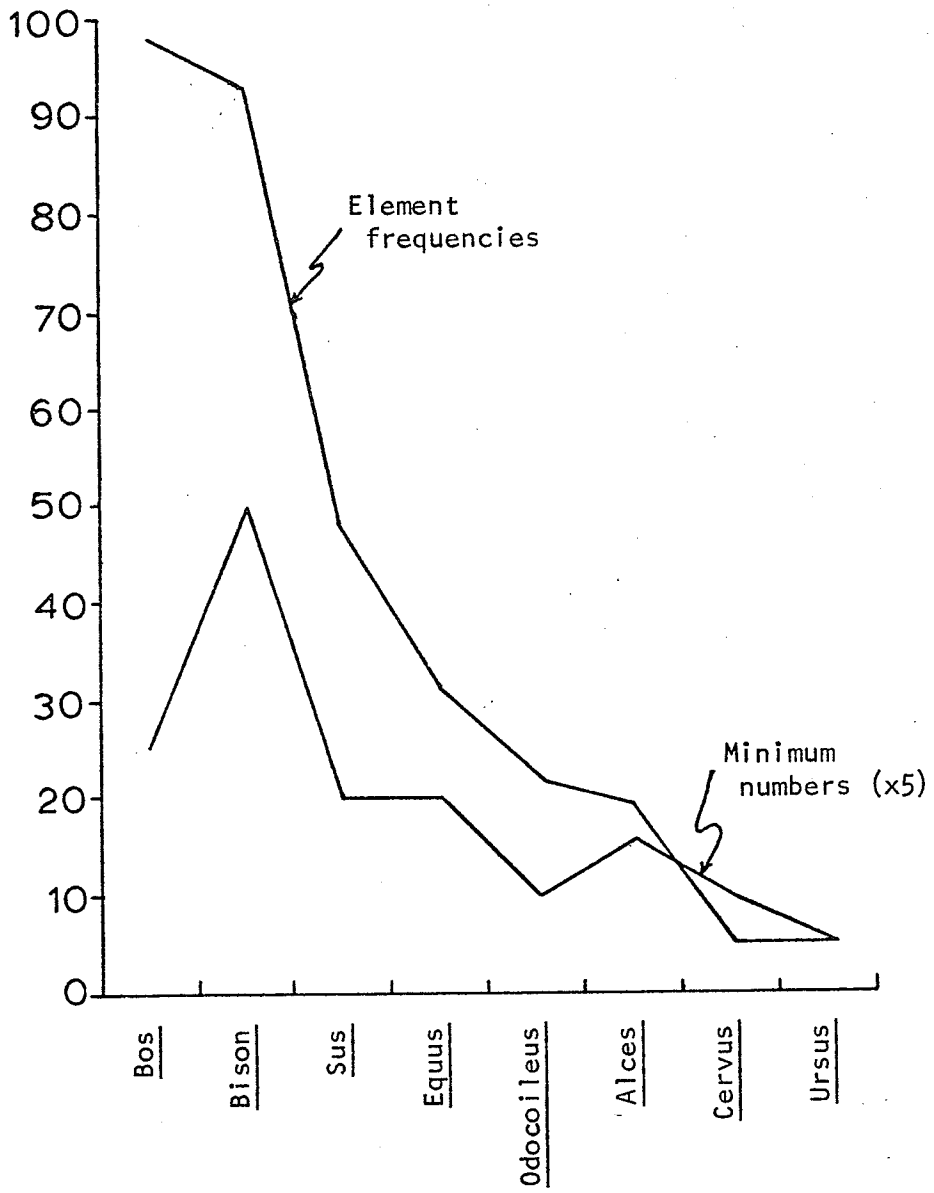


Fig. 11 Large Mammal Element Frequencies and Minimum Number of Individuals

TABLE 9

SUMMARY OF MINIMUM NUMBERS OF
SMALL MAMMALS: FORT VICTORIA

ANIMAL	SPECIMENS	MIND	BASED ON
Microtus spp.	138	10	L. mandibles and lm. humerus
Peromyscus	2	1	Complete maxilla
Phenacomys	2	1	R. tibia
Clethrionomys	38	3	R. femur
Thomomys	1	1	R. mandible
Citellus franklinii	2	1	L. maxilla
Citellus richardsonii	2	1	R. femur
Marmota monax	1	1	R. mandible
Lepus townsendii	2	1	L. ulna
Lepus americanus	312	26	L. mandibles
Mustela frenenta	2	1	R. mandibles
Mustela vision	1	1	R. mandible
Martes americanus	1	1	R. ulna
Mephitis mephitis	1	1	L. radius
Ondatra zibethicus	16	2	L. scapula
Castor canadensis	9	1	L. tibia
Felis catus	11	2	R. metatarsus
Lynx canadensis	3	1	R. mandible
Vulpes vulpes	1	1	R. mandible
Canis latrans	2	1	R. mandible
Canis spp.	16	1	L. mandible
Total	563	59	

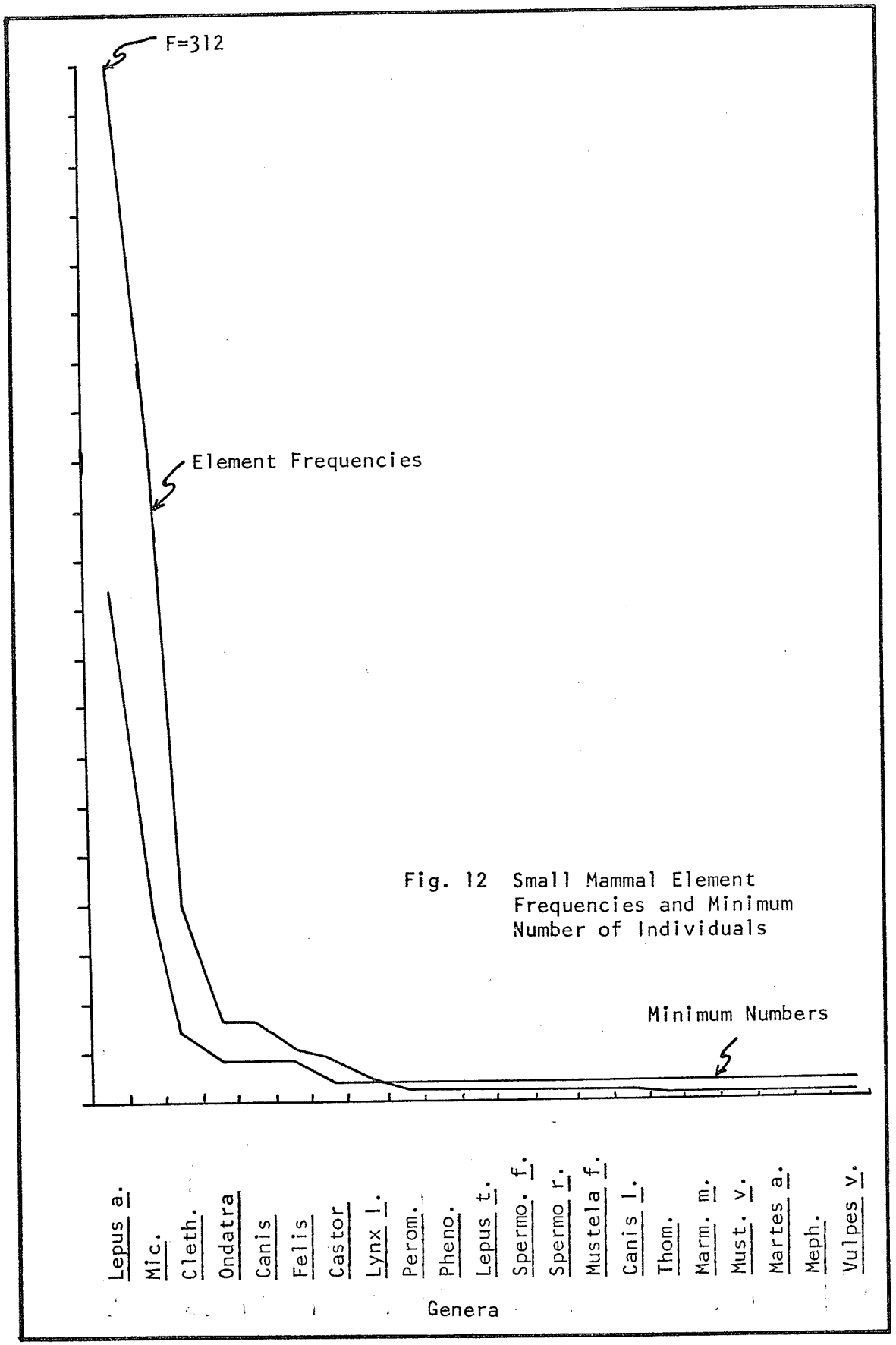


Fig. 12 Small Mammal Element Frequencies and Minimum Number of Individuals

TABLE 10

SUMMARY OF MINIMUM NUMBERS
OF BIRDS: FORT VICTORIA

GENERA	SPECIMENS	MIND	BASED ON
Gallus spp.	29	3	R. humerus
Canachites canadensis	30	2	Complete mandible
Pedioecetes phasianellus	26	2	R. humerus
Tetraonidae	11	3	L. humerus
Anas platyrhyncos	25	4	L. coracoid
Anas acuta	11	1	L. humerus
Anatidae	101	10	6 R. whole humerii and 4 distal R. humerii
Branta canadensis	10	2	R. humerus and 1 L. femur
Bonasa umbellus	3	1	L. tibia
Accipitridae	1	1	L. humerus
Passeriformes	28	2	L. metacarpus
Olor spp.	2	1	L. humerus
Meleagris	2	1	R. tibia
Anas spp.	21	1	R. ulna
Other Domestic Fowl	14	1	L. coracoid
Total	314	35	

sented in Appendix I, Table 32. The distribution of bird was similar to the small mammal remains (Appendix I, Table 33). A comparison of the element frequencies and minimum number of individuals is given in Figure 13.

Fish

The fish weights total approximately 0.21 kilograms. A total of four species of fish, lake sturgeon (Acipenser fulvescens), northern pike (Esox lucius), walleye (Stizostedion vitreum), and burbot (Lota lota), as well as six genera, sucker (Catostomus), sculpin (Cottus), trout (Salmo), goldeye (Hiodon), yellow perch (Perca flavescens) and whitefish (Coregonus) were recovered; other taxa consisted of Stizostedion, Salmonidae, Cyprinidae, and Percopsidae (Table 11). The relative frequencies as compared to the minimum number of individuals and a distribution list of the fish genera are given in Figure 14 and Appendix I, Table 34.

Miscellaneous

Other miscellaneous faunal remains consist of mollusc and egg shell fragments, which occurred throughout the site. The egg shells may be either from domestic or wild fowl while the mollusc shell fragments are similar to that of fresh-water mussel (Anodonta spp.). Remains of a toad (Bufo spp.) were recovered from the west Men's House cellar fill.

Butchering Techniques

The analysis of wild and domestic animal butchering techniques at Fort Victoria involves both the identifiable and unidentifiable

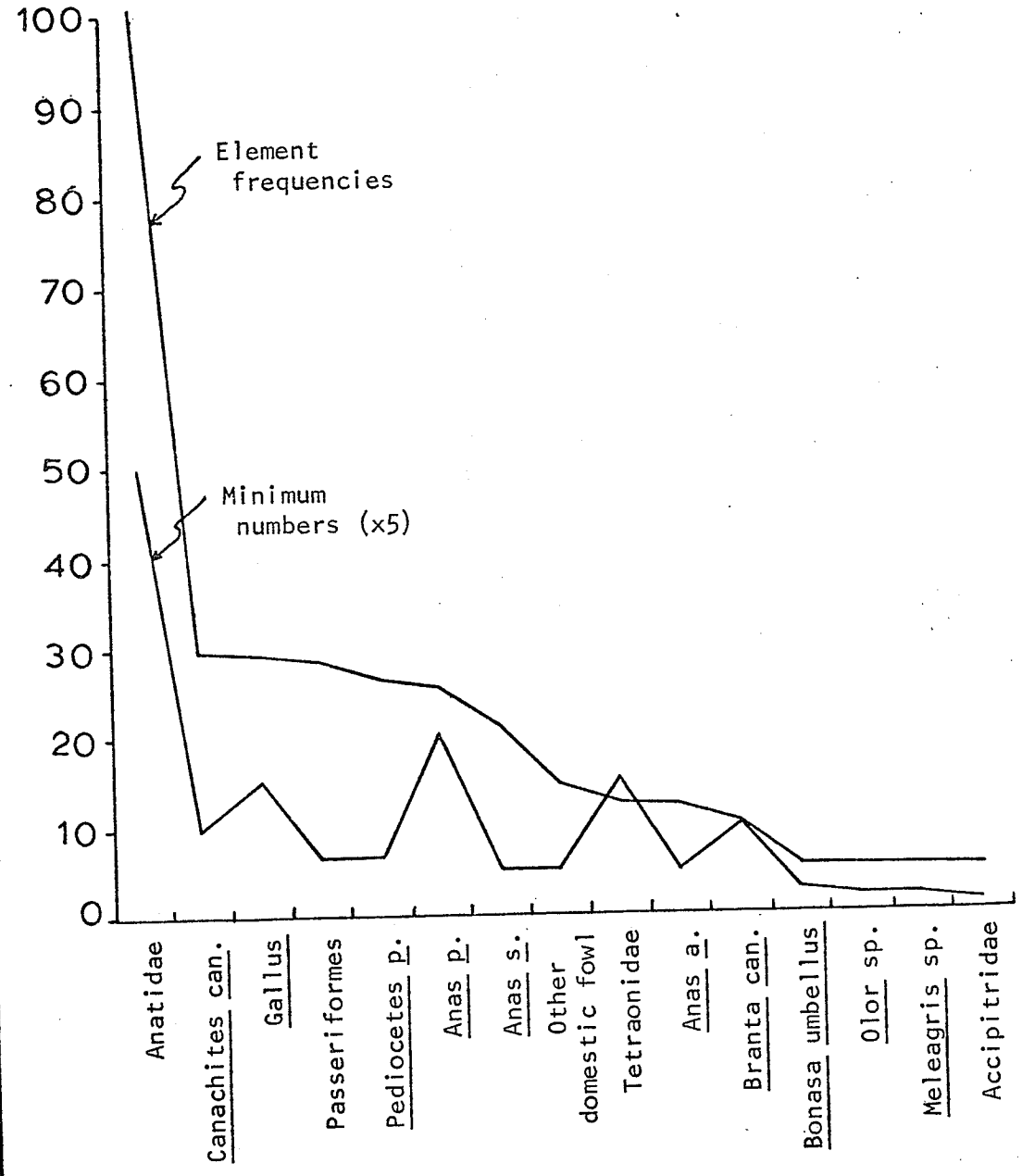


Fig. 13 Bird Element Frequencies and Minimum Number of Individuals

TABLE 11

SUMMARY OF MINIMUM NUMBERS OF FISH: FORT VICTORIA

GENERA	SPECIMENS	*	BASED ON
Acipenser fulvescens	100	1	Scutes
Esox lucius	65	6	R. dentaries
Stizostedion vitreum vitreum	15	2	Large and small cleithra
Stizostedion spp.	46	1	R. dentary
Lota lota	1	1	Palatine
Catostomidae	16	2	R. opercula
Cottus	1	1	Sub-operculum
Salmonidae	2	1	Pleural
Salvelinus	3	1	Dentary
Cyprinidae	2	1	Rostrum
Hiodon	12	4	R. opercula
Perca flavescens	4	1	Dentary
Percopsidae	1	1	Premaxilla
Salmo	16	1	Preoperculum
Coregonus spp.	1	1	Maxilla
Total	284	25	

