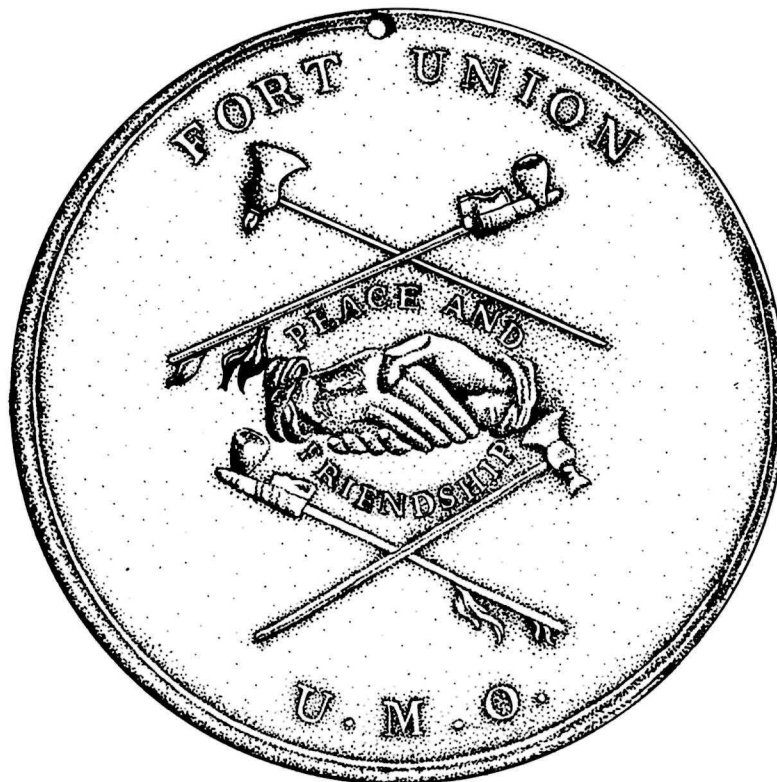


**FORT UNION TRADING POST
NATIONAL HISTORIC SITE
32W117**

Material Culture Reports



Fort Union Trading Post National Historic Site (32WI17)
Material Culture Reports, Part VI:
Preliminary Analysis of Vertebrate Fauna
from the 1968-1972 Excavations

by

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FOREWORD

This report is one of a series which describes the results of National Park Service archeological excavations at Fort Union Trading Post National Historic Site from 1968 through 1972. Although a preliminary report describing the extent and nature of the excavations was produced shortly after the close of each season's fieldwork, until recently the extensive collection of artifacts and other materials recovered during that work has remained largely unanalyzed and unreported for want of sufficient funding.

A systematic effort to analyze and report all classes of material in the Fort Union collection was initiated in 1978 under the direction of Dick Ping Hsu with assistance from Leslie A. Perry. When Hsu transferred from the Midwest Archeological Center in 1981 and Perry left the National Park Service in 1982, this work was continued by William J. Hunt, Jr. These efforts have resulted in a series of manuscript reports, each focusing on a particular aspect of the 1968-1972 work at Fort Union. The series, entitled "Fort Union Trading Post National Historic Site (32WI17) Material Culture Reports," consists of a volume (Part I) by Hunt which critically assesses the fieldwork accomplished during the four seasons of work at the site; four volumes, with sections authored by Hunt or Perry or both, which describe the food-related artifacts (Part II); personal and recreational materials (Part III); the firearms, trapping and fishing equipment (Part IV); and the buttons (Part V) recovered from the site. Another volume (Part VI), by Carole A. Angus and Carl R. Falk, summarizes information about the vertebrate faunal remains from the Fort Union excavations. As more classes of material in this large and important collection are analyzed, more descriptive reports will be completed in this series.

Part VI, the faunal analysis by Angus and Falk, was completed in 1981 and was originally intended to be included as Appendix E in a comprehensive report on the entire artifact assemblage from Fort Union. Since a single, comprehensive manuscript on the Fort Union collection will not be produced for a number of reasons, the faunal report has been slightly reformatted to stand alone as a separate volume in the Fort Union "Material Culture Reports" series. The contents of the report, however, are unchanged.

Because of the size and number of these reports, only a limited number of paper copies have been produced for distribution to active researchers in fur trade archeology. Microfiche copies of these reports may be obtained from the Midwest Archeological Center, Federal Building, Room 474, 100 Centennial Mall North, Lincoln, Nebraska 68508-3873.

Cover illustration: The cover illustrates the reverse of a silver trade medal produced for the Upper Missouri Outfit of the American Fur Company in the early 1830s.

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INTRODUCTION

The following report provides preliminary consideration of unmodified vertebrate assemblages recovered during four seasons of archeological investigation of Fort Union Trading Post National Historic Site, Williams County, North Dakota. Fort Union was almost continuously occupied from its original construction in 1829 until its final abandonment in 1867. And, importantly, except for a short military occupation during the period 1864-1865, the sole function of the post was as a trade distribution and collection center. As a consequence, material remains and other information recovered as a result of the archeological investigation of the fort, together with appropriate historic documentation, provide an important opportunity to assess aspects of human adaptation to the northern Plains during the early historic period.

This contribution focuses on but one aspect of the total network of relationships: utilization of vertebrate resources. Both native and domestic taxa are considered. Following sections provide a brief consideration of historic documentation relevant to use of certain vertebrate species by those who lived in and around the Fort Union area; a descriptive treatment of the vertebrate assemblage; and limited comparison and discussion. Basic support data are organized in a separate volume (Angus and Falk 1981) prepared in conjunction with the present report.

This study was initiated under a Purchase Order agreement (No. PX-6115-7-0100, dated 21 June 1977) between the U.S. Department of the Interior, National Park Service (Midwest Archeological Center) and the

University of Nebraska (Department of Anthropology). Provisions of the original agreement call for preparation of a summary report detailing methods, a description of all identified materials and results of analysis. In so far as possible, all terms of this agreement have been met. Unfortunately, basic provenience units and unit relationships have not been systematically defined nor fully described. Consequently analysis of the vertebrate assemblage has been restricted to site-level generalizations. Difficulties encountered in organization of defined provenience units, and in particular the apparent impossibility of isolating temporally discrete analytic units, are discussed in the main body of this report.

All basic identifications and data recording were completed by C. Angus under the supervision of the Principal Investigator, C. Falk. Angus prepared much of the draft report which was revised and completed by Falk. The assistance, cooperation and patience of the staff of the Midwest Archeological Center throughout the period of this study are gratefully acknowledged. Laurie Soward prepared the original draft report. Figures 1, 2 and 3 were drafted by Sally Donovan.

BACKGROUND

Physical Setting

Fort Union Trading Post National Historic Site is located on the left (north) bank of the Missouri River at an elevation of 1890-1900 ft. (above mean sea level). The Missouri River is located over 1000 ft. to the south; during the fort's historic occupation, the Missouri was directly adjacent to and ca. 20 ft. below the level of the terrace upon which the fort is situated. The confluence of the Yellowstone and Missouri Rivers is several miles to the east. A large coulee is located between the fort and the junction of the two rivers; the coulee extends in a northerly direction, up through the Missouri breaks and into the high prairie grasslands. The Montana-North Dakota state line lies just east of the site area (Figure 1).