* *Minimum Number of Individuals*

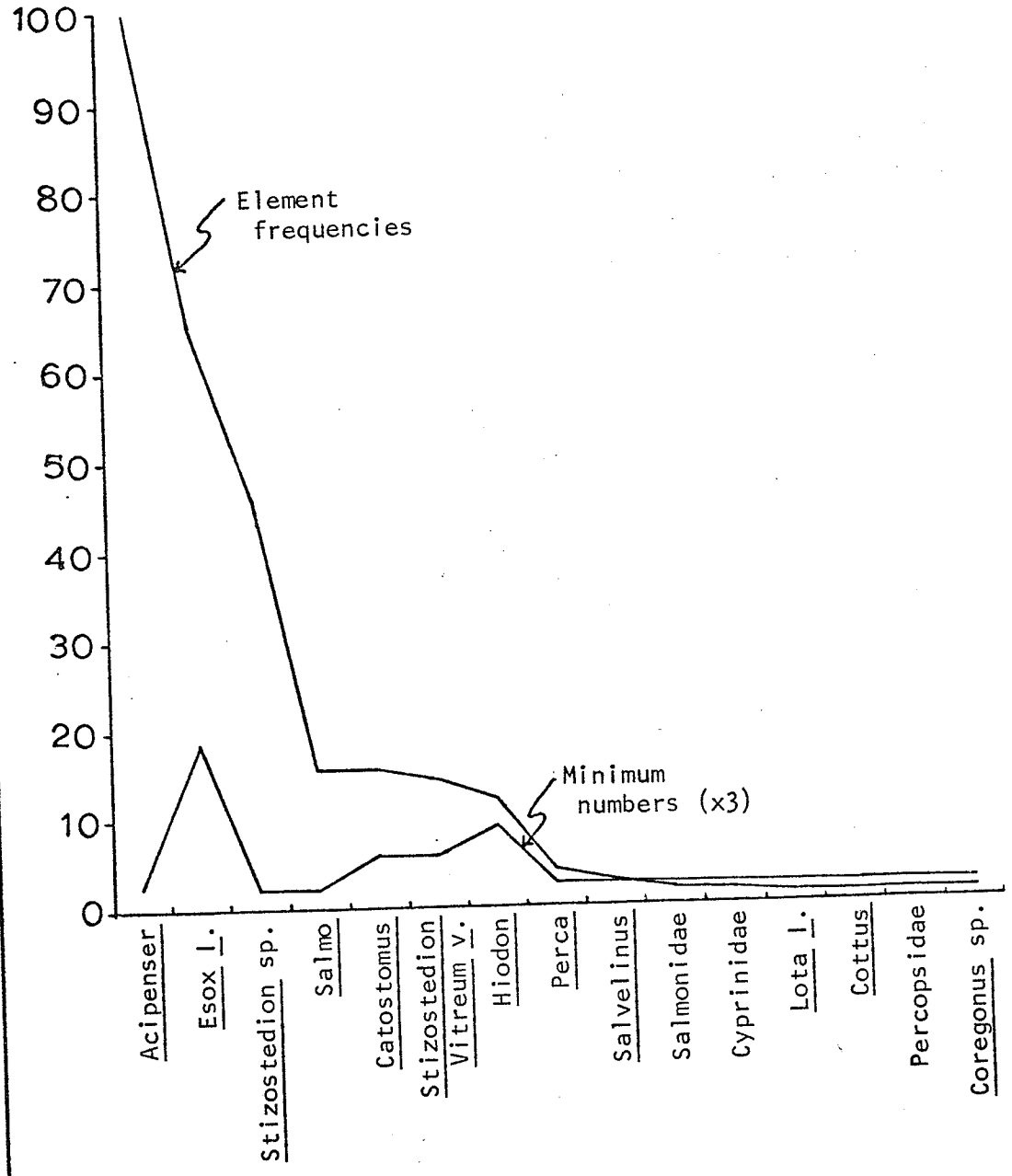


Fig. 14 Fish Element Frequencies and Minimum Numbers of Individuals

large mammal remains (Table 12). The analysis is mainly descriptive in its approach and attempts to follow Guilday, Parmalee, and Tanner's (1962:63) definition of what is considered a butchering mark:

> . . . to qualify as an indicator of butchering, a mark must 1) appear fairly consistently at approximately the same location on a given bone and 2) reflect some anatomically sound reason why the indication should occur at this particular spot.

The analysis is aimed at determining the various types of butchering processes that may have occurred and is summarized as follows: 1) Large wild game animals should show patterns which are similar to the historic references pertaining to butchering. 2) The basic disarticulation of the animals, what portions of meat were being brought back to the fort and whether light, or heavy butchering occurred. 3) Whether any differences in butchering between wild and domestic stock exist with respect to types of marks, and on-site butchering which may be reflected in a greater utilization of the animal or a higher degree of skeletal completeness.

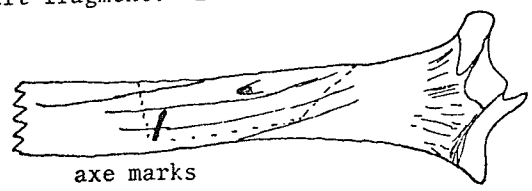
In attempting to quantify the butchering patterns a table was compiled from both the identifiable and unidentifiable large mammal material (Appendix I, Table 35). Both prehistoric and historic references pertaining to butchering of large mammals suggest that the portions or elements that were consistently left at the kill site were: 1) the foot bones consisting mainly of the metapodials and phalanges; 2) the vertebral column, and 3) the head and usually the pelvis. In an attempt to verify whether these elements are missing at Fort Victoria, the minimum numbers of individuals for each genus were compared to the elements recovered from the site, and to the expected number by using the known

TABLE 12

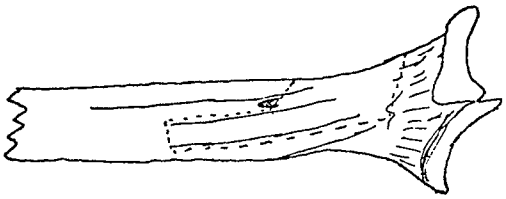
EXAMPLE OF LARGE MAMMAL BUTCHERING ANALYSIS: FORT VICTORIA

R2M14N8

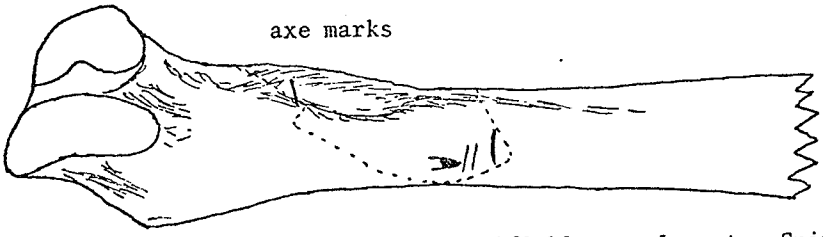
- Tibia shaft fragment. Left side. Axe marks and spiral fracturing.



- Tibia shaft fragment. Left side. Axe marks and spiral fracturing.

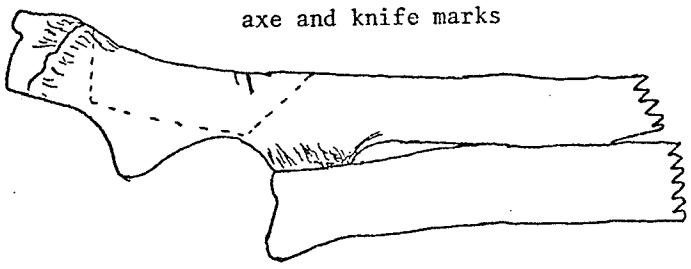


- Femur shaft fragment. Large axe marks present. Left side.



- Longbone shaft fragments. Unidentifiable to element. Spiral fracturing present.

- Proximal end of the ulna. Large axe scars present and also smaller knife scars.

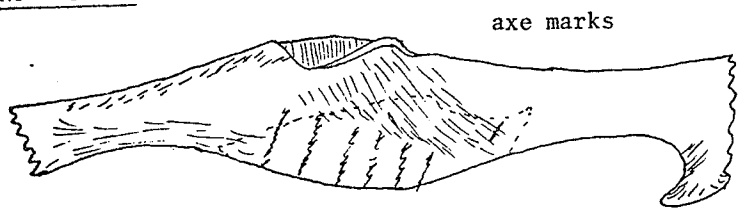


- Scapula blade fragments. Knife marks present.

- Axis fragment, part of the anterior articular process. Axe marks present which were the cause of the fracture. Knife scars also present.

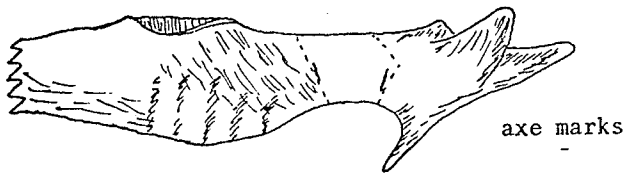
TABLE 12 (Cont.)

R2M14N8 - Cont.

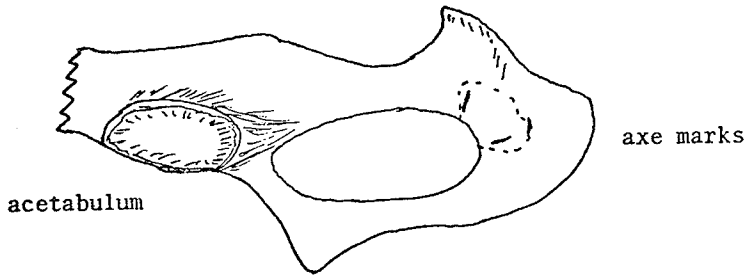


- Pelvic fragment. Axe and knife marks present.

- Pelvic fragment. Axe marks present.



- Pelvic fragment, part of the ishium; axe marks.



- Lumbar vertebrae fragments. Axe and knife scars.
- Cervical vertebrae fragment; part of the anterior articular process and portion of the body.
- Neural spine from lumbar vertebrae. Axe marks present.
- A large amount of calcined and burned bone in the form of long bone and rib shaft fragments. This material is highly fragmented having axe scars.
- Cranial fragments. Axe marks present.
- Rib shaft fragments and seven complete rib shafts ranging from three to approximately 11" in length. The ends of the shafts have been cut by an axe. Knife scars and tooth marks present on shafts.

TABLE 13

EXPECTED NUMBER OF ELEMENTS (BASED ON MIND) COMPARED TO ACTUAL NUMBERS RECOVERED (LARGE MAMMALS): FORT VICTORIA

	Bison bison		Alces		Cervus		Odocoileus	
ELEMENT	A.	E.	A.	E.	A.	E.	A.	E.
Mandible	7	10	0	6	0	2	0	4
Maxilla	1	10	0	3	0	1	0	2
Cranial frag.	7	10	3	1	0	1	2	1
Axis	0	10	1	3	0	1	0	2
C. Vert.	0	60	0	18	0	6	1	12
T. Vert.	1	120	1	36	0	12	1	24
L. Vert.	1	70	0	21	0	7	1	14
Pelvis	1	10	1	3	0	1	1	2
Ribs	1	280	0	72	0	24	0	48
Forelimb								
Scapula	5	20	1	6	1	2	0	4
P. Humerus	0	20	0	6	0	2	0	4
D. Humerus	10	20	0	6	1	2	4	4
P. Radius	4	20	0	6	0	2	2	4
D. Radius	3	20	1	6	0	2	0	4
P. Ulna	4	20	0	6	0	2	2	4
Hindlimb								
P. Femur	1	20	1	6	0	2	0	4
D. Femur	0	20	0	6	0	2	0	4
P. Tibia	1	20	0	6	0	2	0	4
D. Tibia	6	20	2	6	0	2	1	4
Foot Elements								
Carpals	4	80	3	24	0	8	1	16
Astragulus	2	20	1	6	0	2	1	4
Metacarpals	4	20	0	6	0	2	0	4
Calcaneous	3	20	2	6	0	2	0	4
Tarsals	5	30	2	9	0	3	1	6
Metatarsals	0	20	0	6	0	2	1	4
Phalanges	9	240	1	72	0	24	3	48
Metapodials	1	20	0	6	1	2	2	4
MIND		10		3		1		2

Key: A. - actual elements E. - expected elements

number of elements in each species' skeleton. The analyses indicate that the number of large mammal foot bones present is considerably lower than the expected number of bones. For example, bison, with a minimum number of ten individuals, would be expected to have 240 phalanges. However, only nine phalanges or four percent of the expected number were recovered. The foot elements for all the large mammal genera also show relatively low numbers compared to the expected numbers. The identifiable axial skeletal elements recovered from the site are also low compared to the numbers expected (Table 13). There is some difficulty involved in attempting to quantify skull fragments. Very few identifiable pelvic fragments are present, suggesting that the pelvis was left at the kill site.

The Victoria sample suggests that certain portions of the large animals are left at the kill site, and it was noted that these elements were badly fragmented and thus unidentifiable to genus. To investigate this problem, the unidentifiable elements were plotted (Appendix I, Table 35). The results indicate that very few foot elements were present in the unidentifiable portion and even fewer show butchering marks. There are higher numbers of axial and head fragments found in the unidentifiable large mammal segment, and are partially responsible for the lack of these portions found in the identifiable category, but do not account for the total difference.

Determination of the types of fresh meat cuts that were being brought back to Victoria was also attempted. If it is assumed that the best cuts of bison were considered to be the tongue, the rib meat, hump ribs, the meat on either side of the back bone and the marrow bones (Wislizenus 1969:51), the bones which would be recovered from the

site might then be: 1) the spinous processes of the thoracic vertebrae; 2) the rib shafts minus the articular processes; 3) the hyoid; and 4) the marrow bones, of which the hind leg bones were the most important. Butchering marks indicate that with the bison, axe and knife marks occur on the mandibular condyle fragments, suggesting that the jaw was severed from the skull and the tongue was removed. A large mammal hyoid fragment, with knife marks, (R2M13C1) is also indicative of tongue removal. A high frequency of spinous process fragments with axe and knife marks occurred in the unidentifiable large mammal category (Appendix I, Table 35), and although these elements cannot definitely be attributed to bison they do suggest removal of the hump meat of large animals and subsequent transport to the fort.

Very few ribs were identifiable to any of the large mammal species, but a large number of rib shaft fragments were recovered in the sample, the majority lacking articular ends. This suggests that the ribs were broken near their articular ends and the ends left at the kill site with the axial skeleton, a method of butchering which generally conforms to the historic data.

If bone marrow was a preferred food, we would expect marrow bones to be heavily fragmented. The results show that the primary marrow bone, the femur, occurred in low numbers for the identifiable large game mammals. The high number of large mammal femur fragments in the unidentifiable category may account for the lack of identifiable femora. These fragments show axe marks and spiral fractures caused by blows with a heavy implement, (Plate 2) suggesting marrow extraction. A high degree of deliberate bone fragmentation is also exhibited by other marrow bones such as the humerus, radius, and tibia, indicating that these bones may

have been processed at the site for marrow as well (Appendix I, Table 35).

In conjunction with this evidence, an attempt was made to correlate selection of choice meat cuts with distribution (Losey ed. 1973). Ideally, to properly test this, it would require two well separated garbage concentrations, one which can be shown to belong to the chief clerk, the other to the general workers at the fort. However, if it is assumed that the privy situated beside the Men's House was used by the workers, and that any faunal material deposited in the privy was from the dining tables of the workers, it may be possible to demonstrate that these people were eating lesser preferred cuts of animals. The fauna recovered from the privy show some interesting trends (Table 14). A variety of game and domestic animals were recovered from the deposit and indicates that the workers were using both fore and hind quarters of bison. More information concerning types of meat cuts utilized can be gained from the unidentifiable large mammal remains from the privy. Bones from the least preferred cut, that meat from the fore quarter of the animals, was present in the privy fill: ". . . the forequarter, being tough, was the least desirable part of the animal for food, and was frequently thrown away." (Wheat 1972:101). The unidentifiable large mammal elements also indicate that more choice portions or cuts were also used by the workers. A large number of rib shaft fragments, the spinous processes, and femur shaft fragments, were present. The data therefore indicate that the workers at Fort Victoria were utilizing both the less preferred and more preferred game species and both second rate and choice cuts of the animal.

TABLE 14

FAUNAL REMAINS FROM THE MEN'S HOUSE PRIVY: FORT VICTORIA

IDENTIFIABLE GENERA	UNIDENTIFIABLE LARGE MAMMAL ELEMENTS
Bos - incisors	16 femur shaft fragments
- 3 carpals	12 tibia shaft fragments
Bison bison	3 scapula fragments
- 2nd tibia	2 humerus fragments
- scapula	1 atlas fragment
- ulna and radius	6 neural spine fragments - T. vert.
- rib	- vertebrae body fragments
- humerus	1 astragulus fragment
Alces - lateral malleolus	1 fetal bone
- tibia	1 neural bone fragment
Cervus	- rib shaft fragments
- scapula	- long bone shaft fragments
- antlers	2 complete rib shafts
Sus - teeth	4 cranial fragments
Lepus - femur	
Ondatra zibethicus	
Mustela vision	
Canachites canadensis	
Olor - humerus	
Gallus?	
Catostomidae	
Lota lota	

An attempt was made to demonstrate whether a "heavier" butchering of the larger wild game animals occurred at the fort, that is, a more intensive use of the animals. The analysis indicates that some heavier butchering did occur. In the analysis of the butchering marks on bison bone, knife and axe marks were found near the glenoid fossa of the scapula, suggesting that the foreleg was separated from the body and was brought back to the site with part of the scapula (Appendix I, Table 35). The humerus, radius, and ulna all making up the foreleg, were also recovered at the site. Some carpals show knife marks, which may have been made when severing the lower foot from the animal or when skinning. The absence of the metacarpals and phalanges corresponds to the historic references of foot bones being left at the kill site. There is some evidence that the forelegs of Alces, Cervus, and Odocoileus were also brought back to the site, as is indicated by the presence of the scapula, humerus, radius, and proximal ulna.

Evidence that heavier butchering took place comes from the presence of the hindquarter of all the large game animals, with the exception of elk. That the hindlimb was severed from the body by cutting through the femur head or the acetabulum, is indicated by the large number of femur heads with axe and knife marks. Unfortunately, these data are not conclusive because of the lack of femora or acetabulii which could be identified to the generic level. Other hindlimb portions, the femur and tibia, which were supposedly taken back to the habitation site, occur in relatively low frequencies. Of the bison remains from the site, the tibia is present while the femur is absent, but as previously suggested, this absence may be the result of frag-

mentation for marrow extraction. All other wild large mammals show little evidence that the elements of the hindquarter were returned to the site. One bison astragulus also showed encircling knife marks, which is suggestive of skinning (Gilbert 1968:290).