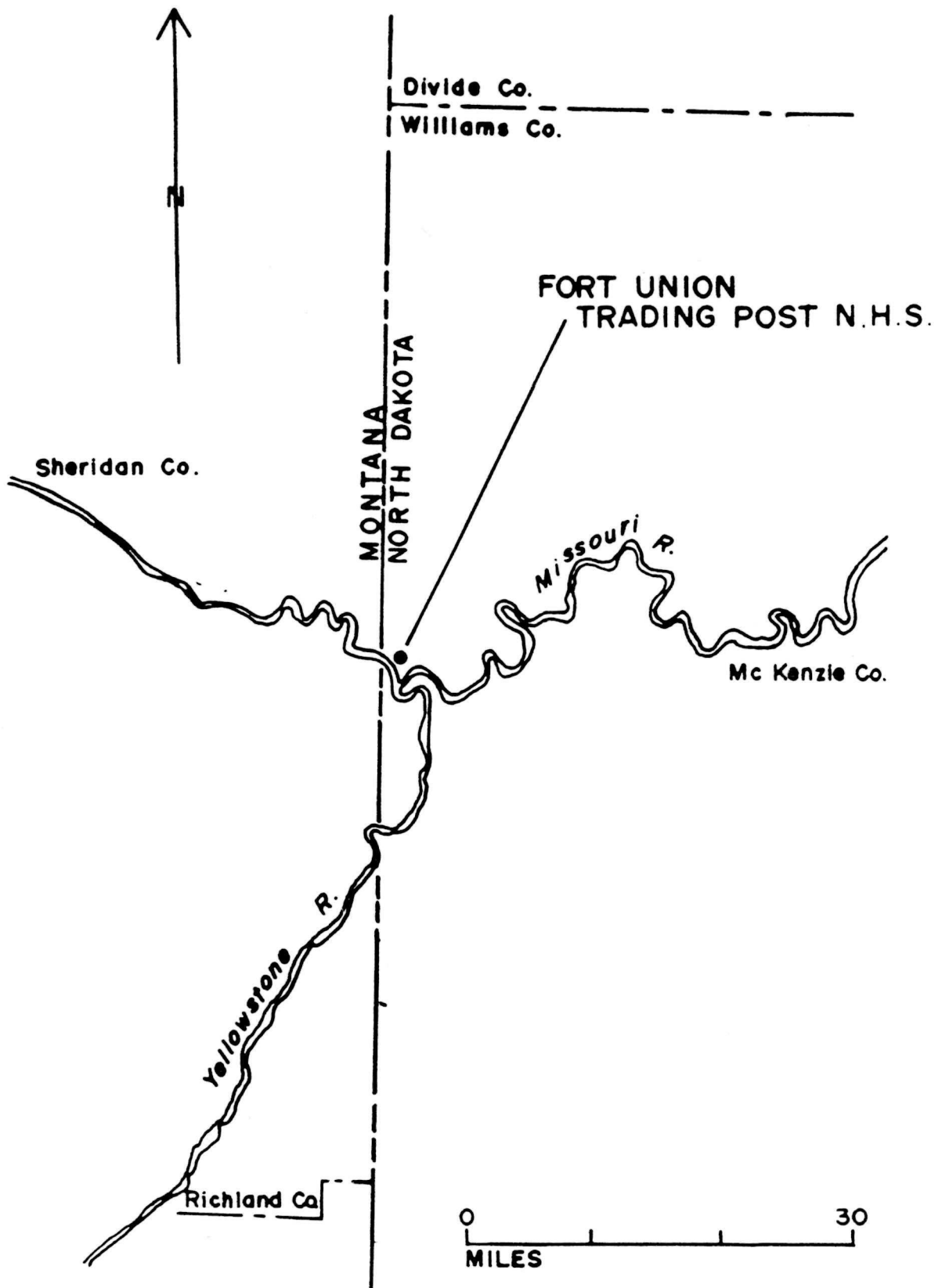


Figure 1. General location, Fort Union Trading Post National Historic Site, Williams County, North Dakota.

Edwin T. Denig provided the following description of Fort Union during the summer of 1843:

Fort Union, the principal and handsomest trading-post of the Missouri River, is situated on the north side, about six and a half miles above the mouth of the Yellowstone River; the country around it is beautiful, and well chosen for an establishment of the kind. The front of the fort is but a few steps, say twenty-five from the bank of the Missouri. Behind the fort is a prairie with an agreeable ascent to the commencement of the bluffs, about one and a half miles in width and two in length, surrounded at the borders with high hills, or bluffs. Above and below, at the distance of two hundred yards commence the points, or bottoms, of the Missouri, which contain great quantities of cottonwood, ash, and elm, supplying the fort with fuel, boat and building timber (Denig in Thompson 1968:272).

From a broader perspective the general Fort Union area is located within the general interface of short and mixed grassland areas of the Northern Temperate grasslands (Shelford 1963:330). Local community developments include both riverine and floodplain associations as well as the eroded high terrace margins (breaks), adjacent grasslands, and wet grasslands (represented by prairie lakes and ponds).

Historic Setting

Construction of Fort Union was begun in the fall of 1829 under the auspices of the American Fur Company owned by John Jacob Astor. The fort was designed to serve, in part, as one of the three major distribution centers for the Company's Upper Missouri Division. The other centers were Fort Clark near the mouth of the Knife River in North Dakota and Fort Tecumseh located at the mouth of the Bad River in South Dakota (Abel 1932:xv, xvii). During the following decades the American Fur Company, and its successors (Pratte, Couteau & Company; and Pierre Couteau, Jr., & Company) enjoyed a virtual monopoly within the Upper Missouri region -- from Council Bluffs, Iowa to the Yellowstone River drainage (Denig 1930:457). This monopoly replaced the independent traders who initiated early trade with various Native American groups and resulted in the introduction of a more formal, structured personnel organization as well as a system of trade and transport (Smith 1960:148; Burroughs 1961:116).

By the early 1840s, however, the fur trade in the general area had declined, mainly as a result of depletion of beaver combined with the decreasing popularity of the beaver skin hat in favor of the silk hat (Phillips 1961:23; Mattison 1962:18). As the availability and demand of beaver skins decreased, buffalo and other less sought peltries gained in importance (Smith 1960:97). An additional factor contributing to the decline of the fur trade in the area may have been competition -- as a result of activity on the part of the Hudson's Bay Company to the west. Visiting Fort Union in 1861, John Mason Brown noted that "the trade of this post has been steadily declining for some years, the Indians finding it more convenient to traffic higher up the river" (Brown in Thompson 1968:103).

Despite the continued decline of the fur trade, advancement of Euro-american settlers, growing tensions between Native Americans, settlers and the military, Fort Union continued operation into the 1860s. In 1865, unable to renew their fur trade license, the Chouteaus sold their properties to James Hubbell and others who formed the Northwestern Fur Company (Mattison 1962:22). The fort was occupied by the military during the winter of 1864-1865 and later abandoned in August of 1865. By 1867 Fort Union, now badly run-down and in need of repair, was completely abandoned. The Northwestern Fur Company moved to nearby Fort Buford which had been established at the mouth of the Yellowstone River the previous year. Much of the fort was subsequently dismantled and transported to Fort Buford for additional building materials.

A number of important primary and secondary sources dealing with Fort Union and the fur trade in general are available. For detailed background and other information concerning Fort Union and its role in the Upper Missouri fur trade the following sources should be consulted: Abel 1932; Athearn 1967; Denig 1930; Mattison 1962; Phillips 1961; Thompson 1968; Hummel 1938; and others.