The analysis of the large mammal remains indicates, as previously mentioned, that marrow extraction of the major marrow bones took place. The femur, humerus, radius, and tibia shafts appear to have been deliberately hit by axe or hammer blows resulting in green bone fractures. It is interesting to note that the minor marrow bones were also fractured, possibly for marrow extraction, which would signify a more extensive use of the animals during certain times. Other examples of intensive utilization of the bones are also apparent. Long bones are highly fragmented at Fort Victoria displaying spiral fracturing, unlike that resulting from natural dessication (Plate 3). This high degree of bone fragmentation at Victoria is similar to that described by Leechman (1951:355) in his study of bone degreasing. It is thus suggested that some of the large mammal remains were processed for marrow and then further segmented for bone degreasing.

The analysis of butchering marks on cattle and pigs is somewhat hampered by the small faunal sample. However, the highest frequencies of sawn bone elements occurred in these two genera, with only one example from a wild species, Odocoileus (Appendix I, Table 35). The sawn Odocoileus humerus is from the upper Dairy and therefore may postdate fort occupation. The high frequencies of sawn bone of domestic stock must be an indication of different butchering techniques

for wild and domestic animals. However, when the sawn bone elements are viewed according to activity areas, the majority occur in a disturbed matrix and in only two cases are they definitely contemporaneous to fort occupation (Table 15). One sawn radius from Sus was recovered from the lower Dairy fill, which is pre-1888 redeposited trash, and one sawn Bos maxilla occurred in Trash pit 4, which may also be composed of later occupation debris. Another interesting point is that Bos bones showed evidence of the utilization of marrow. It appears that bone utilization of domestic stock was often similar to that of wild game animals. This tendency seems reasonable, since there would be no reason to immediately change methods of butchering and utilization simply because the animal was domestic. Grant (1971) when at Victoria in 1872 mentions that Mr. Tait, the chief clerk, brought a quarter of fresh beef to their camp. The Bos element frequencies show evidence for quartering, (Table 16) but are too low to warrant any definite conclusions.

It was also postulated that a greater degree of skeletal completeness would characterize domestic stock. The assumption here is that domestic stock would be butchered near the site and a greater variety of elements from all portions of the skeleton would be expected. A skeletal completeness index, in which the number of elements times 100 are divided by the minimum number of individuals times the number of bones that the animal has, was calculated to determine whether Bos and Sus had higher indices than wild species (Ziegler 1973:20). The computations indicate that Bos and Sus have the highest indices of 18.0 and 10.0 respectively, while the wild large game animals showed

TABLE 15

THE OCCURRENCE OF LARGE MAMMAL BONE BY AREA: FORT VICTORIA

PLOWED MATRIX	FORT OCCUPATION
Bison bison - Pelvis shaft?	-
Bos - Tarsal fragment	Maxilla fragment
- Scapula fragment	
- Femur fragment	
- Acetabulum fragment	
- Tibia fragment	
Bos - *Bison bison* - Pelvis fragment	-
Alces -	-
Cervus -	-
Equus -	-
Odocoileus - Humerus fragment	-
Sus - Tibia shaft fragment	Radius fragment
- Metapodials	
- Ulna fragments	
Unidentifiable Large Mammal Elements	
- Scapula shafts	Femur shaft fragments
- Humerus shaft fragments	Radius shaft fragment
- Femur shaft fragments	Rib shaft fragment
- Tibia shaft fragments	
- Rib shaft fragments	
- Vertebrae fragments	
- Long bone shaft fragments	
- Pelvis fragment	

TABLE 16

DOMESTIC SPECIES ELEMENT FREQUENCIES: FORT VICTORIA

		ELEMENTS								
Genera	MIND	Mandible	Maxilla	Crania	Axis	C.V.	T.V.	L.V.	Pelvis	Ribs
Bos	5	3	1	0	0	0	0	0	6	0
Sus	4	3	5	0	0	0	0	1	0	0
Equus	4	1	1	1	0	0	1	0	1	0

Foreleg		Scapula	P. Humerus	D. Humerus	P. Radius	D. Radius	P. Ulna
Bos	5	5	0	2	4	1	4
Sus	4	2	1	1	2	0	6
Equus	4	0	0	1	1	0	0

Hingleg		P. Femur	D. Femur	P. Tibia	D. Tibia
Bos	5	0	1	1	0
Sus	4	0	1	1	2
Equus	4	0	0	0	0

Feet		Carpals	Astrag.	M. C.	Cal.	Tar.	M. T.	Phal.	Metapod.
Bos	5	17	4	3	3	6	2	10	1
Sus	4	0	0	2	0	0	1	5	2
Equus	4	8	0	1	0	1	3	6	0

Key:

C. V. - Cervical vertebrae
T. V. - Thoracic vertebrae
L. V. - Lumbar vertebrae
P - Proximal
D - Distal
M. C. - Metacarpal
M. T. - Metatarsal
Cal. - Calcaneous
Tar. - Tarsal
Phal. - Phalanges
Metapod. - Metapodial
Astrag. - Astragulus

TABLE 17

SKELETAL COMPLETENESS INDEX
(ZIEGLER 1972): FORT VICTORIA

GENERA	CALCULATION	GENERA	CALCULATION
Sus	$\frac{100 \times 47}{4 \times 100} = 10.0$	Microtus	$\frac{100 \times 136}{10 \times 33} = 41.2$
Equus	$\frac{100 \times 31}{4 \times 100} = 7.7$	Clethrionomys	$\frac{100 \times 27}{3 \times 33} = 27.2$
Bos	$\frac{100 \times 98}{5 \times 110} = 17.8$	Lepus	$\frac{100 \times 297}{10 \times 71} = 41.8$
Odocoileus	$\frac{100 \times 21}{2 \times 110} = 9.5$	Ondatra	$\frac{100 \times 16}{2 \times 78} = 10.3$
Cervus	$\frac{100 \times 5}{1 \times 110} = 4.5$	Castor	$\frac{100 \times 9}{1 \times 78} = 11.5$
Alces	$\frac{100 \times 19}{3 \times 110} = 5.7$	Felis	$\frac{100 \times 11}{2 \times 134} = 40.1$
Bison bison	$\frac{100 \times 93}{60 \times 110} = 8.4$	Canis spp.	$\frac{100 \times 16}{1 \times 134} = 11.9$

Calculation: $\frac{100 \times \text{No. of elements from sample}}{\text{MIND} \times \text{No. of elements of animal}} = \text{S.C.I.}$

lower values: Odocoileus with 9.5, Bison bison with 8.0, Alces with 6.0, and Cervus with 5.0 (Table 17). When the identifiable element frequencies of the domestic stock are compared to those of all wild game animals, no significant differences are found.

Direct evidence that seasonal hunting of some birds occurred at Fort Victoria was sought by looking for the presence of medullary bone in the sample. The results (Table 18) show that the most frequent occurrence of medullary bone was in domestic fowl. This does not allow any definitive statements concerning seasonality since medullary bone may be found throughout the year in present day domestic fowl (Rick 1975:3). The only wild bird remains in which medullary bone was present were three waterfowl and one Canachites specimen; this suggests that these individuals were taken prior to their egg laying during the spring. The absence of medullary bone in the other specimens may be due to the result of summer-fall hunts or, perhaps, a majority of birds taken were male which is less likely. The analysis also indicates that medullary bone was only present in elements which are complete and in no case was it found in fragmented bone. This may be due to a lack of preservation of the substance when exposed to natural conditions. One side of a fully grown Cervus antler was recovered, suggesting that the individual was taken between September and early April:

> The antlers commence their annual growth in April, the velvet is rubbed off in late August and early September, and the antlers are shed in February, March, and early April (Banfield 1974:399).

TABLE 18

OCCURRENCE OF BIRD MEDULLARY BONE BY AREA: FORT VICTORIA

CATALOGUE NO.	LOCATION	GENERA	ELEMENT
R2M7A11-28	Lower Dairy	Anatidae	Femur
R2M7C1-22	Lower Dairy	Anatidae	Humerus
R2M7A12-19	Lower Dairy	Anatidae	Ulna
R2M6N7-17	Cellar Slump	Domestic Fowl	Femur
R2M6T9-34	Cellar Fill	Domestic Fowl	Ulna
R2M9L1-36	Upper Warehouse	*Gallus* spp.	Femur
R2M12C1-300	Midden	*Gallus* spp.	Femur
R2M13C1-188	S.E. Palisade(upper)	*Gallus* spp.	Metacarpus
R2M13D1-92	S.E. Palisade(upper)	*Gallus* spp.	Coracoid
R2M13G2-3	Bird Feature	*Gallus* spp.	Femur
R2M10F4-12	Men's House, E. Cellar (upper)	*Gallus* spp.	Femur
R2M10F6-20	Men's House, W. Cellar Intrusive trash	*Gallus* spp.	Metatarsus
R2M10E8-22	Men's House, E. Cellar 1888 Reoccupation	*Canachites canadensis*	Radius
		Total	13

CHAPTER VIII

DISCUSSION AND COMPARISONS

The analysis of the Fort Victoria faunal sample, as well as that from the other posts, is directed toward an investigation of the subsistence shifts that were derived from the historic data. The comparison of the faunal remains and the historic data will attempt to document subsistence trends at Fort Victoria and similarities or differences in subsistence between Fort Victoria and the earlier fur trading posts.

A Comparison of the Faunal Samples

Large Mammals

The faunal remains from Fort Victoria confirm John McDougall's statement that bison were the principal food source in the area until their disappearance in 1879-1880. Unlike the earlier posts, the Victoria sample has virtually no elk or moose remains. It seems logical that the traders would turn to these game animals when bison became scarce. However, the reduction of elk herds during the 1870's, in conjunction with the traders' dislike of elk meat, may account for their low numbers.

When compared to the samples of the other three fur trading posts, the relative percentages of the element and minimum number frequencies show that Bison bison have the highest percentages at all posts except at Fort White Earth, where elk remains were the most numerous, followed by moose and bison respectively (Table 19). It is thought that this distribution reflects the unavailability of bison due to the Indians burning the surrounding countryside (Nicks 1969).

TABLE 19

RELATIVE PERCENTAGES OF ELEMENT FREQUENCIES AND MINIMUM NUMBER OF INDIVIDUALS FROM FOUR FUR TRADING POSTS

	GENERA		FORT VICTORIA		FORT WHITE EARTH		FORT GEORGE		BUCKINGHAM HOUSE	
			Elements	MIND	Elements	MIND	Elements	MIND	Elements	MIND
Large Mammals	Bison bison		93	10	68	13	321	23	275	15
		%	63.3	58.8	16.3	24.1	61.0	54.8	70.9	46.9
	Alces		19	3	134	14	45	5	39	5
		%	12.9	17.6	32.1	25.9	8.6	11.9	10.1	15.6
	Cervus		5	1	212	24	141	11	28	6
		%	3.4	5.9	50.8	44.4	26.8	26.2	7.2	18.8
	Odocoileus		25	2			14	2	31	3
		%	17.0	11.5	Present	Present	2.7	4.8	8.0	9.4
	Ursus		5	1			-	-	1	1
		%	3.4	5.9	Present	Present	-	-	0.3	3.4
	Total		147	17	414	51	521	41	374	30
Small Mammals	Citelles franklinii		2	1	-	-	-	-	-	-
		%	0.5	2.4	-	-	-	-	-	-
	Citelles richardsonii		2	1	-	-	-	-	-	-
		%	0.5	2.4	-	-	-	-	-	-
	Marmota monax		1	1	-	-	-	-	-	-
		%	0.27	2.4	-	-	-	-	-	-
	Tamiascurius hudsonicus		-	-	65	?	3	1	-	-
		%	-	-	30.1	-	1.1	2.2	-	-

TABLE 19 (Continued)

Small Mammals

GENERA	FORT VICTORIA Elements	FORT VICTORIA MIND	FORT WHITE EARTH Elements	FORT WHITE EARTH MIND	FORT GEORGE Elements	FORT GEORGE MIND	BUCKINGHAM HOUSE Elements	BUCKINGHAM HOUSE MIND
Lepus americanus	312	26	2	1	23	5	8	1
%	84.1	63.4	0.9	10.0	8.2	8.7	5.6	9.1
Lepus townsendii	2	1	-	-	-	-	2	1
%	0.5	2.4	-	-	-	-	0.5	2.4
Castor canadensis	9	1	134	9	253	15	130	8
%	2.4	2.4	62.0	90.0		65.2	91.5	72.7
Ondatra zibethicus	16	2	1	?	1	1	-	-
%	4.3	4.9	0.5	-	1.1	2.2	-	-
Mustela frenenta	2	1	-	-	-	-	-	-
%	0.5	2.4	-	-	-	-	-	-
Mustela vision	1	1	-	-	-	-	-	-
%	0.27	2.4	-	-	-	-	-	-
Martes americanus	1	1	-	-	-	-	-	-
%	0.27	2.4	-	-	-	-	-	-
Lontra canadensis	-	-	6	?	-	-	-	-
%	-	-	2.8	-	-	-	-	-
Mustela erminea	-	-	-	-	-	-	2	?
%	-	-	-	-	-	-	1.5	-
Mephitis mephitis	1	1	-	?	-	-	1	1
%	0.27	2.4	-	-	-	-	0.5	9.1
Lynx canadensis	3	1	-	-	-	-	-	-
%	0.8	2.4	-	-	-	-	-	-

TABLE 19 (Continued)

	GENERA	FORT VICTORIA Elements	FORT VICTORIA MIND	FORT WHITE EARTH Elements	FORT WHITE EARTH MIND	FORT GEORGE Elements	FORT GEORGE MIND	BUCKINGHAM HOUSE Elements	BUCKINGHAM HOUSE MIND
Small Mammals	Vulpes vulpes	1	1	-	?	1	1	3	1
	%	0.27	2.4	-	-	1.1	2.2	2.1	9.1
	Canis latrans	2	1	8	?	-	-	-	-
	%	0.5	2.4	3.7	-	-	-	-	-
	Canis spp.	16	1	-	-	-	-	19	2
	%	4.3	2.4	-	-	-	-	11.8	14.3
	Total	371	41	216	10	281	23	163	14
Birds	Anas playrhyncos	25	4	21	-	51	7	10	3
	%	10.5	9.3	67.7	-	24.2	2.1	13.2	16.7
	Anas acuta	11	1	-	-	-	-	4	1
	%	4.6	2.3	-	-	-	-	5.3	5.6
	Anas discors	-	-	1	-	6	1	-	-
	%	-	-	3.2	-	2.8	2.9	-	-
	Spatula clypeata	-	-	-	-	-	-	3	2
	%	-	-	-	-	-	-	3.9	11.1
	Anatidae	101	26	-	-	26	6	-	-
	%	42.3	60.5	-	-	12.3	17.6	-	-
	Branta canadensis	10	2	1	-	40	4	14	2
	%	4.2	4.7	3.2	-	19.0	11.8	18.4	11.1
	Anser albifrons	-	-	-	-	-	-	8	2
	%	-	-	-	-	-	-	10.5	11.1
	Pelecanus	-	-	-	-	1	1	-	-
	%	-	-	-	-	0.5	2.9	-	-

TABLE 19 (Continued)

	GENERA		FORT VICTORIA Elements	FORT VICTORIA MIND	FORT WHITE EARTH Elements	FORT WHITE EARTH MIND	FORT GEORGE Elements	FORT GEORGE MIND	BUCKINGHAM HOUSE Elements	BUCKINGHAM HOUSE MIND
Birds	Olor columbianus		-	-	-	-	2	1	10	2
		%	-	-	-	-	0.9	2.9	13.2	11.1
	Olor buccanator		2	1	4	-	61	8	20	2
		%	0.8	2.3	12.9	-	28.9	23.5	26.3	11.1
	Grus americanus		-	-	3	-	2	1	1	1
		%	-	-	9.7	-	0.9	2.9	1.3	5.6
	Buteo		-	-	-	-	1	1	-	-
		%	-	-	-	-	0.5	2.9	-	-
	Larus		-	-	-	-	-	-	1	1
		%	-	-	-	-	-	-	1.3	5.6
	Canachites canadensis		30	2	-	-	2	1	2	1
		%	12.6	4.7	-	-	0.9	2.9	2.6	5.6
	Pediocetes phasianellus		26	2	-	-	4	1	4	1
		%	10.9	4.7	-	-	1.8	2.9	5.3	5.6
	Bonasa umbellus		3	1	-	-	-	-	-	-
		%	1.3	2.3	-	-	-	-	-	-
	Ectopistes migratorius		-	-	1	1	15	2	-	-
		%	-	-	3.2		7.1	5.9	-	-
	Meleagris		2	1	-	-	-	-	-	-
		%	0.8	2.3	-	-	-	-	-	-
	Gallus		29	3	-	-	-	-	-	-
		%	12.1	7.0	-	-	-	-	-	-
	Total		239	43	31		211	34	76	18

TABLE 19 (Continued)

	GENERA		FORT VICTORIA Elements	FORT VICTORIA MIND	FORT WHITE EARTH Elements	FORT WHITE EARTH MIND	FORT GEORGE Elements	FORT GEORGE MIND	BUCKINGHAM HOUSE Elements	BUCKINGHAM HOUSE MIND
Fish	Catostomus		16	2	14 scales		1	1	-	-
		%	7.3	10.0			0.9	100.0	-	-
	Cottus		1	1	-	-	-	-	-	-
		%	0.5	5.0	-	-	-	-	-	-
	Salvelinus		3	1	-	-	-	-	-	-
		%	1.4	5.0	-	-	-	-	-	-
	Hiodon		12	4	47 scales		-	-	-	-
		%	6.5	20.0			-	-	-	-
	Perca flavescens		4	1	5 scales		-	-	-	-
		%	1.8	5.0			-	-	-	-
	Coregonus		1	1	224 scales		-	-	-	-
		%	0.5	5.0			-	-	-	-
	Acipenser fulvescens		100	1?	-	-	-	-	-	-
		%	45.9	5.0	-	-	-	-	-	-
	Esox lucius		65	6	25 scales		45	?	3	1
		%	29.8	30.0			39.1	-	33.3	50.0
	Stizostedion vitreum vitreum		15	2	38 scales		69	?	6	1
		%	6.9	10.0			60.0	-	66.3	50.0
	Lota lota		1	1	-	-	-	-	-	-
		%	0.5	5.0	-	-	-	-	-	-
	Total		218	20	353 scales		115	1	9	2

The next most frequent genus found at Victoria is deer, being more numerous than at the early posts. Bear remains are low at all fur trading posts (Table 19).

The comparison of the Fort Victoria large mammal butchering analysis to the earlier posts is hampered by the limited comparative data. The comparison therefore only deals generally with: 1) off-site butchering; 2) large game quartering; 3) marrow extraction; and 4) bone degreasing (Appendix 1, Table 35, Appendix 2, Tables 38, 39, Kidd 1970, Appendix 2:234).

Low frequencies of lower limb elements, axial elements and head elements occur at the forts, indicating that they were abandoned at the kill site. However, proportionately larger numbers of lower foot elements and vertebrae are present in the Fort Victoria sample. High frequencies of fragmented rib shafts are present at all sites, while articular ends occur in low numbers, indicating that they were left attached to the vertebral column at the kill site while the rib meat was brought to the forts. Bison thoracic spinous processes occur at all posts and were presumably brought back with the hump. Large game quartering was evident at all posts, although frequencies vary.

The medullary cavities of major marrow bones were deliberately fractured. Bones preferred for degreasing occur in highly fragmented form at the posts, and display a consistent pattern of breakage. According to Vehik (1977:170): "The vertebrae, rib, leg and foot bones . . ." were the most frequently used grease bones. Bonnichsen (1973:10-11) mentions that the proximal ends of humerii were utilized and that ribs and thoracic vertebral neural spines were broken into two six inch

sections, while vertebrae were cut in half for degreasing. A summary of bone degreasing indicates that deliberate bone breakage of elements which were most frequently used for grease occur at all posts (Table 20). However, lower numbers of identifiable humerii and femora occur at Fort Victoria suggesting that degreasing was more predominant at this post.

Small Mammals

The small mammal sample from Victoria does not correspond to the historic records on the use of smaller mammals as food sources. The low beaver frequencies recovered suggest that the animal was only an occasional food item. The faunal remains from other posts and the historic references, clearly indicate that beaver meat was very palatable. An adequate explanation for their low numbers at Fort Victoria is difficult although M'Gillivray comments that overharvesting of fur bearing animals entirely ruined the surrounding Fort George area within two years (Morton ed. 1929:77). Erasmus states that beaver had been overtrapped and by the 1870's were very scarce in the Fort Victoria area. Therefore, company workers may have been discouraged from trapping the few existing animals for food.

There is variability in certain small mammal frequencies among the four posts. Lepus americanus is found in high percentages at Fort Victoria whereas Castor canadensis occurs in low numbers; the remains from the three earlier posts indicate an inverse distribution (Table 19). The high number of Tamiascurius elements recovered at Fort White Earth were not found at other posts.

Low hare frequencies at Fort George, Fort White Earth and Buckingham House suggest nothing more than the occasional hare dinner. High

TABLE 20

A SUMMARY FOR EVIDENCE OF BONE DEGREASING

FORT GEORGE	BUCKINGHAM HOUSE	FORT WHITE EARTH	FORT VICTORIA
- Rib shaft fragments - Vertebrae fragments? - Few foot elements - Few neural spine frags. - Few complete proximal humerii - High number of longbone fragments (femur, humerus, radius, etc.)	? - Few vertebrae fragments - Few foot elements ? - Few complete proximal humerii - High number of longbone fragments	- Rib shaft fragments - Few vertebrae fragments - Few foot elements - Few neural spine frags. - No complete proximal humerii - High number of longbone fragments	- Rib shaft fragments - Vertebrae fragments - Few foot elements - Many neural spine frags. - No complete proximal humerii - High number of longbone fragments - High number of inominate fragments

hare frequencies at Fort Victoria may be the result of shortages of other fresh meat supplies in the area. However, they may also be due to population peaks during fort operations. Keith (1963:37) notes that hare peaks in the Hudson's Bay area occurred in 1865, 1876, 1886, and 1896-7 and were followed by sudden drops. Also, high hare populations in Alberta were recorded in 1885 and 1895 (ibid:42). The possibility exists that large numbers were taken during these peaks. Furthermore, the occupation periods of other posts were relatively short and therefore spanned fewer hare peaks. The high recovery of hare remains from Fort Victoria may therefore be explained in terms of: 1) a longer period of occupation than the other posts, years in which at least three to four peaks occurred; and 2) the consumption of smaller animals because of a decrease of large game animals.

Birds

The Fort Victoria bird remains indicate that relatively large numbers of waterfowl and upland game birds were utilized. However, preference seems to be toward the waterfowl, especially the various duck species which occur in the parklands. A comparison of the avi-fauna recovered from the other fur trading forts shows that although similarities in waterfowl frequencies are present, there is a high degree of variability in the relative percentages of other genera. Numerous swan remains were recovered from the earlier posts and were absent at Fort Victoria, while relatively high frequencies of upland game birds occur at Victoria, having lower frequencies at the other posts (Table 19).

To conclude, the Fort Victoria bird sample corresponds to the

historic references on the use of waterfowl and upland game birds as a supplement to the diet. The striking differences between the faunal samples of the four forts is the high frequency of swan remains at the earlier posts. The primary reason for this difference is changing markets. During the late eighteenth century and early nineteenth century swan's down was in demand in Europe (Kortright 1942).

Fish

Fish remains recovered from Fort George, Buckingham House and Fort White Earth indicate that, like the Victoria sample, high numbers of Esox lucius and Stizostedion were recovered, and low frequencies of Coregonus exist at these sites (Table 19). The low numbers of fish remains recovered is anomalous. The historic references suggest that fish (particularly whitefish) were an important food source and caught in large quantities to feed men and dogs. The almost complete absence of lake whitefish at Fort Victoria, and the low numbers at other fur trading posts, do not conform to the historic sources. It is quite conceivable that whitefish were processed near lakes where they were caught, (filleting, drying or smoking); thus their remains would not be found at the posts.

Sturgeon were utilized at Fort Victoria and their absence at the early posts does not correspond to the historic references. However, during the 1977 field season a number of sturgeon scutes were recovered from Fort George suggesting that the fish was used at this post (Losey et al. 1977 Appendix X).

Changes in Animal Use at Fort Victoria (1864-1898)

The faunal data from Fort Victoria have been valuable in reconstructing past animal use but they are insufficient for a rigorous evaluation of the propositions advanced in Chapter V. The total sample is small and most deposits are not dated accurately enough to allow tracing of the adjustments to the various stages of bison decline. Consequently the data will be divided into only two major periods, 1864-83 and 1883-98. For purposes of discussion the remains from the early period at Fort Victoria will be compared with data from the three earlier posts. It should be noted that the changes that took place during this period at Fort Victoria will be partly masked by combining the faunal remains. For example, if there was a steady increase in the intensity of bison use throughout, the combined sample will reveal intermediate levels of intensity.

The propositions outlined in Chapter V included:

1. Increased utilization of poorer meat cuts involving the return of lower leg bones, axial, pelvic and cranial elements.

2. More intensive processing of bones for marrow and bone grease, indicated by a lack of identifiable humerii and femora and deliberate fragmentation of vertebrae, ribs and lower foot elements.

3. Changes in the frequency and/or variety of other game animals.

4. A gradual shift to the use of domestic livestock.

Increased Efficiency

The comparison of the Fort Victoria butchering analysis to the early fur trade posts aided in evaluating increased efficiency. All sites contained low frequencies of lower foot elements, when com-

pared to the minimum number of individuals. However, higher bison lower limb indices occur at Fort Victoria, while no significant differences in other large game mammal indices occur (Table 21). This suggests that a more efficient use of bison took place. A comparison of other element indices (skull, vertebrae and pelvis) perhaps would have reinforced the idea of increased efficiency but they were not quantitatively comparable. The unidentifiable large mammal remains from Fort White Earth (Hurlburt 1977) contain few vertebral and skull fragments suggesting a low efficiency in the use of the animal, while these elements occur in large numbers at Fort Victoria.

Increase in Intensity of Efficiency

The second change which may have occurred due to the decrease of bison, is an increased intensity in large game use. Evidence for this on skeletal remains would be a deliberate breakage of various elements of the animal.

The Fort Victoria butchering analysis indicates that marrow extraction and bone degreasing took place. In attempting to illustrate increased intensity, a comparison of expected marrow bones and grease bones was computed (Table 22). The data indicate that the Fort Victoria bison sample has lower indices than the early posts suggesting that the elements were more intensively fractured. Other large game animal indices show no significant differences. Also, the lowest proximal humerii and femora occurred at Fort Victoria, and are found in highly fragmented form in the unidentifiable large mammal sample (Table 13). The use of these and other elements indicates that bison was intensively used at Fort Victoria. It should be noted that an

TABLE 21

COMPARISONS OF SELECTED BONE ELEMENT RATIOS

Species \ Forts	Fort Victoria	Fort George	Buckingham House	Fort White Earth
Bison bison lower limb	0.62	0.043	0.077	?
Cervus lower limb	0.022	0.073	0.038	?
Alces lower limb	0.067	0.071	0.059	?
Odocoileus lower limb	0.1	0.1	0.1	?

*index = $\frac{\text{Recorded elements}}{\text{expected numbers of lower limbs}}$

Note: High indices show a greater frequency of lower limb elements

TABLE 22

COMPARISON OF SELECTED INTACT ELEMENTS INCLUDED IN MARROW AND BONE DEGREASING (HUMERUS, RADIUS, FEMUR, TIBIA)

	Fort Victoria		Fort George		Buckingham House		Fort White Earth	
	#	Index	#	Index	#	Index	#	Index
Bison bison	25	0.31	166	0.9	102	0.98	?	?
Cervus	1	0.12	54	0.61	8	0.25	?	?
Alces	4	0.17	18	0.45	12	0.33	?	?
Odocoileus	7	0.44	2	1.0	9	0.38	?	?

* Index = $\frac{\text{Bone ratios observed}}{\text{expected elements}}$

Note: Low indices show a high degree of fragmentation of marrow and grease bones

increased intensity of utilization could come about because of seasonal deficiencies in game, but they also occurred at other posts. It is therefore suggested that a more intensive wild game utilization at Fort Victoria was due to the difficulties encountered in procuring meat. As with the increased efficiency model, problems arose when attempting to quantify and compare other elements used in bone degreasing from the fur trading posts.

The Temporary Subsistence Shift

As pointed out by Losey and Prager (1975:172) this shift, if it occurred, was not a permanent replacement for the disappearance of the bison from the plains and parklands. In attempting to illustrate the temporary subsistence shift a comparison of the variety of species recovered from Fort Victoria to the early posts was undertaken, and indicates that a greater variety of small mammals are present at Fort Victoria (Table 23), but the majority of these species were not used as food by the fur traders. Also, a greater diversity of fish were recovered at Fort Victoria, and sturgeon is almost totally absent at the early posts (Table 19). Bird varieties are not significantly different. Furthermore, high hare frequencies occur in the 1864-83 fill and suggest that a more intensive use of this animal took place during the initial period of occupation (Table 23). The largest number of waterfowl remains were recovered in the initial period of occupation, while all sturgeon remains also occur in the 1864-83 fill (Table 24).

The Permanent Subsistence Shift

The final shift to domestic stock and other agricultural products did occur throughout the Saskatchewan area as evidenced from the nume-

rous historical sources. In order to examine the permanent subsistence shift, occupation of the fort is divided into the initial occupation period dates and the reoccupation period dates. The element frequencies of the various genera indicate that large wild animals and domestic stock, and high frequencies of hare, waterfowl, and fish occur in the initial period of occupation (Table 24). The reoccupation fill is dominated by upland game birds, cattle, and some pigs.

The results from this general chronological division indicate an abundance of wild game genera were utilized during the initial occupation period but also occur during the reoccupation of the fort. It also appears that domestic stock was used prior to the demise of the bison. This verifies the historic accounts that domesticates were used to some extent prior to 1883. It is also noteworthy that the fur traders were not above slaughtering their own horses and oxen during periods of fresh meat scarcity (Grant 1971:175).

TABLE 23

COMPARISON OF FAUNAL VARIETY OF THE FUR TRADING POSTS

	Victoria	White Earth	Fort George	Buckingham House
Large Mammal				
No. taxa / No. elements	5/147	5/414	4/521	5/374
Small Mammal	15/371	6/216	5/281	7/163
Bird	10/239	6/31	12/211	11/76
Fish	10/218	6/353	3/115	2/9

TABLE 24

DISTRIBUTION OF ANIMAL ELEMENTS AND THEIR CHRONOLOGY: FORT VICTORIA

Genera	Palisade Trench Fill - 1864	Initial Occupation Debris 1864-83	Picket Fence Fill 1888	Reoccupation Debris 1888-98
Bison	1	44	--	--
Moose	--	5	--	1
Elk	--	2	--	--
Deer	--	6	--	1
Bear	--	--	--	--
Cattle	--	22	1	8
Pigs	--	20	--	2
Domestic Fowl	--	5	--	2
Hare	2	151	--	3
Muskrat	--	2	--	--
Beaver	--	6	--	--
Waterfowl	1	95	--	3
Upland Fowl	--	4	--	20
Sturgeon	X	X	--	--
Northern Pike	X	X	--	X
Walleye-Sauger	--	X	--	X
Goldeye	--	X	--	X
Sucker	--	X	--	--

X = present

CHAPTER IX

SUMMARY AND CONCLUSIONS

The results of the Fort Victoria faunal analysis and its comparison to the early posts has documented a long period of European subsistence in North Central Alberta. An evaluation of the subsistence alternatives shows how the fur traders avoided severe hardships by understanding the problems that the loss of the bison herds would cause and restoring the subsistence equilibrium with domestic stock and agriculture. A summary of the results and their implications follows.

A comparison of the Fort Victoria faunal remains to the early fur trading posts show that higher percentages of elk and moose remains occur at the early forts. These posts also have higher beaver frequencies, whereas greater hare remains were recovered at Fort Victoria. Waterfowl were extensively used at all posts, but more swan remains were recovered at the early posts, due to economic reasons. The Fort Victoria sample contained greater numbers of upland game birds than the other forts. The early posts have comparatively few fish remains, including sturgeon, whereas the Fort Victoria sample contains greater numbers and diversity of fish species, with sturgeon being important.

Evidence of seasonal utilization at Fort Victoria was minimal. The elk antler remains suggest that the animal was killed between late September and February. The bird medullary bone analysis indicates that some waterfowl and upland game birds were hunted during the early spring months prior to egg laying. Absence of medullary bone in fragmented bird remains suggests that this substance does not preserve well when exposed.

The wild game butchering analyses at Fort Victoria are similar to prehistoric analyses and to the historic references on butchering methods. Analyses of aboriginal butchering show which elements were brought back to the habitation sites and processed there. The historic references indicate that butchering processes were variable and dependent upon many factors. Archaeological evidence of marrow extraction and bone degreasing confirms the historic data concerning the use of these articles by the traders, and it appears that processing also took place at the posts. The early posts utilized large quantities of grease for making pemmican, while grease was used as butter at Fort Victoria and perhaps as an additional food source during periods of hardship.

The domestic animal butchering analysis at Fort Victoria shows that cattle long bones were deliberately fractured, suggesting that marrow extraction took place. This may have occurred because of a continuing preference for marrow or because hardships were encountered by the disappearance of the bison. Also, higher percentages of domestic skeletal elements were recovered, suggesting a greater utilization of domestic animals or that the animals were butchered at the site.

A comparison of the butchering analysis indicates that similarities between the early posts and Fort Victoria existed. The data show that lower limbs, head and axial elements were usually left at the kill sites and choice portions as well as quarters were brought to the posts. Quartering of large game animals is more evident at the provisioning posts.

Generally, faunal distributions at Fort Victoria and other posts are similar. On this basis it was proposed that the majority of the

faunal remains recovered from the fireguard at Fort Victoria are contemporaneous to occupation of the post. The implications of refuse disposal at fur trading posts are presently being more stringently pursued at Fort George. If disposal patterns can be isolated then more valid interpretations on subsistence from the archaeological remains will be forthcoming. For example, if bone debris can be related to specific living areas, then individual and family social status and subsistence can be investigated.