Archeological Investigations

The archeological investigation of Fort Union has been carried out intermittently over the past 12 years. Major excavations were completed

in 1968, 1969, 1970 and 1972; materials considered in this report were recovered during these four years. Table 1 provides a summary of work completed during the major field periods.

The primary objectives guiding field activities during each of the field periods appear to have been the location, definition and description of architectural remains. The majority of information collected was oriented toward future reconstruction and public interpretation of the historic area. Reasonable efforts appear to have been made to recover artifactual materials which would be of potential use in future interpretive programs. An overall sampling design, including systematic recovery procedures, was not employed. Selective screening was attempted during the early days of the 1972 season but soon abandoned (Gillio 1973:2). In addition, some materials were selectively discarded in the field during the 1972 season (Gillio 1973:3). Conversations between Falk and Wilfred Husted shortly after the 1970 field season suggest that this practice was followed during prior years.

Test excavations were initiated in 1968 under the direction of Jackson W. Moore. Foundations of most major structures were located including the palisade, Bourgeois' house, bastions, powder magazine, and kitchen. Vertical provenience was maintained for some units.

More extensive excavations were directed by Wilfred Husted during 1969 and 1970. Two bastions, the Bourgeois' house, kitchen, blacksmith shop and the Indians' and artisans' house were completely excavated. Structures which were partially uncovered included the store range and cellar, magazine, and dwelling range, as well as additional portions of the palisade foundations. Vertical control was also selectively maintained during the 1969 and 1970 seasons. Figure 2 provides an illustration of major excavations completed through the 1970 season.

Archeological investigations during the 1972 field season were directed by David A. Gillio; this work was completed under a contractual agreement between the University of Colorado and the National Park Service (Contract No. 4970B20155 dated 16 June 1972). The dwelling range was almost completely excavated while portions of the palisade foundation, storage room and dairy room were tested. Exploratory tests were undertaken to locate the bell tower, "new" tower, privys and the east

Table 1. Summary of major archeological investigations, Fort Union Trading Post National Historic Site, Williams County, North Dakota.*

Year	Investigator - (Institution)	Summary of Work Completed
1968	Jackson W. Moore, Jr. (National Park Service, Midwest Regional Office)	Test trench investigation of palisade foundations; portions of Bourgeois' house, northeast bastion, southwest bastion, powder magazine excavated; other minor tests (Moore 1968).
1969	Wilfred M. Husted (Midwest Archeological Center)	Continued work on palisade foundations; complete excavation of southwest and northeast bastions; test of front gate area; partial excavation of Indians' and artisans' house; continued excavation of kitchen, store range, powder magazine (Husted 1970).
1970	Wilfred M. Husted (Midwest Archeological Center)	Contour map of site area completed; excavation of Bourgeois' house, kitchen, blacksmith shop and Indians' and artisans' house completed; continued work in front gate area; continued excavation within the store and dwelling ranges; partial investigation of the ice house (including removal of 4 burials); continued investigation of palisade foundations (Husted 1971).
1972	David A. Gillio (University of Colorado)	Excavation within dwelling range; tests within store range and dairy room; other tests both within and outside palisade foundations (Gillio 1973).

*This summary does not include minor projects carried out by Midwest Archeological Center personnel and others (e.g., Anderson 1973; Anderson and Galley 1976; Loendorf 1971; and Thiessen 1977). Falk (1978) provides basic information on vertebrate fauna recovered during the investigations of a presumed late nineteenth century Native American village area associated with Fort Union.

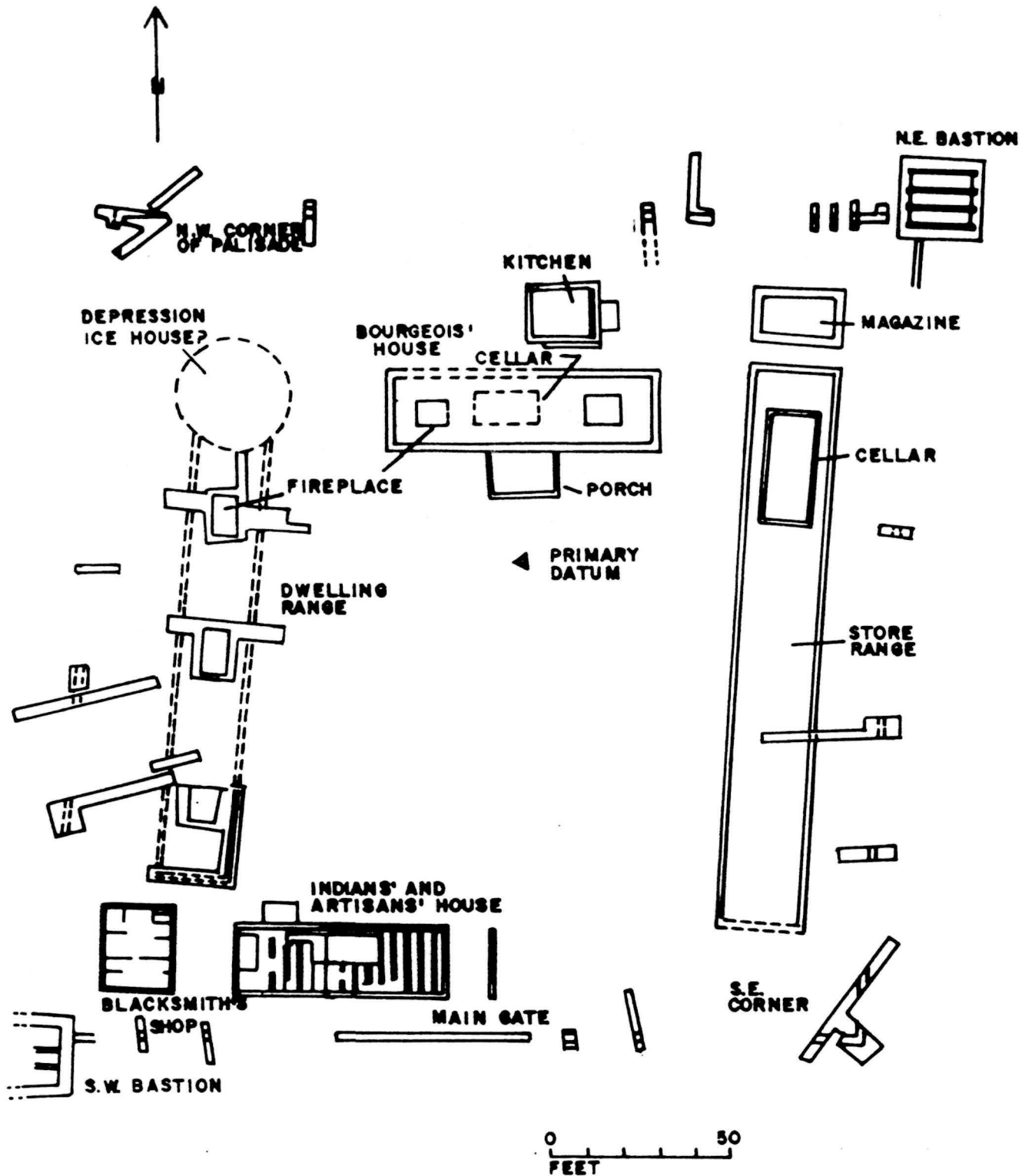


Figure 2. Plan view of portions of Fort Union Trading Post National Historic Site showing results of the 1968-1970 field investigations (adapted from Husted 1971, Figure 2).

and north enclosures; these efforts were largely unsuccessful. In contrast to previous investigations, much of Gillio's activity focused on areas outside defined structures and outside the palisade foundation. Horizontal controls were maintained through use of a grid system; vertical control was again maintained in select units. Figure 3 shows the general location of units excavated during the 1972 season. To date, map information from the 1972 and 1968-1970 projects has not been fully correlated.