The results obtained from an evaluation of the subsistence shift alternatives during the demise of the plains bison, are not as conclusive as was initially hoped. An increased efficiency, and intensity of game animal use, a temporary shift to other game resources, and a permanent domestic animal subsistence shift could be more adequately evaluated with more precise chronological control of the sample. In documenting increased efficiency, the Fort Victoria sample showed that greater numbers of those large mammal remains generally left at the kill site were found, than at the early fur trading posts. Also, wild game animal remains display a more intensive utilization than those from the early posts. The results of a temporary subsistence shift to other game are inconclusive, although a greater variety of small mammals are found at Fort Victoria, and hare, waterfowl and fish were more extensively used prior to 1883. The last alternative, that of a permanent shift to domestic stock, is evident and seems to have been a gradual one that began before 1883. Therefore, the faunal analysis and historic data indicates that the few remaining bison were more efficiently and intensively used, while domestic stock as well as agricultural products were increasingly utilized. In other

words, a combination of these alternatives took place at various periods of bison extinction outlined in Chapter V.

The Fort Victoria faunal analysis and the additional historic data have provided greater insight into the problems encountered when attempting to define European subsistence patterns in Alberta. As Schiffer (1972) has shown, and Guilday (1966) and Binford (1968) have discussed, faunal remains undergo processes which, if more thoroughly understood, will lead to more valid interpretations on subsistence in historic and prehistoric archaeology.

These problems must be dealt with the aid of historic data when interpreting the faunal sample. The major processes encountered in this study were:

1. Off-site butchering.
2. Trade of provisions by the Indians to the posts.
3. Highly fragmented bone which is the result of marrow extraction and bone degreasing.
4. Destruction and redistribution of faunal remains by scavengers.
5. Disposal of bone remains in areas outside the fort compound.
6. Post-occupational disturbance of the site.

Furthermore, the study has shown the inherent problems encountered when using historical documentation and archaeological data and that the use of only historic analogy or faunal analysis is sometimes insufficient to understand subsistence patterns. As has been stated by many scholars, the historical and archaeological records are different analogs of human behavior and therefore do not always coincide.

To conclude, Adams (1977) states that historical archaeology is

the combination of historical and archaeological methodologies in the study of culture. The comparison of faunal remains from four fur trading posts spanning 107 years, has shown changes in European subsistence. The study indicates that early Alberta fur traders initially utilized their local resources, relying only minimally on eastern products. The increasing intensive utilization of local game animals brought about their demise which then necessitated a return to a more traditional way of subsistence for the Europeans -- the use of domestic stock and agricultural products.

REFERENCES

Adams, William H.
1977 Silcoot, Washington: Ethnoarchaeology of a Rural American Community. Reports and Investigations No. 54. Washington State University.

Arnold, Ken
1971 Preliminary Investigations at Fort Victoria. Heritage Sites Service. Edmonton, Alberta.

Banfield, A. W. F.
1974 The Mammals of Canada. National Museum of Natural Sciences, Ottawa.

Beeston, E. K.
1889 Inspection Report, on file at Hudson's Bay Company Archives, Winnipeg, Manitoba.

Belanger, A. J.
1973 The Calgary-Edmonton-Edmonton-Calgary Trail. Frontier Books 29, Calgary.

Belcourt, G. A.
1944 Buffalo Hunt, translated by J. A. Burgesse. The Beaver 275:13-17. Winnipeg, Manitoba.

Binford, Lewis
1968 Historical Archaeology - Is it Historical or Archaeological. In: Historical Archaeology and the Importance of Material Things, edited by Leland Ferguson, pp.13-22.

Bird, Charles and Ralph Bird
1967 The Aspen Parkland. In: Alberta -- A Natural History, edited by W. G. Hardy, pp. 135-149. Mismat Corporation Limited, Edmonton.

Bonnichsen, Robert
1973 Some Operational Aspects of Human and Animal Bone Alteration. In: Mammalian Osteo-Archaeology: North American, pp. 9-24. Burns and Oates, London.

Bredin, T. F. (Editor)
1972 Parsons on the Plains. By John McDougall (1842-1917). Longman, Don Mills, Ontario.

Casteel, R. W.
1972 Some archaeological uses of fish remains. American Antiquity 37:404-419. Salt Lake City.

Chambers, E. J.
1906 The Royal North-West Mounted Police, a corps history. The Mortimer Press, Montreal-Ottawa.

Clark, W. Dean
1971 Historic Resources Development, Victoria Settlement (Preliminary). Unpublished proposal, 1971. Human History Division, Provincial Museum and Archives of Alberta.

Coues, Elliot (Editor)
1965 The Manuscript Journals of Alexander Henry and of David Thompson (1799-1814). Ross and Haines, Minneapolis.

Cowie, Isaac
1913 The Company of Adventures. A narrative of Seven Years in the Service of the Hudson's Bay Company during 1867-1874 on the great Buffalo Plains. William Briggs, Toronto.

The Edmonton Bulletin. Commercial Printers Limited, Edmonton.
1881 December 24, 31; January 31
1882 January 10
1883 March 24

Erasmus, Peter
1976 Buffalo Days and Nights. Glenbow-Alberta Institute, Calgary.

Farley, F. L.
1925 Changes in the Status of Certain Animals and Birds During the Past Fifty Years in Central Alberta. The Canadian Field Naturalist, 39(9):200-202. Ottawa.

Ferguson, Leland
1968 Historical Archaeology and the Importance of Material Things. In: Historical Archaeology and the Importance of Material Things, edited by Leland Ferguson, pp. 5-8.

Frison, G. C.
1970 The Kobald Site, 24BH406: A Post-Altithermal Record of Buffalo-Jumping for the Northwestern Plains. Plains Anthropologist 15(47):1-35.

Gilbert, B. M.
1968 Some Aspects of Diet and Butchering Techniques among Prehistoric Indians in South Dakota. Plains Anthropologist 14(43):277-294, edited by A. E. Johnson.

Glover, Richard G. (Editor)
1962 David Thompson's Narrative 1784-1812. The Publications of the Champlain Society No. 40. Toronto.

Grant, G. M.
1971 Ocean to Ocean. Sanford Fleming's expedition through Canada in 1872. Hurtig, Edmonton.

Griesbach, William Antrobus
1946 I Remember. The Ryerson Press, Toronto.

Guilday, John E.
1966 Animal Remains from Archaeological Excavations at Fort Ligonier. Annals of the Carnegie Museum 42.

Guilday, J. E., P. W. Parmalee, and D. P. Tanner
1962 Aboriginal butchering techniques at the Eschelman Site (36La12), Lancaster County, Pennsylvania. Pennsylvania Archaeologist 32:59-83.

Hardy, W. G. (Editor)
1955 The Alberta Golden Jubilee Anthology. 1905-1955. Cultural Activities Branch, Department of Economic Affairs.

1975 Alberta: A Natural History. Edmonton, Alberta.

Harmon, D. W.
1957 Sixteen Years in the Indian Country, edited by W. K. Lamb. Macmillan, Toronto.

Hind, H. Y.
1971 Narrative of the Canadian Red River. Exploring Expeditions of 1857 and of the Assiniboine and Saskatchewan Exploring Expedition of 1858. Hurtig, Edmonton.

Hurlburt, Isobel
1977 Faunal Remains from Fort White Earth N. W. Co. (1810-1813). Human History, Occasional Paper No. 1. Provincial Museum of Alberta.

Innis, H. A.
1956 The Fur Trade in Canada. University of Toronto Press, Toronto.

Ironside, R. G., and E. Tomasky
1971 Development of Victoria settlement, Alberta. Alberta Historical Review 19(2):20-29. Historical Society of Alberta, Calgary.

Jarvis, W. H.
1973 Official Reports, Royal North West Mounted Police, by the Commissioners of the Royal North West Mounted Police.

Johnson, A. M. (Editor)
1967 Saskatchewan Journals and Correspondence. Publications of the Hudson's Bay Record Society No. 26, London.

Kane, Paul
1925 Wanderings of an Artist among the Indians of North America. M. G. Hurtig Ltd., Edmonton.

Kanis, Tom
1884 Field Notes of Victoria Settlement: Season of 1884. Department of Interior, Technical Branch, Ottawa.

Kells, Edna
1934 Elizabeth McDougall, Pioneer. United Church Publishing House, Toronto.

Keith, L. B.
1963 Wildlife's Ten-Year Cycle. The University of Wisconsin Press, Madison, Wisconsin.

Kehoe, T. F.
1967 The Boarding School Bison Drive. Plains Anthropologist. Memoir No. 4, 12:1-165. Lincoln, Nebraska.

Kehoe, T. A. and A. B. Kehoe
1960 Observations on the Butchering Techniques at a Prehistoric Bison Kill in Montana. American Antiquity 25:420-423. Salt Lake City.

Kidd, R. S.
1970 Fort George and the Early Fur Trade in Alberta. Provincial Museum and Archives of Alberta, Publication No. 2.

Kortright, F. H.
1942 The Ducks, Geese and Swans of North America. Stackpole Co., and Wildlife Management Institute, Washington.

Korvemaker, E. F.
1974 Archaeological Excavation Manual. Unpublished Manuscript, Heritage Sites Service, Alberta.

Leechman, Douglas
1951 Bone Grease. American Antiquity 16:355-356. Salt Lake City.

Losey, T. C. et al.
1973 An interdisciplinary investigation ofFort Enterprise, Northwest Territories, 1970. Boreal Institute for Northern Studies, University of Alberta. Occasional Publications 9.

1977 Archaeological Investigations: Fort Victoria, 1974. Historic Sites Service, Occasional Paper No. 2. Edmonton, Alberta.

1977 Archaeological Investigations: Fort Victoria, 1975. Historic Sites Service, Occasional Paper No. 3. Edmonton, Alberta.

N.d. Archaeological Investigations: Fort Victoria, 1976. Preliminary Report submitted to Historic Sites Service, Edmonton, Alberta.

N.d. Archaeological Investigations at Fort George, 1977. Preliminary Report submitted to the Archaeological Survey of Alberta, Edmonton, Alberta.

Losey, T. C. and G. Prager
1975 A consideration of the effects of the demise of bison on the

subsistence economy of Fort Victoria: a late 19th century Hudson's Bay Company post. Canadian Archaeological Association Bulletin 7:162-182. Ottawa.

MacDonald, G. H.
1954 Fort Augustus-Edmonton. Northwest Trails and Traffic. Douglas Printing Company, Edmonton.

1959 Edmonton. Fort-House-Factory. Douglas Printing Company, McDermid Studios, Edmonton.

MacEwan, J. W. G.
1968 A Short History of Western Canada. MacGraw Hill-Ryerson, Toronto.

MacGregor, J. G.
1949 Blankets and Beads: a history of the Saskatchewan River. The Institute of Applied Art, Edmonton.

MacInnis, C. M.
1930 In the Shadow of the Rockies. Riveringtons, London.

Macoun, John
1882 Manitoba and the Great North-West. The World Publishing Company, Guelph, Ontario.

Mair, Charles
1908 Through the Mackenzie Basin. A Narrative of the Athabasca and Peace River Treaty Expedition of 1899. Simpkins, Marshall, Hamilton, Kent and Company Limited, London.

McCreight, M. I.
1950 Buffalo Bone Days. A Story of the Buffalo slaughter on our western plains. Du Bois, Pennsylvania.

McDougall, J. C.
1896 Saddle, Sled and Snowshoe: Pioneering on the Saskatchewan in the Sixties. William Biggs, Toronto.

McTavish, G. S.
1963 Behind the Palisade. Gray's Publishing Canada, Victoria.

Morton, Arthur S. (Editor)
1929 The Journal of Duncan M'Gillivray of the North West Company at Fort George on the Saskatchewan, 1792-95. MacMillan, Toronto.

Moss, Ezra Henry
1955 The Flora of Alberta; a Manual of Flowering Plants, Conifers, Ferns and Fern Allies found growing without Cultivation in the Province of Alberta, Canada. The University of Toronto Press, Toronto.

Nicks, Gertrude C.
1969 The Archaeology of two Hudson's Bay Company Posts: Buckingham House (1792-1800) and Edmonton House III (1810-1813). M. A. Thesis on file, Department of Anthropology and Cameron Library, the University of Alberta, Edmonton.

Nix, James Ernest
1960 Mission Among the Buffalo; the Labours of the Reverends George M. and John C. McDougall in the Canadian Northwest, 1860-1876. Ryerson, Toronto.

Olsen, Stanley
1960 Postcranial Skeletal Characteristics of Bison and Bos. Peabody Museum 35(4) Cambridge.

Paetz, M. J. and J. S. Nelson
1970 The Fishes of Alberta. The Queen's Printer, Government of Alberta.

Peel, Bruce
1972 Steamboats on the Saskatchewan. Prairie Books, The Western Producer, Saskatoon.

Ray, Arthur J.
1974 Indians in the Fur Trade. University of Toronto Press, Toronto.

Rick, A. M.
1975 Bird Medullary Bone: a seasonal Dating Technique for Faunal Analysts. Canadian Archaeological Association Bulletin 7:183-190. Ottawa.

Roe, F. G.
1951 The North American Buffalo: a critical study of the species in its wild state. University of Toronto Press, Toronto.

Rogers, E. S.
1973 The Quest for Food and Furs. The Mistassini Cree, 1953-1954. National Museum of Canada. Publications in Ethnology No. 5.

Russel, R. C.
1955 The Carlton Trail, The broad highway into the Saskatchewan country from the Red River Settlement, 1840-1880. Modern Press, Saskatoon.

Salt, W. Ray, and A. L. Wilk
1958 The Birds of Alberta. Government of Alberta. The Queen's Printer, Edmonton.

Schiffer, M. B.
1972 Archaeological Context and Systematic Context. American Antiquity 32:156-165. Salt Lake City.

Schuyler, Robert L.
1970 Historical and Historic Sites Archaeology as Anthropology: Basic Definitions and Relationships. Historical Archaeology 4:83-89.

Sibbald, Andrew
1971 West with the McDougalls. Alberta Historical Review 19:1-4. Historical Society of Alberta, Calgary.

Sutherland, Alexander
1888 A Summer in Prairie-land. Notes of a Tour through the North-West Territory. Toronto.

Turner, P. J.
1950 The North West Mounted Police, 1873-1893 Vol. I. King's Printer, Ottawa.

Vehik, S. C.
1977 Bone Fragments and Bone Grease Manufacturing: A Review of their Archaeological Use and Potential. Plains Anthropologist 22:169-182.

Wheat, J. B.
1972 The Olsen-Chubbuck site: a Paleo-Indian bison kill. Memoirs of the Society of American Archaeology No. 26.

White, T. E.
1953 Observations on the butchering techniques of some aboriginal peoples. American Antiquity 17:254-317. Salt Lake City.

Wislizenus, F. A.
1969 A Journey to the Rocky Mountains in the Year 1839. Reprinted from the first edition by the Rio Grande Press, Inc., New Mexico.

Wissler, Clark
1910 Social Organization and Ritualistic Ceremonies of the Blackfoot Indians. Anthropological Papers of the American Museum of Natural History Vol. VII. New York.

Yellen, John
1974 Cultural Patternings in Faunal Remains: Evidence from the !Kung Bushmen. Unpublished manuscript.

Young, H. S.
1966 Impressions of Fort Edmonton. Alberta Historical Review pp. 22-25. Historical Society of Alberta, Calgary.

Ziegler, A. C.
1973 Inference from Prehistoric Faunal Remains. An Addison Wesley Module in Anthropology No. 43. Bernice P. Bishop Museum, Honolulu.