In summary, 13 major structural units were located during four seasons of investigation outlined above; nine of these were completely or nearly completely excavated (Bourgeois' house, powder magazine, Indians' and artisans' house, kitchen, store range, blacksmith shop, dairy room, northeast bastion and front gate area) while four were partially excavated (dwelling range, ice house, southwest bastion and palisade). In addition, a number of substantial tests were excavated both within and outside the limits of the palisade foundation.

Over 9,000 catalog lots have been defined to accommodate materials recovered during the above investigations. Prior to the completion of the present volume a number of preliminary descriptions were available for some material classes. These include: locks and keys (Brown 1974), gun parts and related materials (Carrillo n.d.), clay tobacco pipes (Carrillo 1971; Pfeiffer 1975), trade beads (Galley 1975a), modified glass (Galley 1975b), human remains (Jantz n.d.), transportation associated artifacts (Lueck 1975), buttons (Wolf 1975) and ceramics (McClure 1972). With the exception of the paper dealing with human remains these analyses represent work generated primarily as a result of undergraduate and graduate class projects. An additional, and more recent, study by Perry (1981) is of note and provides a useful body of historical documentation and an informative discussion regarding food procurement strategies during the early historic period. Background research carried out in conjunction with the present contribution was completed prior to completion of Perry's manuscript however, and little use has been made of this document.

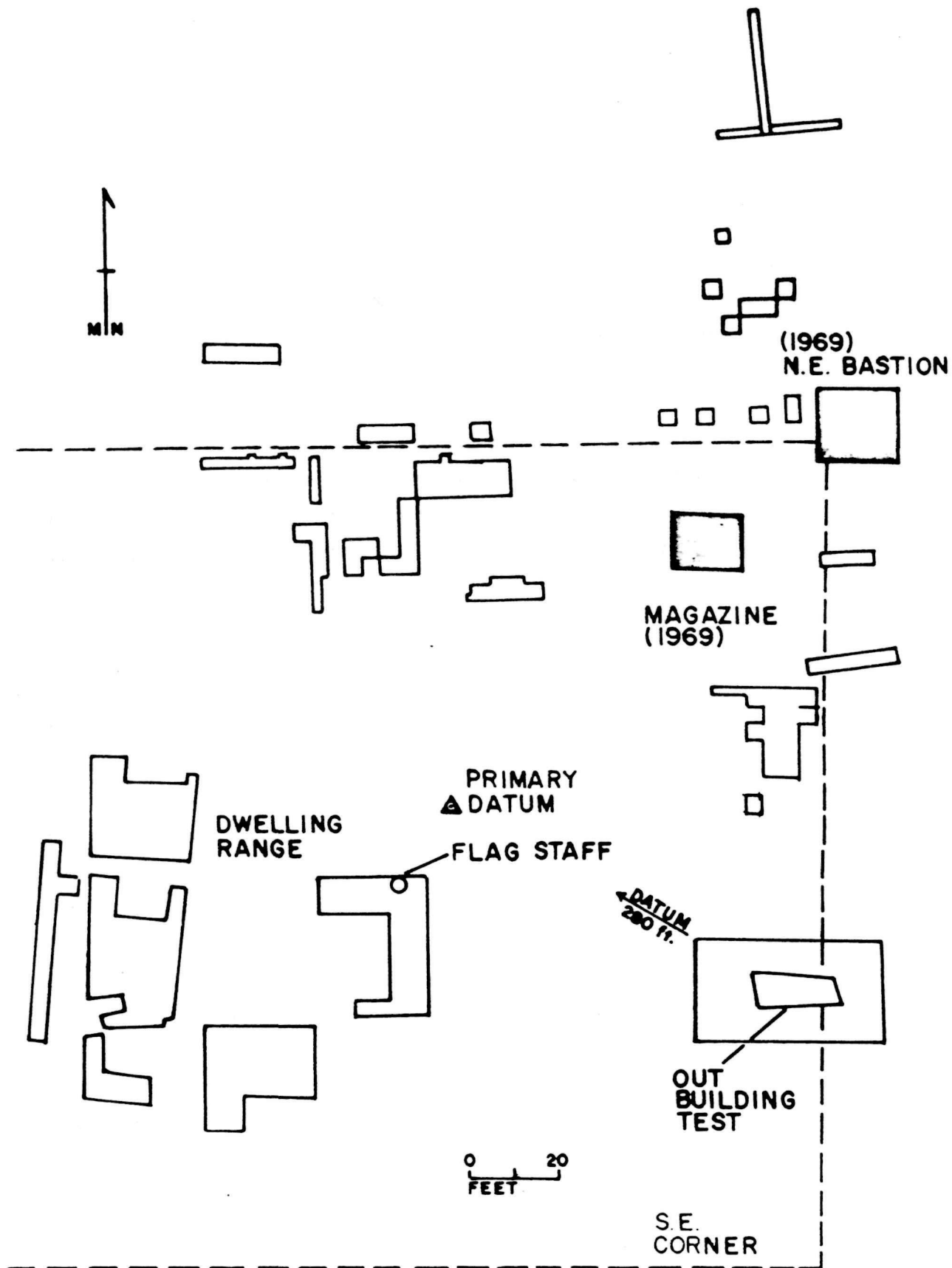


Figure 3. Plan view of Fort Union Trading Post National Historic Site showing location of units excavated during the 1972 field season (adapted from Gillio 1973, Figure 1).

PRELIMINARY CONSIDERATION OF VERTEBRATE
RESOURCE USE: HISTORIC DOCUMENTATION

Throughout its period of operation, Fort Union was the temporary home and stop-over for a number of well-known figures. These include George Catlin (1832), Prince Maximillian du Wied (1833), Pierre Jean de Smet (1840), John Audubon (1843), and many others. The written accounts of these individuals, taken with those of traders and fur company employees provide a fairly detailed description of Fort Union, its occupants and operation. The following preliminary notes are drawn from these, as well as more recent secondary sources, and focus primarily on use of both wild and domestic animals. A cursory description of the fort is included along with information concerning subsistence and other day-to-day activities.

The post was surrounded by a stockade which enclosed an area of about 52,000 square feet. A number of log structures were located within the stockade including the Bourgeois' house, general living quarters, trade room, storerooms, ice house, kitchen, stables, hen house, cooper's shop, the gunsmith and blacksmith shops, milk house and dairy (Athearn 1967: 22). A number of Indian groups (e.g., Crow, Blackfeet, Assiniboine) camped around the fort at various times of the year -- normally in conjunction with trade activities. Catlin's 1832 illustration, for example, depicts a fairly large number of lodges outside the palisade walls (Catlin 1973:14, 22).

Supplies were transported from St. Louis during the spring and summer months for distribution to posts located along the Missouri River; items were transported inland from these distribution points as necessary. Trade was most active during the winter months, a reflection of the fine quality of furs during this period. Trade during other seasons of the year was less active since most Indians lacked an acceptable medium of exchange (Kurz 1937:216). During the spring and summer, beaver pelts, buffalo robes and other furs were transported downriver in MacKinaw boats constructed at the fort and operated by men who had come upriver by steamboat the previous year (Denig 1930:459).

The total number of inhabitants of the fort undoubtedly varied seasonally and year-to-year. Personnel under the immediate direction of the bourgeois consisted of clerks, workmen, and resident hunters and trappers numbering 40-50 (Kurz 1937; Catlin 1973:21). Maximillian's journals suggest perhaps double that figure, as well as Indian and half-breed women and children.

A fairly strict social hierarchy was in force. The most important individual was the bourgeois who was responsible for directing all trade and the daily operation of the fort. A glimpse of the rigid social order may be found in Kurz's journal:

Clerks are served with the bourgeois at the first table which is fairly well furnished for this part of the country. We have meat well selected bread, frequently soup and pie. Hunters and workmen eat at the second table having meat biscuits, black coffee with sugar (Kurz 1937:236).

While employees ate with the bourgeois, resident Indians were given food rations of meat, corn and lard (Kurz 1937:223).

Animal products were derived from both domestic and wild populations. However, wild food sources appear to have been a more significant part of the diet during the entire period of occupation; this is not surprising considering the isolated location of the fort. Meat, in particular, could be supplied economically through the experienced hunters who exploited available local resources.

Table 2 is from Fort Union inventories for the years 1831, 1832, 1845 and 1851. These data suggest a small increase in the variety and number of domestic animals over time. On the other hand, primary sources contain many references to the use of locally procured foods. In 1833, Maximillian remarked that there were "...an inconsiderable number of cattle, swine, goats and domestic animals" but that the occupants of Fort Union "...consumed 600-800 buffalo a year" (Thwaites 1904-1906, XXII: 382). In 1832, Catlin noted that "MacKenzie's table groans under the luxuries of the country; with buffalo meat and tongues, with beaver tails and marrow-fat" (Catlin 1973:21).

During the 1840s, larger numbers of domestic cattle were present but local sources continued to be the primary source of fresh meat. In 1843 Edwin Denig recorded "...30 head of cattle and a goodly number of hogs" (Denig in Audubon 1897:187). However, he also notes that "...no

Table 2. Select inventory data for 1831, 1832, 1845 and 1851 - Fort Union (adapted from Thompson 1968: 142, 144).

Year	Inventory
1831	1 sorrel horse, 1 bay horse, 6 Indian horses, 1 bull*
1832	34 mules, 30 horses, 3 bay horses, 1 roan, 1 bull*, 1 ox, 2 goats, 1 boar, 1 sow
1845	17 Indian horses, 16 mules, 18 milch cows, 1 heifer*, 4 oxen, 1 bull*, 3 - 2½ year old steers, 1 - 2½ year old bull*, 8 calves, 13 large hogs
1851	4 Indian horses, 4 mules, 3 train dogs, 7 oxen, 1 black bull, 1 red stag bull, 2 young cut bulls*, 11 milch cows, 4 heifers*, 3 - 2 year old bull calves*, 6 - 1 year old calves*, 7 small calves*, 4 hogs, 2 pigs

* May refer to either domestic cattle (Bos) or Bison.

market being open for surplus stock and but few raised for the use of the fort, our efforts are not much directed to that business" (Denig 1830:408). Further reliance on local, rather than domestic animals, may also be inferred from the fact that a stable was built "...for buffalo calves annually raised here, being caught in winter storms" (Denig in Audubon 1897:185). Parenthetically, it is appropriate to note that caution should be taken in the interpretation of primary accounts dealing with wild and domestic bovids. It is possible that the terms "cattle", "bull", "cow", and "calf" may refer to either domestic cattle (Bos) or American bison (Bison bison).

As Kurz's journal suggests, most fresh meat was supplied by regularly employed hunters who "...go on the chase once a week when fresh meat is needed...and kill as many buffalos and elk as they need" (Kurz 1937:132). Fresh meat could be stored in the ice house for periods when local resources were scarce.

In addition to fresh meat, cured or dried meat constituted a significant portion of the diet. Kurz relates that "...nearly 15,000 pounds of cured meat was purchased at an Assiniboin camp..." of which "...Mr. Denig is forced to use at least 60 pounds a day on account of the multitude of people who eat here" (Kurz 1937:124, 271).

Cured pork imported from the Midwest was yet another source of food for early traders. During the late eighteenth and early nineteenth centuries, cured pork provided "...soldiers, explorers and travelers a ready-made meat supply; compact, nourishing and imperishable" (Towne and Wentworth 1950:149-150). Wintering with the Mandan, Maximillian noted that "...in the absence of buffalo herds, the men lived all winter on salt pork and the flesh of the cabri [antelope]" (Thwaites 1904-1906, XXII:383). In discussing faunal remains from Fort Berthold, Smith notes the presence of swine elements as possibly representing imported salt or dried pork (Smith 1972:167). The transport of cured meat to Fort Union is indicated by the presence of "2 bbl of prime bacon hams" in the inventory for 1832 (Thompson 1968:156).

Although not present during the early years, dairy cows supplied milk products during the 1840s (see inventories for 1845, 1851) and a special milk house was built to house them (Denig in Audubon 1897:180).

Domestic chickens were also kept during the decade (Denig in Audubon 1897: 185; Kurz 1937:241) and may have served as a source of both eggs and meat.

While long distances were usually covered by boat, local transportation as well as drafting was facilitated by horse, mules, oxen and dogs. Inventory lists, Maximillian's account and Denig's description of the stable (Denig in Audubon 1897:185) suggest that 50-60 horses were sometimes quartered.

The use of dog trains for local transportation, especially during heavy snow, seems to have been adopted from the Indians. Annual inventories for 1845 and 1851 include "29 dog collars and harnesses" and "three train dogs." Kurz (Fort Union) and Chardon (Fort Clark) make reference to the use of train dogs and sleds by traders and hunters (Kurz 1937:250; Abel 1932:94). The dogs were obtained from the Indians and are described by Kurz as differing "...very slightly from wolves, howl like them, do not bark and not infrequently mate with them." He also mentions another type of dog "...brought here from the Rocky Mountains...small, lop-eared canines covered with long shaggy hair" (Kurz 1937:239).

In the early years of the fur trade (1820s and early 1830s) buffalo and especially beaver skins were the most sought after items for export to the East and Europe. In 1832 Maximillian estimated that 50,000 buffalo robes and 25,000 beaver skins were sent from Fort Union annually. Other furs mentioned in this account are otter, weasel, marten, lynx, red fox, cross fox, silver fox, mink, muskrat and deer (Thwaites 1904-1906, XXII:380). By 1838, the beaver population had been greatly reduced and the buffalo robe became the single most common and valuable item in the fur trade (Burroughs 1961:116; Thompson 1968:46-47; Phillips 1961: 429).

During Denig's tenure as bourgeois in the 1840s and the 1850s he remarks that "The most numerous and useful animal in this country is...the buffalo...upward of 150,000 are killed annually throughout the extent of our trade" (Denig 1930:410). In 1852, on his last day at Fort Union, Kurz took an inventory of the pelts in the press room.