PLATES

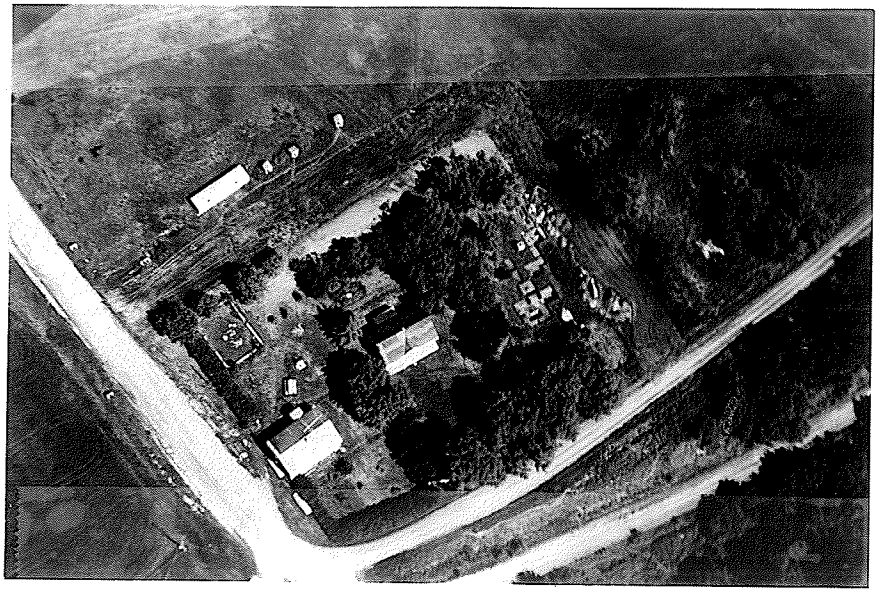


Plate 1. Aerial View of Excavations at Fort Victoria

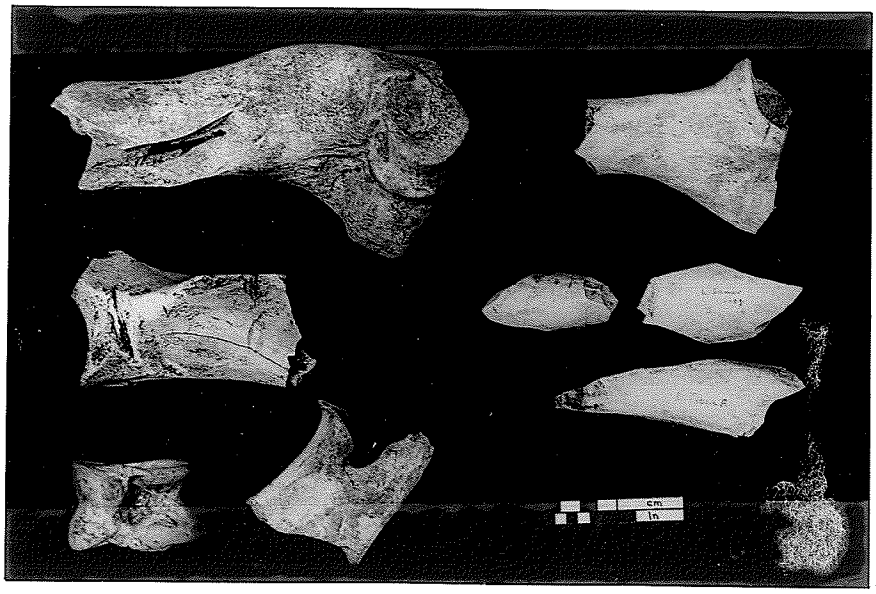


Plate 2. Presence of Butchering Marks of Large Mammal Elements

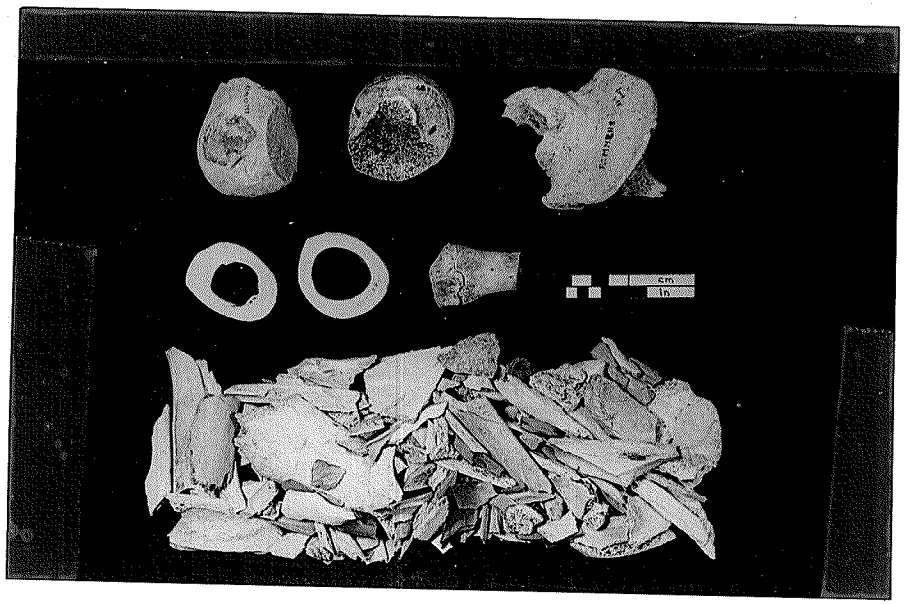


Plate 3. Photograph Showing High Degree of Bone Fragmentation of Large Mammal Elements

APPENDIX A:

SUPPLEMENTARY DATA: FORT VICTORIA

TABLE 25

MAMMALS: ELEMENT FREQUENCIES AND MINIMUM NUMBER OF INDIVIDUALS

Key:
L-Left side
R-Right side
?-Side unknown
w-whole
s-Shaft
?-Ident. questionable

(Each species column is subdivided L R ?.)

Element		*Microtus* sp. Vole	*Clethrionomys* sp. Vole	*Phenacomys* vole	*Peromyscus* sp. mouse	*Thomomys* pocket gopher	Franklin's ground squirrel	Richardson's Ground Squirrel	*Marmota monax* woodchuck	*Lepus townsendii* jack rabbit	*Lepus americanus* snowshoe hare	*Mustela frenata* weasel	*Mustela vision* mink	*Martes americana* marten	*Mephitis mephitis* striped skunk	*Ondatra zibethicus* muskrat
Cranium	-whole	1	1		1											
	-frag.	20									4 2 5	1				
Maxilla	-whole	1			1		1 1									
	-frag.	2									1 2 1					1
Mandible	-whole	9 6				1					9 5 1	1	1			
	-frag.	2 3	3 2						1		24 19 1					1 1 1
Upper Dentition	-whole	12									10					1
	-frag.															1
Lower Dentition	-whole															1
	-frag	2									11					
Indeterm Dentition	-whole															
	-frag.										5					
Horn Core	-whole															
	-frag.															
Antler	-whole															
	-frag.															
Scapula	-whole	1 1	2 1								5 5					
	-frag.	1 1									7 3					2
Humerus	-whole	5 4	3 3								1					
	-prox.										3 2 1					
	-dist.										8 3					
Radius	-whole	3 4	2												1	
	-prox.										1					
	-dist.										1 2					
Ulna	-whole										1 2			1		
	-prox.	3 4								1	2 2					
Metacarpus	-whole										1 2 1					
	-prox.										1 2					
	-dist.									1	1					
Carpals	-Radial															
	-Interm.															
	-Ulnar															
	-Other															

Element		*Castor canadensis* american beaver	*Felis catus* common cat	*Lynx lynx* lynx	*Vulpes* sp. fox	*Canis latrans* coyote	*Canis* sp.	*Sus scofra* pig	*Bos* sp. cattle-oxen	*Equus* horse	*Ursus* sp. bear	*Odocoileus* sp. deer	*Cervus* sp. elk	*Alces alces* moose	*Bison bison* buffalo	Bos-Bison
Cranium	-whole															
	-frag.	1								1						2
Maxilla	-whole															
	-frag.						1	2 2 1	1						1	
Mandible	-whole		1													
	-frag.			1	1	1	1 1	2 1 1	1 1 1	1	1				1 6	1 2
Upper Dentition	-whole						1 3	4 1 2	1 1	1 2	1	1	1		2 1	1 2
	-frag.								2							2
Lower Dentition	-whole			1 1			1 1	1 2 1	3 2 2	1 1	1?	1?			1 1 1	1 2
	-frag								3						1 4	
Indeterm Dentition	-whole															2
	-frag.							1								
Horn Core	-whole															
	-frag.															2
Antler	-whole															
	-frag.												1			
Scapula	-whole															
	-frag.	1						1 1	1 4				1	1	3 2	
Humerus	-whole							1s							1s	
	-prox.											1 2 1				
	-dist.	1						1	1 1	1			1		5 5	
Radius	-whole											1s		1		
	-prox.		1?					1 1	3 1	1		1			3 1	
	-dist.								1					1	2 1	1 1
Ulna	-whole															
	-prox.		1				1	2 4	4			2			1 3	2
Metacarpus	-whole		1					1							1	
	-prox.								2 1	1					1 1	
	-dist.						1 1	1							1	1
Carpals	-Radial								3 3	3				2		1
	-Interm.								2 3	1		1			1	2
	-Ulnar								1					1	1	1 1
	-Other								3 1 1	3 1 1					2	3

TABLE 25 (Continued)

Key:
L - Left side
R - Right side
? - Side unknown
w - whole
s - Shaft
? - Ident. questionable

Element	Microtus sp. Vole	Clethrionomys sp. Vole	Phenacomys Vole	Peromyscus sp. mouse	Thomomys pocket gopher	Franklin's ground squirrel	Richardson's ground squirrel	Marmota monax woodchuck	Lepus townsendii jack rabbit	Lepus americanus snowshoe hare	Mustela frenata weasel	Mustela vision mink	Martes americana marten	Mephitis mephitis striped skunk	Ondatra zibethicus muskrat	Castor canadensis american beaver	Felis catus common cat	Lynx lynx lynx	Vulpes sp. fox	Canis latrans coyote	Canis sp.	Sus scofra pig	Bos sp. cattle-oxen	Equus horse	Ursus sp. bear	Odocoileus sp. deer	Cervus sp. elk	Alces alces moose	Bison bison buffalo	Bos-Bison
	L R ?	L R ?	L R ?	L R ?	L R ?	L R ?	L R ?	L R ?	L R ?	L R ?	L R ?	L R ?	L R ?	L R ?	L R ?	L R ?	L R ?	L R ?	L R ?	L R ?	L R ?	L R ?	L R ?	L R ?	L R ?	L R ?	L R ?	L R ?	L R ?	L R ?
Phalanges 1st whole																							2 2	2		1			1 1	2
Phalanges 1st -frag.										4 3 15 type?												2	3	2		1?			4	
Phalanges 2nd whole	15 type?																					3		1		1			2	1
Phalanges 2nd -frag.																2					1		1	1				1?		
Phalanges 3rd whole																							1		1				1	
Phalanges 3rd -frag.																							1							
Pelvis -whole	1									1 1																				
Pelvis -frag.	2	3								11 12					1 1	1	1				1		3 3	1		1?		1	1	3 2
Femur -whole	3 6	2 3								1 1																		1		3 2
Femur -prox.							1			4 9					1	1s 1							1?						1?	2
Femur -dist.										11 7												1	1							
Tibia -whole	7 6	2 3					1			3 2					1														1	
Tibia -prox.			1							3 7						1						1	1?							
Tibia -dist.	1									2 4											1	1 1				1		1 1	3 4	
Fibula -whole		2 3	1																										1	
Fibula -prox.										1													1 2					2	1 1?	1 1
Lateral Malleolus -whole																														
Lateral Malleolus -frag.																														
Tarsals -whole										1											1		2 3	1		1		1 1	1 3	
Tarsals -frag.																							1						1	
Astragulus -whole										2										1			2 2					1	1 1	
Astragulus -frag.																										1				1
Calcanium -whole										5 5													1 1			1		1	3	
Calcanium -frag.										1													1					1		1
Sesamoids -whole																							2 2 2						2	1
Sesamoids -frag.																														2
Metatarsus -whole										5 2 4					1		2					1	1	1 1 1						1
Metatarsus -prox.										2 2 1													1			1				1
Metatarsus -dist.										1 1 4																				
Metapodials -prox.		3w																				2				2?	1?		1?	1
Metapodials -dist.																							1?							3
Patella -whole																														
Patella -frag.																												1		
Vertebrae -Axis																									1?	1				
Vertebrae -Cerv.										1 1							2							1		1			1?	
Vertebrae -Thor.	~~10~~ type?									4 7							2					1				1			1?	
Vertebrae -Lumbar																														
Vertebrae -Caudal																1														
Total Specimens	138	38	2	2	1	2	2	1	2	312	2	1	1	1	16	9	11	3	1	2	16	47	98	31	5	25	5	19	92	56
Minimum No.	10	3	1	1	1	1	1	1	1	12	1	1	1	1	2	1	2	1	1	1	1	4	5	4	1	2	1	3	6	3

TABLE 26

BISON DISTAL HUMERII BONE
MEASUREMENTS: FORT VICTORIA

CAT. NO.	SIDE	LATERAL MEASUREMENT	MEDIAL MEASUREMENT	THICKNESS OF OLECRANION
R2M6S7-5	Left	No measurement	10.88 cm.	4.81 cm.
R2M7A8-86	Left	9.1 cm.	9.8 cm.	3.95 cm.
R2M9E1-33	Left	9.03 cm.	No measurement	4.3 cm.
R2M12E6-12	Left	No measurement	9.35 cm.	4.0 cm.
R2M13L12-49	Left	9.72 cm.	9.96 cm.	4.25 cm.
R2M12D16-1	Right	7.85 cm.	9.11 cm.	3.94 cm.
R2M12D16-2	Right	No measurement	9.52 cm.	--
R2M12E5-11	Right	8.0 cm.	8.7 cm.	3.8 cm.
R2M12G16	Right	8.5 cm.	9.54 cm.	4.22 cm.
R2M12E5-8	Right	8.0 cm.	9.21 cm.	4.01 cm.

TABLE 27

DISTRIBUTION OF LARGE MAMMAL SPECIMENS BY AREA: FORT VICTORIA

AREA	SPECIES	Mandible	Maxilla	Crania	Teeth	Horn Core	Antler	Ear Ossicle	Axis	C. Vert.	T. Vert.	L. Vert.	Pelvis	Ribs	Scapula	P. Humerus	D. Humerus	P. Radius	D. Radius	Ulna	P. Femur	D. Femur	P. Tibia	D. Tibia	Astragulus	Calcaneous	P. Metacarpal	D. Metacarpal	P. Metatarsal	D. Metatarsal	Metapodials	Carpals	Tarsals	Phalanges	Patella	Sesamoids	Lat. Malleolus	Total
S.E. Palisade-lower	Sus				1																													1				2
	Eq.				1																								1									2
	Bi				2																													1			1	4
	B-B	1																																				1
Picket-Fill Fence	Bos														1																							1
Block-Fill	Bos																					1				1						1						3
	Bi				2																																	2
Diagonal - Fill	Od.																	1	1																			2
Privy -Fill	Sus				1																																	1
	Cer						1								1																							2
	Al.																							1												1		2
	Eq.				1																																	1
	Bos				3																																	3
	Bi				1									1	1			1	1	1				2								3				1	12
	B-B	1			1																											1						2
Trash Pits 2-3	Sus				2																																	2
Trash Pit 3	Bi	1																																				1
Trash Pit 4	Sus		1												2								1	1										1				6
	Eq.												1																									1
	Bos		1										1																			3						5
	Bi	1																																				1
	B-B				1								1																									2

TABLE 27 (Continued)

AREA	SPECIES	Mandible	Maxilla	Crania	Teeth	Horn Core	Antler	Ear Ossicle	Axis	C. Vert.	T. Vert.	L. Vert.	Pelvis	Ribs	Scapula	P. Humerus	D. Humerus	P. Radius	D. Radius	Ulna	P. Femur	D. Femur	P. Tibia	D. Tibia	Astragulus	Calcaneous	P. Metacarpal	D. Metacarpal	P. Metatarsal	D. Metatarsal	Metapodials	Carpals	Tarsals	Phalanges	Patella	Sesamoids	Lat. Malleolus	Total
Midden	Sus																												1[C]									1
Lower	Bos																															3					1	4
E. Palisade	Eq.				1																											1						2
Upper	Bos																																1					1
	Bi																1																					1
	B-B				1																							1				1						3
Lower	Bi	1																																				1
Intrusive	Sus																										1[C]											1
Trash	Bos																								1													1
North	Sus				1															2				1									2					6
Fireguard	Ur.	1																																				1
	Od.																2			1													3					6
	Cer																													1								1
	Al.																							1	1	1							2					5
	Eq.	1																										1			4	1	1					8
	Bos	2											2		1			4	1	3	1				2	1		1	1			1	3		1			24
	Bi	1			1										3		3	3		1				2	2	1						2						19
	B-B				3	2							3		1				2	1			2	1	1	1		1		1	1		1	2	1			24
East	Al.								1									1													1							3
Fireguard	Bos												1																									1
	Bi.														1		3	1						1						1					1			7
	B-B				1																			1														3
Provision's	Bos																																	1				1
Store-Upper	Bi																1															1						2

TABLE 27 (Continued)

	SPECIES	Mandible	Maxilla	Crania	Teeth	Horn Core	Antler	Ear Ossicle	Axis	C. Vert.	T. Vert.	L. Vert.	Pelvis	Ribs	Scapula	P. Humerus	D. Humerus	P. Radius	D. Radius	Ulna	P. Femur	D. Femur	P. Tibia	D. Tibia	Astragulus	Calcaneous	P. Metacarpal	D. Metacarpal	P. Metatarsal	D. Metatarsal	Metapodials	Carpals	Tarsals	Phalanges	Patella	Sesamoids	Lat. Malleolus	Total
Main Midden - Upper	Sus	1																														1						1
	Od.																															1						1
	AL.																														1						1	1
	Bos.												1		1		1									1										1		8
Lower	Sus																			1																			1
	AL.																	1													1	1	1					3
	Bos																							2														2
	Bi																			1																		1
	B-B																															1						1
U. South Palisade	Od.																			1																		1
	Sus																																					1
Trading Store-Upper	Bi												1				2																					2
Lower	Bi					1																																1
Press Room Upper	Sus					1				1																												2
	Ur.												1						1[S]																			2
	Od.																1																					1
	Cer																																1					1
	AL.																			2	1		1															4
	Bi																																1					1
Lower	Bos																																					1
Cellar - Upper	Bi					1																																
Lower	Od.									1																1												2
	AL.																					1									1	2				1		1
	Bi	1				3			1															1														10
Fill	Bi					1																																1

TABLE 27 (Continued)