Those found in greatest number are buffalo, elk, Virginia deer, antelope, gray wolf, prairie wolf (coyote), gray fox, red fox, mice; then grizzly bear, beaver, ermine, hedgehog, muskrat, white hare, otter, marten, skunk, and cross fox (Kurz 1937: 329).

Other animals which Kurz describes as common to the area are rabbits, squirrels, badgers, rats, raccoons, lynxes, black bears, black and red wolves, prairie dogs, buzzards, turkeys, doves and parakeets (Kurz 1937: 329).

Except for the buffalo, the degree to which other large herbivores were hunted is unclear. Denig states that "Elk, deer, bighorn, and antelope are numerous...although they are not hunted to any extent except in a great scarcity of buffalo" (Denig 1930:411).

Except for wolves, coyotes, beaver and possibly fox, pelts of the smaller animals were not to be highly valued as trade items in the later years of the trade (1840s and 1850s). Kurz states that:

...since the beaver pelts have fallen in price, that far-famed class of trappers are no longer found at all. Beaver skins used to be their principal branch of industry; other pelts like ermine, fox, muskrat, otter and Alpine hare are either too rarely obtained or else not sufficiently profitable to justify risking so many dangers (Kurz 1937:125).

Denig writes that:

...red and gray foxes, hares, badgers, skunks, wildcats, otters, ermines and muskrats are killed when opportunity offers...The trade cannot have the effect of exterminating them, except the beaver and red fox (Denig 1930:411).

As Ewers notes, "ermine" in this accounts refers to the winter skin of the weasel (Ewers 1977:255).

Wolf and coyote skins were still rather highly prized items at the time; however, unlike other small mammals, they were actively sought. Denig writes, "...wolves of three kinds, the white wolf, the large gray back wolf and the small prairie wolf (coyote) are all very plentiful and a good deal hunted and many killed" (Denig 1930).

Other animal populations abundant at posts such as Fort Union were the common house mouse (Mus musculus) and the Norway rat (Rattus norvegicus). These aggressive rodents were introduced from the Old World by the first immigrants to North America and spread rapidly wherever settlers traveled. In his Fort Clark diary, Chardon provides a tally of rats killed each month -- a total amounting to 3,729 at the end of two or three years (Abel 1932:193). Maximillian states that cats were imported in order to combat rodents, specifically the Norway rat (Thwaites 1904-1906, XXIII:235-236).

There were similar problems at Fort Union. Kurz considered mice and rats as the most common animals represented in the fort's pelt room (Kurz 1937:329).

Finally, although of less economic significance, mention should be made of the various common and unusual pets kept at the fort. These included cats, native dogs, a red fox, a grizzly bear, an eagle, a parrot, and three wolfhounds (Thompson 1968:103, 142, 162).

THE ARCHEOLOGICAL REMAINS

Laboratory Procedures

Prior to initiation of the present study considerable effort had been directed toward preparing and organizing the Fort Union vertebrate assemblage. All materials had been previously cataloged and washed; many specimens were labeled with catalog and site designations. Preliminary separation of identifiable elements had been completed by Falk and Wilfred Husted and preliminary taxonomic and element identifications sorting initiated by Robert Warren and Ray Mundell under Falk's supervision.

Beginning in the fall 1977, Angus supervised the completion of all specimen numbering and reexamined all bone lots for identifiable remains. Identifiable specimens, for the purpose of this study, include all items which could be classified with respect to element, side and completeness. Unidentifiable specimens include all items which could not be so classified. In addition, rib shaft fragments were not coded.

Nearly all identifications were completed utilizing the comparative faunal collection maintained by the Midwest Archeological Center. In some instances comparative collections curated by the Nebraska State Museum and the Department of Anthropology (Division of Archeological Research) were employed.

Each element identified was examined with respect to a series of descriptive variables. Table 3 provides a full listing of these variables; specific values and actual codes are presented in Angus and Falk (1981).

Table 3. Variable list for descriptive analysis of vertebrate fauna recovered from Fort Union Trading Post National Historic Site.

Variable			
Number	Label	Column ¹	Value
1	Site designation	1-4	FOUS
2	Catalog number	5-8	0001-
3	Provenience code	9-23	not used
4	Taxonomic identification	26-28	001-880
5	Specimen number	29-32	0001-
6	Element identification	33-35	001-137
7	Side	-36	0-3
8	Portion	-37	0-9
9	Aspect	-38	0-8
10	Relative maturity	-39	0-6
11	Age	40-41	01-6
12	Sex	-42	0-3
13	Pathology	-43	0-1
14	Use phase	-44	0-5
15	Butchering evidence	-45	0-2
16	Charring	-47	0-1
17	Hardness	-48	0-1
18	Discoloration	-49	0-1
19	Non-human alteration	-50	0-4
20	Measurement 1	52-54	001-
21	Measurement 2	55-57	001-
22	Measurement 3	58-60	001-
23	Measurement 4	61-63	001-
24	Measurement 5	64-66	001-
25	Measurement 6	67-69	001-
26	Measurement 7	70-71	01-
27	Measurement 8	72-73	01-
28	Measurement 9	74-75	01-

¹Columns 24-25, 46, 51, 76-80 open.

Variables 1-3 are oriented toward locational information. Both site and catalog designations were recorded for all specimens. Provenience code information was not recorded. (As noted earlier, basic provenience unit definitions have not been completed as of this date). Variables 1-13 represent basic specimen data (taxonomic and element identifications, completeness measures) and other information recorded as appropriate (relative maturity, age, sex, pathology). Variable 10 (age) refers to chronological age at death, inferred from patterns of dental wear and eruption.

Variables 14-19 relate to observed or inferred characteristics which reflect pre- and post-depositional treatment of the specimen by human or non-human agents. Variables 20-28 consist of nine element specific cranial and post-cranial measurements. Measurements were taken for all taxa which were well-represented in the sample and where measurement data were judged to be of potential value for future analyses (e.g., age/sex determination; separation of closely related taxa). For the most part, measurements were taken to the nearest 1.0 mm.; for smaller taxa, however, measurements were taken to the nearest 0.1 mm. Instruments utilized include sliding calliper, curved calliper, measuring box and tape measure.

All information was recorded on computer code sheets for transfer to a standard 80-column data card. Each case (card) represents a single element. In some instances (e.g., Bison and Canis crania, and Canis mandibles) more measurements were taken than could be included given the single card format. In these instances a second card (2) was employed.

Bone and antler tools and tool fragments are not considered in the present analysis. These specimens were removed from the unmodified remains and boxed separately for analysis by project archeologists. A tabular summary of these remains -- including basic taxonomic and element identifications -- was prepared, however, and is contained in Angus and Falk (1981).

All identified specimens have been bagged and boxed for permanent storage by the National Park Service. These materials are presently curated by the Midwest Archeological Center, Lincoln, Nebraska. A full set of computer punch cards containing all original data is also on file at the Center (see also Angus and Falk 1981 for a full card listing).

Results

The identified sample includes 7895 coded elements. Eighty-seven taxonomic groupings are represented with the following class distribution: mammal - 35, bird - 44, reptile - 2, and fish - 6. Amphibian remains were not represented in the collection. Table 4 presents a summary listing of identified remains by taxonomic group.

Table 4. Summary of vertebrate taxa recovered from Fort Union Trading Post National Historic Site, Williams County, North Dakota.

Taxonomic Identification (common name)	Number of Specimens	Percent of Class	Percent of Total
<u>FISH</u>			
<u>Lepisosteus</u> sp. (gar)	2	0.13	0.03
<u>Hiodon alosoides</u> (goldeye)	2	0.13	0.03
<u>Cypleptus elongatus</u> (blue sucker)	8	0.54	0.10
<u>Ictaluridae</u> (catfish)	1	0.07	0.01
<u>Ictalurus</u> spp. (catfish)	1470	99.05	18.62
<u>Stizostedion</u> sp. (walleye/sauger)	1	0.07	0.01
<u>subtotal</u>	<u>1484</u>	<u>99.99</u>	<u>18.80</u>
 <u>REPTILE</u>			
<u>Chrysemys picta</u> (western-painted turtle)	4	80.00	0.05
<u>Colubridae</u> (non-venomous snake)	1	20.00	0.01
<u>subtotal</u>	<u>5</u>	<u>100.00</u>	<u>0.06</u>
 <u>BIRD</u>			
<u>Ardea herodias</u> (great blue heron)	1	0.13	0.01
<u>Olor</u> sp. (swan)	8	1.00	0.10
<u>Branta canadensis</u> (Canada goose)	121	15.14	1.53
<u>Chen</u> sp. (snow/blue goose)	33	4.13	0.42
<u>Anatinae/Aythinae</u> (ducks)	60	7.51	0.76
<u>Anas</u> spp. (mallard, pintail, gadwall)	107	13.39	1.35
<u>Anas platyrhynchos</u> (mallard)	9	1.12	0.11
<u>Anas</u> spp. (teal)	9	1.12	0.11
<u>Anas crecca</u> (green-winged teal)	13	1.62	0.16
<u>Anas discors</u> (blue-winged teal)	13	1.62	0.16
<u>Anas americana</u> (American wigeon)	1	0.13	0.01
<u>Aythinae</u> (diving ducks)	13	1.62	0.16
<u>Carthartes aura</u> (turkey vulture)	2	0.25	0.03
<u>Accipitridae</u> (hawks, eagles)	2	0.25	0.03
<u>Accipiter</u> sp. (bird hawks)	3	0.38	0.04
<u>Buteo</u> sp. (buzzard hawks)	4	0.50	0.05
<u>Aquila chrysaetos</u> (golden eagle)	4	0.50	0.05
<u>Haliaeetus leucocephalus</u> (bald eagle)	1	0.13	0.01
<u>Circus cyaneus</u> (marsh hawk)	1	0.13	0.01
<u>Falco</u> sp. (prairie or sparrow falcon)	1	0.13	0.01
<u>Falco sparverius</u> (sparrow hawk)	1	0.13	0.01
<u>Pedioecetes phasianellus</u> (sharp-tailed grouse)	113	14.14	1.43
<u>Tetraonidae</u> (grouse/prairie chicken)	91	11.38	1.15

Table 4. Summary of vertebrate taxa recovered from Fort Union Trading Post National Historic Site, Williams County, North Dakota (continued).

Taxonomic Identification (common name)	Number of Specimens	Percent of Class	Percent of Total
<u>Gallus gallus</u> (domestic chicken)	72	9.01	0.91
<u>Grus</u> sp. (crane)	2	0.25	0.03
<u>Grus canadensis</u> (sandhill crane)	3	0.38	0.04
<u>Fulica americana</u> (American coot)	3	0.38	0.04
Charadriidae (killdeer/plover)	1	0.13	0.01
Scolopacidae (sandpipers)	12	1.50	0.15
<u>Numenius americanus</u> (long-billed curlew)	3	0.38	0.04
<u>Bartramia longicauda</u> (upland plover)	1	0.13	0.01
<u>Larus</u> sp. (gull)	1	0.13	0.01
Columbidae (? <u>Columba livia</u> ; domestic pigeon)	4	0.50	0.05
<u>Zenaidura macroura</u> (mourning dove)	3	0.38	0.04
<u>Ectopistes migratorius</u> (passenger pigeon)	32	4.00	0.41
<u>Bubo virginianus</u> (great horned owl)	2	0.25	0.03
Strigidae (owls)	1	0.13	0.01
Picidae (woodpeckers)	2	0.25	0.03
<u>Eromophila alpestris</u> (prairie horned lark)	1	0.13	0.01
<u>Pica pica</u> (black-billed magpie)	4	0.50	0.05
<u>Corvus corax</u> (northern raven)	25	3.13	0.32
<u>Corvus brachyrhynchos</u> (American crow)	11	1.38	0.14
Icteridae (blackbirds)	3	0.38	0.04
Passeriformes (perching birds)	2	0.25	0.03
<u>subtotal</u>	<u>799</u>	<u>100.02</u>	<u>10.10</u>
<u>MAMMAL</u>			
<u>Lepus townsendii</u> (white-tailed jack rabbit)	52	0.93	0.66
<u>Sylvilagus</u> spp. (cottontail)	392	6.99	4.97
<u>Spermophilus tridecemlineatus</u> (13-lined ground squirrel)	22	0.39	0.28
<u>Thomomys talpoides</u> (northern pocket gopher)	1	0.02	0.01
<u>Castor canadensis</u> (beaver)	110	1.96	1.39
<u>Peromyscus</u> sp. (deer mouse)	3	0.05	0.04
<u>Onychomys leucogaster</u> (northern grasshopper mouse)	8	0.14	0.10
Cricetidae (New World rats and mice)	2	0.04	0.03
<u>Ondatra zibethicus</u> (muskrat)	11	0.20	0.14
<u>Rattus norvegicus</u> (Norway rat)	240	4.28	3.04

Table 4. Summary of vertebrate taxa recovered from Fort Union Trading Post National Historic Site, Williams County, North Dakota (concluded).

Taxonomic Identification (and name)	Number of Specimens	Percent of Class	Percent of Total
<u>Mus musculus</u> (house mouse)	49	0.87	0.62
<u>Erethizon dorsatum</u> (porcupine)	26	0.46	0.33
<u>Canis</u> spp. (dog, wolf, coyote)	690	12.31	8.74
<u>Canis</u> cf <u>familiaris</u> (dog)	8	0.14	0.10
<u>Canis latrans</u> (coyote)	85	1.52	1.08
<u>Vulpes vulpes</u> (red fox)	71	1.27	0.90
<u>Vulpes velox</u> (swift fox)	341	6.08	4.32
<u>Ursus</u> sp. (black/grizzly bear)	15	0.27	0.19
<u>Ursus arctos</u> (grizzly bear)	1	0.02	0.01
<u>Mustela frenata</u> (long-tailed weasel)	1	0.02	0.01
<u>Taxidea taxus</u> (badger)	50	0.89	0.63
<u>Mephitis mephitis</u> (striped skunk)	27	0.48	0.34
<u>Felis catus</u> (domestic cat)	134	2.39	1.70
<u>Lynx</u> cf <u>rufus</u> (bobcat)	2	0.04	0.03
Equidae (horse)	4	0.07	0.05
<u>Sus scrofa</u> (domestic pig)	466	8.31	5.90
<u>Cervus elaphus</u> (wapiti)	307	5.48	3.89
<u>Odocoileus</u> cf <u>virginianus</u> (white-tailed deer)	496	8.85	6.28
<u>Odocoileus</u> cf <u>hemionus</u> (mule deer)	8	0.14	0.10
<u>Antilocapra americana</u> (pronghorn antelope)	187	3.34	2.37
Deer/pronghorn antelope	233	4.16	2.95
<u>Bos taurus</u> (cattle)	59	1.05	0.75
<u>Bison bison</u> (American bison)	475	8.47	6.02
Bovidae (bison/cattle)	1011	18.03	12.81
Bovidae/Cervidae	20	0.36	0.25
<u>subtotal</u>	<u>5607</u>	<u>100.02</u>	<u>71.03</u>
GRAND TOTAL	<u>7895</u>		<u>99.99</u>

This listing provides simple frequencies only. Minimum number of individuals calculations have not been presented since, in the absence of critical provenience definitions, these numbers would have little or no meaning.