AREA	SPECIES	Mandible	Maxilla	Crania	Teeth	Horn Core	Antler	Ear Ossicle	Axis	C. Vert.	T. Vert.	L. Vert.	Pelvis	Ribs	Scapula	P. Humerus	D. Humerus	P. Radius	D. Radius	Ulna	P. Femur	D. Femur	P. Tibia	D. Tibia	Astragulus	Calcaneous	P. Metacarpal	D. Metacarpal	P. Metatarsal	D. Metatarsal	Metapodials	Carpals	Tarsals	Phalanges	Patella	Sesamoids	Lat. Malleolus	Total
North Shed Lower	Bi																								1											1		1
	Sus																													2							2
Dairy-Upper	Od									1							1													2							4
	Bi							1																														1
Lower	Sus				2											1[3]		1				1																5
	Od									1							1													2							4
	Eq										1																						2				3
	Bos														1										1								2				4
	Bi	2	1		2	1		1				1					1									1	1	1					3		1		16
Compound																										1						1			1		3
Men's House Plow Zone	Od																								1													1
	B-B																														2	1				1	4
Cellar P.B.R.	Ur																																1					1
	B-B																														1							1
West Cellar	Sus											1																										1
Blacksmith Shop-Plow Zone	Sus		2		1															1													1				5
	Ur				1																																	1
	Al.																															1						1
	Eq.				3																											1						4
	Bos				2																				1	1						1	1		1			7
	Bi.				1																																	1
	B-B																						1	1										2	1			5
North Gate Upper	Sus				1												1																					1
	Od																													1								1
	Eq.																																	1				1
Lower	Sus	2	2		1												1																					6
	Al.														1																								1
	Eq.																1																						1
	Bos														1										1							1							3
	Bi.	1																																1				2
	B-B				2																																	2

TABLE 27 (Continued)

AREA	SPECIES	Mandible	Maxilla	Crania	Teeth	Horn Core	Antler	Ear Ossicle	Axis	C. Vert.	T. Vert.	L. Vert.	Pelvis	Ribs	Scapula	P. Humerus	D. Humerus	P. Radius	D. Radius	Ulna	P. Femur	D. Femur	P. Tibia	D. Tibia	Astragulus	Calcaneous	P. Metacarpal	D. Metacarpal	P. Metatarsal	D. Metatarsal	Metapodials	Carpals	Tarsals	Phalanges	Patella	Sesamoids	Lat. Malleolus	Total
South Gate Upper	Bos																																	1				1
	Bi				1																						1											2
	B-B												1																					1				2
S.E. Palisade - Upper	Sus	1			1																										1						3
	Al.																																			1	1
	Eq.			1														1										1			3	1					7
	Bos				6															2						1					3	1		1	1	15
	Bi.				1						1				1																1						4
	B-B	1			1																			1											1	1	4
					AXIAL SKELETON												FORE					HIND									FEET							Total	369

KEY

Bi = Bison bison
B-B = Bos - Bison
Al. = Alces
Eq. = Equus
Od. = Odocoileus
Ur. = Ursus
Cer. = Cervus

TABLE 28

LARGE MAMMAL BONE WEIGHT/FT.^{3} OF MATRIX: FORT VICTORIA

Area	Raw Weight(Grams)	Cubic Ft. of Matrix	Wt. of Bone/Ft.^{3}
Factor's - upper kitchen	142.4	20.1	7.1
House - cellar test	0	3.78	--
Men's House			
- Plow Zone	1,415.3	916.57	1.5
- 1888 reoccupation	318.0	28.8	11.0
- Occupation Fill	73.8	16.4	4.5
West Cellar			
- 1888 reoccupation	16.1	12.0	1.3
- Occupation Fill	102.4	6.6	15.5
- Intrusive Trash	28.4	28.57	0.99
Blacksmith's Shop			
- Plow Zone	2,476.6	1,033.35	2.4
- 1888 Cellar Fill	501.6	51.66	9.7
- Occupation Debris	13.0	6.1	2.1
- Ash Pit	18.1	12.6	1.4
Picket Fence Footer Trench	--	55.74	0
North Gate			
- Upper	484.0	47.5	10.2
- Lower	2,683.0	144.0	18.6
Palisade			
- East upper	1,340.9	168.25	8.0
- North upper	17.5	28.2	0.6
- Footer trench	174.0	585.93	0.3
Intrusive Modern Trash	93.5	27.6	3.4
Midden - Upper	16.3	5.0	3.3
- Lower	704.1	22.0	32.0
Fireguard - North	15,694.3	11,016.0	1.4
- East	4,792.1	7,128.0	0.7
Warehouse - Upper	1,055.40	263.05	4.0
South Gate - Upper	856.8	260.7	3.3
- Lower	16.0	36.0	0.4
S. E. Palisade - Upper	4,822.0	730.65	6.6
- Lower	872.5	749.8	1.2
Block	752.7	76.88	9.8
Diagonal	117.4	10.1	11.6
Privy	.8,451.7	54.94	153.8
Trash Pit 1	133.9	30.70	4.4
Trash Pit 2	--	8.0	--

TABLE 28 (Continued)

Area	Raw Weight(Grams)	Cubic Ft. of Matrix	Wt. of Bone/Ft.^{3}
Trash Pit 3	280.3	12.0	23.4
Trash Pit 2-3	295.3	34.75	8.5
Trash Pit 4	3,337.1	37.7	88.5
West Palisade			
- Upper	55.03	202.6	0.27
- Lower	--	25.36	--
South Palisade			
- Upper	--	166.0	--
- Lower	--	63.22	--
Trading Store			
- Upper	137.01	212.8	0.64
- Lower	493.6	--	--
Fur Press Room			
- Upper	748.17	886.35	0.84
- Lower	169.38	279.99	0.60
Cellar - Slump	22.4	--	--
- Trash	--	--	--
- Fill	59.12	55.0	1.1
North Shed			
- Upper	25.87	107.6	0.24
- Lower	298.13	--	--
Dairy			
- Upper	319.16	136.96	2.03
- Lower	2,478.43	655.32	3.78

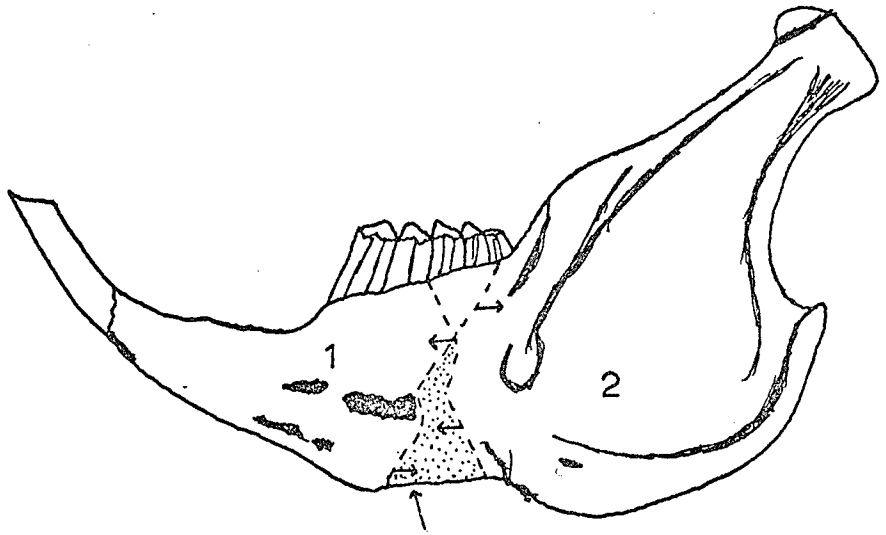
TABLE 29

A COMPARISON OF LEFT MANDIBLE FRAGMENTS FROM LEPUS AMERICANUS (FRAGMENTS FROM THE SAME PART OF THE MANDIBLE COME FROM DIFFERENT INDIVIDUALS)

PROVENIENCE	BUTCHERING MARKS	OVERLAP	LEFT AND RIGHT MATCH
R2M6K2-38	No	Yes	No
R2M6B7-49	No	No	Indeterminate
R2M6E2-77	No	Yes	Indeterminate
R2M6X2-34	No	No	Indeterminate
R2M7A6-49	No	Yes	Indeterminate
R2M7A7-10	No	Yes	No
R2M7A9-47	No	Yes	No
R2M7A9-48	No	Yes	No
R2M7A11-20	Yes	Yes	No
R2M7A18-23	No	Yes	No
R2M7B1-122	No	Yes	No
R2M7B1-123	No	Yes	Indeterminate
R2M7B2-14	No	Yes	Yes (6B2-25)
R2M7B2-15	No	Yes	Indeterminate
R2M9C1-42	No	Yes	Indeterminate
R2M10G1-81	No	Yes	No
R2M10G3-10	No	Yes	No
R2M12C7-2	No	Yes	Indeterminate
R2M12F2-24	No	No	Indeterminate
R2M12H3-71	No	No	No
R2M12L1-64	No	Yes	No
R2M12L2-57	No	Yes	No
R2M12L2-59	No	Yes	Indeterminate
R2M12N8-63	No	Yes	No
R2M12N11-63	No	Yes	Indeterminate
R2M12N11-64	No	No	Indeterminate
R2M13B1-132	No	Yes	Indeterminate
R2M13H1-156	No	Yes	Indeterminate
R2M13H1-158	No	Yes	Indeterminate
R2M13L-7-91	No	No	Indeterminate

TABLE 29 (Continued)

PROVENIENCE	BUTCHERING MARKS	OVERLAP	LEFT AND RIGHT MATCH
R2M13L9-4	No	Yes	No
R2M13L-9-7	No	No	Indeterminate
R2M12G6-3	No	Yes	Indeterminate
Total	33	33	



The diagram shows how all left mandible fragments were compared to a complete mandible to determine whether or not they overlapped one another. If overlap occurred, both fragments are from different individuals, as is the case with #1 and #2.

Fig. 15 Left Mandible of Lepus americanus

TABLE 30

DISTRIBUTION OF SMALL MAMMAL ELEMENTS BY AREA: FORT VICTORIA

AREA	SPECIES	Mandible	Maxilla	Crania	Teeth	C. Vert.	T. Vert.	L. Vert.	Pelvis	Ribs	Scapula	Humerus	Radius	Ulna	Femur	Tibia	Fibula	Astragulus	Calcaneous	Metacarpal	Metatarsal	Metapodial	Carpals	Tarsals	Phalanges	Patella	Total
Men's House Plow Zone	L.a.	3						4	9		1	1			1	6	5										39
	O.z.	2		1					1		1						1	1									7
Men's House East Cellar Post Bldg. Removal	L.a.	1			1				2				1		1					1							7
	O.z.				1																1						2
	Thom.	1																									1
1888-Reoccupation Fill	L.a.															1	1										2
	Mic.	2	1			10			1	2		1	2	2	2	3									8		34
Occupation Debris 1864-1888	L.a.										1				1												2
	Mic.	6			16				1	14	4	7	5	5	6	10	10								7		91
	Cas.								1																		1
	Per.			1																							1
Men's House Occupation Debris	L.a.	1		2	5				1			1				1									1		12
	Cloth	5		1					3		3	6	2		5	5	5					3					38
Blacksmith's Shop - Plow Zone	L.a.				1				2		1				2	1											7
	Per.		1																								1
	C.f.		2																								
	C.L.																	1									1
	Canis				1																						1
North Gate Upper	L.a.	2																	1						1		4
Lower	L.a.	5	1		2			2			2	2		1	1						1				5		22
	Cas.														1												1
E. Palisade Upper	L.a.			1			1		1						1				1								5
	O.z.										1																1
N. Palisade Upper	L.a.	1																									1
Palisade Footer Trench	L.a.						1																				1
Midden-upper	L.a.															1											1
-lower	L.a.	4							2		2														1		9
North Fireguard	L.a.	2		1	1				1										1								6
	M.F.	1		1																							2
	C.L.	1																									1
	Canis	2			1																						3
	V.f.	1																									1
E. Fireguard	L.a.								1																		1
Provisions Store-upper	L.a.	2											1	1		1											5
lower	L.a.				1																						1

TABLE 30 (Continued)

AREA	SPECIES	Mandible	Maxilla	Crania	Teeth	C. Vert.	T. Vert.	L. Vert.	Pelvis	Ribs	Scapula	Humerus	Radius	Ulna	Femur	Tibia	Fibula	Astragulus	Calcaneous	Metacarpal	Metatarsal	Metapodial	Carpals	Tarsals	Phalanges	Patella	Total
South Gate Upper	L.a.														1												1
S.E. Palisade - upper	L.a.	5	1						1			4			3	3			2		2	4					25
	L.c.				1																						1
- lower	L.a.				1																						1
	Cas.														1												1
	L.c.	1			1																						2
Exterior East Upper	L.a.				1																						1
	O.z.				1																						1
Palisade Trench Fill	L.a.											1															1
Privy	L.a.	1			3				1			1															6
	M.v.	1																									1
Trash Pit 1	L.a.	1			2																	3			2		8
Trash Pit 2	L.a.														1	1											2
Trash Pit 3	L.a.				1																						1
Midden Fill	L.a.	2										2		1							1	1	1				8
Palisade - upper	M.a.													1													1
Trading Store Upper	L.a.				1		2		2				1		1	1					1				1		10
Lower	L.a.			1			1			1				1					1		1						6
	O.z.						1																				1
Press Room	O.z.														1												1
Upper	L.a.	2		1										1					2		2				1		9
Lower	L.a.	1																									1
	C.r.													1	1												2
Trading Store Cellar-Lower	L.a.	1												1	2						1						5
	Cas.			1							1	1															3
Fill	L.a.										1																1
North Shed Upper	L.a.	1	1								1																3
Lower	L.a.	2																									2
Dairy -upper	L.a.	1							1					1		1									2		6
	Cas.																								2		2
lower	L.a.	18	1	5			2		2	3	12	4	1	2	2	3			2	2	11				6		76
	Cas.															1											1
	O.z.	1																									1
	M.m.												1														1
Trash Pit 4	L.a.	1											1		1						1						4
	L.T.																			1							1
	Mic.	4	1	2												2											9

TABLE 30 (Continued)

AREA	SPECIES	Mandible	Maxilla	Cranla	Teeth	C. Vert.	T. Vert.	L. Vert.	Pelvis	Ribs	Scapula	Humerus	Radius	Ulna	Femur	Tibia	Fibula	Astragulus	Calcaneous	Metacarpal	Metatarsal	Metapodial	Carpals	Tarsals	Phalanges	Patella	Total

KEY

Mic. = Microtus
Per. = Peramyscus
Cleth. = Clethrionomys
Thom. = Thomomys
C.F. = Citelles franklinii
C.r. = Citelles richardsonii
L.a. = Lepus americanus
M.f. = Mustela frenenta
M.v. = Mustela vision
M.a. = Martes americanus
M.m. = Mephites mephites
O.z. = Ondatra zibethicus
Cas. = Castor canadensis
F.c. = Felis catus
L.c. = Lynx canadensis
V.f. = Vulpes vulpes
C.L. = Canis latrans
Canis = Canis
L.T. = Lepus townsendii
M.m. = Marmota monax
Phen. = Phenacomys

TABLE 31

SMALL MAMMAL WEIGHT (GRAMS) DISTRIBUTION: FORT VICTORIA

AREA	WEIGHT (GRAMS)
MEN'S HOUSE	
- Plow Zone	54.1
- East Cellar, Post Building Removal	8.7
- 1888 Reoccupation	7.7
- West Cellar Post Building Removal	2.7
- 1864-83 Occupation Debris	14.8
BLACKSMITH'S SHOP	
- Plow Zone	16.6
- 1888 Cellar Fill	2.3
NORTH GATE	
- Upper	8.5
- Lower	43.5
PALISADES	
- East, Upper	3.9
- North, Upper	0.1
- North, Lower	0.7
- West, Upper	1.15
- South, Upper	2.08
- Southeast, Upper	49.15
- Southeast, Lower	9.38
MIDDEN	
- Upper	6.7
- Lower	28.9
FIREGUARD	
- North	48.2
- East	0.7
TRADING STORE	
- Upper	7.38
FUR PRESS ROOM	
- Upper	14.38
- Lower	2.36
TRADING STORE	
- Cellar Fill	1.1
NORTH SHED	
- Upper	5.33
- Lower	3.18

TABLE 31 (Continued)

AREA	WEIGHT (GRAMS)
DAIRY	
- Upper	4.86
- Lower	74.81
WAREHOUSE	
- Upper	8.08
SOUTH GATE	
- Upper	0.8
1888 PICKET FENCE TRENCH	0.35
BLOCK	0.20
DIAGONAL TRENCH	0.20
PRIVY	52.6
TRASH PITS	
- #1	5.4
- #2	---
- #3	3.8
- #2-#3	5.3
- #4	17.31

TABLE 32

AVIAN FAUNA: MINIMUM NUMBER OF INDIVIDUALS

KEY: L - Left Side R - Right Side ? - Side Indeterm.		Gallus spp.		Meleagris		Other Domestic fowl		Canachites can.		Pediocetes phas.		B. umbellus		Tetraonidae		Anas platy.		Anas acuta		Anas spp.		Anatidae		Branta can.		Accipitridae		Olor spp.		Passeriformes	
		L	?R	L	?R	L	?R	L	?R	L	?R	L	?R	L	?R	L	?R	L	?R	L	?R	L	?R	L	?R	L	?R	L	?R
cranium	-whole	2																											
	-frag.							11														1	2						
mandible	-whole																			1									
	-frag.							2																					
quadrate	-whole							1	1																				
humerus	-whole	1	2				1			1			1						1	2	1	3	7		1			1	1
	-prox.		2				1			1						1	1	1		2	1	1							
	-distal								1		2			3		1	1	1		2		1	4			1			1
radius	-whole	1					1	1														2	2						
	-prox.													1								1	1						
	-distal	1						1										1											
ulna	-whole	1					1	1	1		1											1							
	-prox.															1		1		2		1							
	-distal																1	1											2
scapula	-whole	1				1	1															2	2						
	-prox.								1													2	1						
	-distal																												
coracoid	-whole	1	1			1	1	1	1		2					1					2	3	6						
	-prox	1						1			1			1		1	4						1	1						
	-distal																			1			3					1	
2nd & 3rd metacarpus	-whole		2					1		1	1					1			1			3	3					2	
	-prox.																						1						2
	-distal																												
digits	-whole							1														1	1	1					
	-frag.																												
phalanges	-whole	1	2	1						3				2		1	1	1				1	1	3				1	3
	-frag.																												1
clavicular	-whole	1				1				1										1		3							
	-frag.															1						1							
sternum	-whole																			2									
	-frag.																												
keel	-whole		1			1																3							
	-frag.									1						2				2		3	6	1	1				
xiphisternal	-whole															2				1								1	
	-frag.															2						1							
pelvis	-whole																												
	-frag.	1	1			1																1	2						
femur	-whole	1				1	1				1					1	1	1	1			3		1				1	2
	-prox.	1								1		1										1	1	1				1	
	-distal																					1	1					1	1
tibia	-whole						1							1	1							1	1						
	-prox.				1				1		1	1				1	1	1	1	2		3	2	1					1
	-distal																												
fibula	-whole					1																2	1						
	-prox.															1													
tarso-metatarsus	-whole		2							1	1											3						4	1
	-prox.													1								1						1	
	-distal																			1								1	
sesamoids										5																			
ribs														1								1							
vertebrae	-whole									1																			
	-frag.																					1							
sacrum		1						1																					
total specimens		29		2		14		30		26		3		11		25		11		21		101		10		1		2	28
minimum nos.		3		1		1		2		2		1		3		4		1		1		10		2		1		1	2

*Remains of four Gallus individuals are not computed above.

TABLE 33

DISTRIBUTION OF BIRD ELEMENTS BY AREA: FORT VICTORIA

AREA	ELEMENTS	Mandible	Cranial	Humerus	Radius	Ulna	Scapula	Coracoid	2+3 Metacarpal	Digits	Phalanges	Furculum	Sternum	Keel	Xiphisternal	Pelvis	Femur	Tibia	Fibula	T. Metatarsus	Sesamoids	Ribs	Vertebrae	Sacrum	Total
Men's House Plow Zone	C.c.			1			1							1				1							3
	P.p.																1	1							1
	A.p.																	1							2
	An.	1				1												1							3
	Acc.			1																1					1
	Pass.																								1
East Cellar (Post Bldg. removal)	C.c.							2																	2
	An.							1																	1
	Ana.			1	1														1					1	3
Reoccupation Debris	C.c.	1	13	1	1	1																		1	18
Occupation Debris	B.c.										2														2
West Cellar Reoccupation	Tet.																	1							1
	Debris																			1					1
West Cellar Intrusive Trash	G.							1																	2
	G.c.	1			1	1		1	1	1															6
	P.p.			1				2			3	1					2	1		2	5		1		18
	Tet.										2														2
	An.																					1			1
Blacksmith's Shop - Plow Zone	G.							1																	1
	A.p.								1																1
	An.			1																					2
1888 Fill	An.							1							1										1
	Ana.						1											1							1
1864-83 Fill	An.																								
North Gate Upper	G.						1									2		1						1	4
Lower	An.			2				1					2	1											6
	B.c.																								1
	Ana.		1																						1
E. Palisade Upper	An.											1										1			1
Intrusive Trash	Tet.																								
Midden Upper	C.c.				1																				1
Lower	G.										1														1
	P.p.			1				1												1					2
	An.			1																					2
	B.c.											1													1

TABLE 33 (Continued)

AREA	ELEMENTS	Mandible	Cranial	Humerus	Radius	Ulna	Scapula	Coracoid	2+3 Metacarpal	Digits	Phalanges	Furculum	Sternum	Keel	Xiphisternal	Pelvis	Femur	Tibia	Fibula	T. Metatarsus	Sesamoids	Ribs	Vertebrae	Sacrum	Total
Fireguard	G.										1														1
North	An.			1																					1
East	G.				1																				1
Provisions Store - Upper	G.		2																						2
Men's House	G.			1							1						1								3
Upper	B.u.					1																			1
	P.p.								1																1
Lower	G.							1																	1
	A.p.							1																	1
S.E. Palisade	G.							1	1		1														3
Upper	P.p.			1																					1
	Tet.			1																					1
	A.p.			1				1		1	1														4
	A.a.																	1							1
	An.																	1							1
Lower	P.p.					1																			1
	An.																1								1
Palisade Trench	A.a.																	1							1
Privy	Tet.			1																					1
	A.a.			1		1																			2
	A.p.												2					1							3
	An.								1																1
Trash Pit 1	B.c.			1																					1
Trash Pit 4	Tet.			1																					1
	A.p.												1												1
	A.a.																1								1
Main Midden	G.			1								1													2
	A.p.							1																	1
	B.c.																1								1
Trading Store																									
Upper	Ana.							1											1	1					3
Lower	Ana.					1							2												3
Press Room	Pass.							1																	1
Upper	Ana.							2				1		1			1				1				6
Trader's Cellar	D.f.			1		1	2					1		1	1		2	1	1						11
Upper	Pass.							1																	1
Lower Fill	Ana.			4	1	1		1				1													8
	Pass.								1							1	4	4							10
	D.f.			1		1			1								1								4

TABLE 33 (Continued)

AREA	ELEMENTS	Mandible	Cranial	Humerus	Radius	Ulna	Scapula	Coracoid	2+3 Metacarpal	Digits	Phalanges	Furculum	Sternum	Keel	Xiphisternal	Pelvis	Femur	Tibia	Fibula	T. Metatarsus	Sesamoids	Ribs	Vertebrae	Sacrum	Total
North Shed	Ana.																1								1
Upper																									
Lower	Ana.			1				1	2								1	1							6
Dairy																									
Upper	Ana.			2		1		1			2			1					1						8
Lower	Ana.		2	11	3	1	6	8	6	1	2	3		5		1	5	4		3			1	2	64
Compound	Ana.							1		1															2
																							TOTAL		264

KEY

G.	- Gallus	A.p.	- Anas platyrhyncos
C.c.	- Canachites canachites	A.a.	- Anas acuta
P.p.	- Pediocetes phasianellus	An.	- Anas spp.
B.u.	- B. umbellus	Ana.	- Anatidae
Tet.	- Tetraonidae	B.c.	- Branta canadensis
D.f.	- Domestic fowl	Pass.	- Passeriformes

TABLE 34

DISTRIBUTION OF FISH: FORT VICTORIA

AREA	GENERA
MEN'S HOUSE	
- Plow Zone	Stizostedion Acipenser Esox lucius
- East Cellar 1888 Reoccupation	Esox lucius
- West Cellar Occupation Debris	Esox lucius
BLACKSMITH'S SHOP	
- Plow Zone	Acipenser Esox lucius Stizostedion vitreum vitreum Catostomes
- 1888 Cellar Fill	Esox lucius
NORTH GATE	
- Upper	Esox lucius
- Lower	Acipenser Esox lucius Stizostedion
MIDDEN	
- Upper	Acipenser Esox lucius
- Lower	Acipenser Catostomes Esox lucius Hiodon Perca Salmo Stizostedion
WAREHOUSE	
- Upper	Stizostedion
EAST PALISADE	
- Upper	Esox lucius
- Lower	Acipenser Esox lucius

TABLE 34 (Continued)

SOUTHEAST PALISADE	
- Upper	Acipenser
	Esox lucius
- Lower	Acipenser
PRIVY	Acipenser
	Catostomes
	Lota lota
	Cyprinidae
TRASH PIT #1	Acipenser
TRASH PIT #2 and #3	Acipenser
TRASH PIT #4	Acipenser
	Catostomes
	Cottus
	Stizostedion
	Coregonus
	Salmonidae
FIREGUARD	Acipenser

TABLE 35

PRESENCE OF BUTCHERING MARKS: FORT VICTORIA

GENUS	ELEMENTS	Mandible	Maxilla	Crania	Atlas	Axis	C. Vert. - Body	C. Vert. - S. Proc.	T. Vert. - Body	T. Vert. - S. Proc.	L. Vert. - Body	L. Vert. - S. Proc.	Vert. - Body	Vert. - S. Proc.	Pelvis - Body	Acetabulum	Ribs	Scapula - Articular	Scapula - Blade	P. Humerus	D. Humerus	Humerus Shaft	P. Radius	Radius Shaft	P. Ulna	Ulna Shaft
Bison bison	Axe mark	3											1					3				1		3		
	Knife mark	1																1				1		1	1	
	Sawn bone														17											
	Spiral fracture	1																3				7		5		
Bos	Axe mark	1														1						1	1	1	1	
	Knife mark																	1							3	
	Sawn bone		1													1		2								
	Spiral fracture															1		3				1	2	1		
Alces	Axe mark					1																	1			
	Knife mark					1															1					
	Sawn bone																									
	Spiral fracture																	1			1					
Cervus	Axe mark																									
	Knife mark																	1								
	Sawn bone																									
	Spiral fracture																									
Odocoileus	Axe mark																									
	Knife mark																				1					
	Sawn bone																					1				
	Spiral fracture																					2				
Sus	Axe mark																	1								
	Knife mark																								2	
	Sawn bone																	1						1	1	
	Spiral fracture																									
Large Mammal Unident.	Axe mark	5		2	1		10	2	1	18	1	1	1		8	3	X	1	15		1	1		4	2	
	Knife mark			1						7	1	2	1	1	2	2	X	1	4			2		2	1	
	Sawn bone												1		3		X	3						1		
	Spiral fracture														4	1		1	4	1	13	1	5	1		
		AXIAL ELEMENTS																FORELIMB								

TABLE 35 (Continued)

GENERA	ELEMENTS	P. Femur	D. Femur	Femur Shaft	P. Tibia	D. Tibia	Tibia Shaft	Longbone Shaft	Astragulus	Calcaneus	P. Metacarpal	D. Metacarpal	P. Metatarsal	D. Metatarsal	P. Metapodial	D. Metapodial	Metapodial Shaft	Carpals	Tarsals	Phalanges	Lat. Malleolus
Bison bison	Axe mark	1					4														1
	Knife mark						1		1	1	2							2			1
	Sawn bone																				
	Spiral fracture					1	3				2										
Bos	Axe Mark								2		1		3							1	
	Knife mark								2	2										1	1
	Sawn bone			1			1												1		
	Spiral fracture												1							1	
Alces	Axe mark	1																1	1		
	Knife mark																				
	Sawn bone																				
	Spiral fracture						1														
Cervus	Axe mark																				
	Knife mark																				
	Sawn bone																				
	Spiral fracture																		1		
Odocoileus	Axe mark													1		1					
	Knife mark																				
	Sawn bone														1						
	Spiral fracture																				
Sus	Axe mark	1					1														
	Knife mark		1																		
	Sawn bone						1								2						
	Spiral fracture																				
Large Mammal Unident	Axe mark	6	2	8	2	1	7	X			1			1							
	Knife mark	1	2	2	1			X													
	Sawn bone	2		12				X													
	Spiral fracture			9	1			X													

HIND LIMB

FEET

TABLE 36

FAUNAL REMAINS FROM TRASH PIT #4: FORT VICTORIA

	IDENTIFIABLE	UNIDENTIFIABLE LARGE MAMMAL ELEMENTS
Large Mammals	*Sus* - 1 maxilla *Sus* - 2 scapulas *Sus* - 2 tibias *Sus* - 1 phalange *Equus* - 1 pelvis *Bos* - 1 cranial fragment *Bos* - 1 pelvic fragment *Bos* - 3 carpals *Bison* - 1 mandible	- long bone shaft fragments - scapula fragment - axis fragment - spinous process fragment (thoracic vertebrae) - cervical vertebrae fragments - lumbar vertebrae fragments - tibia shaft fragments - femur shaft fragments - pelvic fragments - ulna fragments - axis fragment - cranial fragments - rib shaft fragments
Small Mammals	*Lepus americanus* - 6 elements *Lepus townsendii* - 1 element	
Birds	*Anas acuta* - 1 element *Anas* species - 1 element *Canachites canadensis* - 1 element	
Fish	*Catostomes* - 1 element *Perca* - 1 element *Stizostedion* - 1 element *Acipenser fulvescens* - 1 element *Coregonus*? - 1 element	

APPENDIX B:

SUPPLEMENTARY DATA: FORT GEORGE, BUCKINGHAM HOUSE, AND FORT WHITE EARTH

TABLE 37

SUMMARY OF MINIMUM NUMBERS OF INDIVIDUALS:
BUCKINGHAM HOUSE (ANALYZED BY G. PRAGER, 1975)

GENERA	ELEMENTS	MIND	BASED ON
Bison bison	275	15	R. Tibia and I. L. Tibia
Alces alces	39	5	L. Tibias
Cervus canadensis	28	6	L. Tibias
Equus spp.	14	2	L. Tibias
Ursus spp.	1	1	Canine
Odocoileus spp.	31	3	R. calcaneii
Canis spp.	19	2	R. Ulnae
Castor canadensis	130	8	L. Tibias
Vulpes vulpes	3	1	Scapula
Mephitis mephitis	1	1	Scapula
Lutra canadensis	2	1	Metapodial
Lepus townsendii	2	1	Radius
Lepus americanus	8	1	Humerus
Peromyscus maniculatus	1	1	Humerus
Olor buccanator	20	2	Humerus
Grus americana	1	1	Synsacrum
Olor columbianus	10	2	Tarometatarsus
Branta canadensis	14	2	Coracoids
Anser albifrons	8	2	Humerus
Anas platyrhyncos	10	3	Humerus
Anas acuta	4	1	Coracoid
Spatula clypeata	3	2	Ulna
Larus spp.	1	1	Humerus
Canachites canadensis	2	1	Radius
Pediocetes phasianellus	4	1	Humerus
Perdix perdix	2	1	Humerus
Esox spp.	3	1	Centrum
Stizostedion spp.	6	1	Maxilla
Ictalurus spp.	1	1	Clethrum

TABLE 38

WEIGHTS AND DISTRIBUTION OF LARGE MAMMAL BONE:
FORT WHITE EARTH (FROM HURLBURT, N.D.)

GENERA	REFUSE PIT		CABINS		ALL OTHER AREAS	
	Elements	Weight	Elements	Weight	Elements	Weight
Bison bison	68	52 lbs. 13.5 oz.	53	30 lbs. 1 oz.	14	8 lbs. 10 oz.
Alces	134	41 lbs. 14 oz.	55	27 lbs. 14 oz.	13	4 lbs. 13 oz.
Cervus	212	69 lbs. 9.5 oz.	81	21 lbs. 12 oz.	7	3 lbs. 10 oz.
Total	414	164 lbs. 5 oz.	189	79 lbs. 11 oz.	34	17 lbs. 1 oz.
Long bone shaft fragments	1,872	50 lbs. 7.5 oz.	713	18 lbs. 7.5 oz.	368	5 lbs. 10.5 oz.
Proximal and distal long bones	93	10 lbs. 5 1/4 oz.	57	6 lbs. 6.5 oz.	11	13.5 oz.
Rib shaft fragments	940	38 lbs. 10 1/4 oz.	596	9 lbs. 6 oz.	119	2 lbs. 2 3/4 oz.
Pelvis and sacrum	30	1 lb. 12 oz.	11	1 lb. 8.5 oz.	1	1 oz.
Skull	13	1 3/4 oz.	6	2 oz.	2	1 oz.
Phalange	12	13 oz.	1	1 oz.	-	-
Vertebrae	8	1 lb. 5 oz.	-	-	-	-
Metatarsal	5	6 oz.	-	-	-	-
Carpals	-	-	-	-	1	1 oz.

TABLE 39

LARGE MAMMAL ELEMENT FREQUENCIES:
BUCKINGHAM HOUSE (1972 SAMPLE IDENTIFIED BY G. PRAGER)

	Bison bison		Alces		Cervus		Odocileus		Ursus	
	L.	R.	L.	R.	L.	R.	L.	R.	L.	R.
Scapula - W	4	3		1						
P	5	6	1	1	1					
D		1								
Humerus - P	2	3								
D	7	6	1							
Radius - W		1								
P	6	9	2	1			2			
D	6(1)	7								
Ulna - P	7	6	2	1			1			
D	6	7								
Carpals - all	3	10	2			1		2		
Metacarpals						2		1?		
Phalanges F.				3?				3?		
Inominate F.	1									
Femur - P	5	6					1			
D	2	8					2			
Tibia - W		1								
P	9	5	2	1		2	1			
D	9	9	3	2	4	2	2			
L. malleolus	10	6	3		2	1				
Patella	12	13			4					
Calcaneous							3			
Astragulus	2	2					1	1		
Tarsals							1			
Metatarsal								1		
Metapodial										
Mandible F.							2	1		
Maxilla F.							1			
Dentition		2	1			1	3			1 +
Total	208		27		20		29		1	

W - whole; P - proximal; D - Distal; F - Fragment