A summary breakdown of all identified remains, organized by taxon and element, completeness (side and portion) and relative maturity, is

contained in Angus and Falk (1981). This volume also includes a similar breakdown organized by catalog unit.

In addition to the above, five isolated human specimens were recorded during the identification of non-human remains. These specimens include: right M₁ (Cat. No. 3738); pes digit, right phalanx 3 (Cat. No. 4131); right navicular (Cat. No. 7175); manus digit, right phalanx 2 (Cat. No. C5); and right proximal metacarpal 4 (Cat. No. C6). The latter two specimens are from the University of Colorado investigation. All specimens represent mature individuals.

At least four individuals are represented by human remains recovered from the ice house depression (Husted 1971:39). These materials are presently curated by the University of Tennessee, Department of Anthropology (Knoxville, Tennessee). A brief descriptive treatment of these materials is provided by Jantz (n.d.). The results of this study suggest that the ice house remains may represent "Siouan speaking" populations (Jantz n.d.: 7-8). Field observations, as well as associated materials, suggest a post-1867 date for these remains.

ACCOUNT OF SPECIES

This unit provides a systematic account of identified remains with appropriate comments on problems encountered during the identification process as well as remarks concerning the archeological occurrence of these taxa within the general region.

Fish Remains

Fish elements constitute nearly 19% (n=1484) of the total collection. Specimens assignable to the genus Ictalurus make up over 99% of this total (see Table 4). For the most part these specimens represent the channel catfish (I. punctatus), a common species which is widely distributed throughout the Missouri drainage (Bailey and Allum 1962:89; U.S.D.I. 1953:52-54). More specific identifications within the genus have not been attempted, though the large and well preserved character of the assemblage (which includes a number of diagnostic elements: e.g.,

ethmoid complex, pectoral spine, cleithrum; see for example Paloumpis 1963, 1964; Calovich et al. 1964; Krause 1977) suggests that such an undertaking would prove fruitful.

Catfish are commonly represented in prehistoric and historic assemblages in North Dakota and eastern Montana (e.g., Olson 1942:90; Woolworth and Wood 1960:302; Angus 1975:58; Lehmer, Wood and Dill 1978:172-174; Falk, Morey and Angus 1980:570; etc.) and appear to have been a consistent, if not critical, food source. The use of catfish by Native American groups is well documented (e.g., Denig 1930:582; Gilmore 1924) and this resource was certainly utilized by those living at Fort Union (e.g., Audubon 1897:90, 93; see also Perry 1981:59). Lewis and Clark noted the abundance of catfish during their ascent of the Missouri River, though a detailed account is lacking (Burroughs 1961:265).

Additional taxa represented include gar, goldeye, blue sucker, walleye and a small unidentified catfish. The blue sucker (Cycleptus elongatus) identification should be considered tentative. This taxon is reported within the Missouri River system (e.g., Bailey and Allum 1962:78-79) but the historic distribution is uncertain. Goldeye and walleye are commonly found in an archeological context within the Upper Missouri (e.g., Lehmer, Wood and Dill 1978; Falk, Morey and Angus 1980:570); gar and blue sucker are not. In any event, the low frequency of these non-catfish remains suggest minimal subsistence use during the historic period, at least as reflected in the Fort Union sample.

Reptile Remains

Five reptilian specimens comprise 0.06% of the total identified assemblage. Four elements are identified as western painted turtle while non-venomous snakes are represented by a single vertebra. The western painted turtle is common within the basin today and is reported from a number of archeological locations (e.g., Metcalf 1963:115; Lehmer, Wood and Dill 1978:122; Falk, Morey and Angus 1980:570).

Bird Remains

A total of 799 avian specimens were identified; these materials represent 10.1% of the total Fort Union sample. At least 17 Families are present and these taxonomic divisions form the basis for the following discussion. The reader is referred to Parmalee (1977) for an informative discussion of the use of these and other birds based on a consideration of archeologically recovered materials from South Dakota.

Ardeidae (herons, bitterns)

A single great blue heron (Ardea herodias) element was identified from the Fort Union sample. This widespread species is found through much of North Dakota during the summer months (Robbins et al. 1966:14). Great blue herons appear to have been sighted by Lewis and Clark (Burroughs 1961:183) as well as Audubon (1897:9). Heron remains are known from archeological contexts, though usually in low frequency (e.g., Smith 1960:229; Calabrese 1972:32).

Anatidae (waterfowl)

Three hundred eighty-seven elements were referred to one of eleven groupings within this large and diverse Family. This total comprises nearly half of the avian sample. The dominance of waterfowl is not surprising considering that western North Dakota and eastern Montana lie well within the modern path of many migratory species (see, for example, Bellrose 1968). References to bird migrations during the early historic period by Lewis and Clark (Burroughs 1961:194), Chardon (Abel 1932:137) and Kurz (1937:325) suggest a generally similar pattern. Maximillian also noted large numbers of waterfowl, principally ducks and geese, during his visit to Fort Union (Thwaites 1904-1906, XXIII:199).

Eight swan elements represent the trumpeter (Olor buccinator) or whistling (O. columbianus) swan. Adequate comparative materials are lacking at present. Audubon (in Steward 1975:64) suggests that Native American groups at Fort Union made occasional use of swans as a food source. Swan remains are generally unreported from archeological contexts within the state though at least one individual is represented at the Bagnell village site in Oliver County (Parmalee 1980:77; see also Wood and Woolworth 1964: 51).

A total of 154 goose elements were identified; 121 of these appear to represent Canada goose (Branta canadensis) while the remainder are referred to the genus Chen (snow or blue goose). As Parmalee (1977:201) has noted, identification of the goose and duck remains poses a number of potential hazards; the possibility of error in assessment of the Fort Union specimens cannot be totally ignored. Identified specimens do, however, compare well with available reference materials and it is felt that errors are held to a minimum. Goose remains are reported from historic (Smith 1960:229; Woolworth and Wood 1960:301; Falk 1969) and prehistoric (Calabrese 1972:32; Falk, Morey and Angus 1980:570; Parmalee 1980:77) contexts within North Dakota.

Two hundred twenty-five duck elements comprise over half of the waterfowl sample and include both surface feeding and diving ducks. Duck remains are also commonly recovered from North Dakota sites and are reported from Kipp's Post (Woolworth and Wood 1960:301), Like-a-Fishhook Village (Falk 1969), Amahami (Lehmer, Wood and Dill 1978:171-172), White Buffalo Robe (Falk, Morey and Angus 1980:570-571), Bagnell (Parmalee 1980:77), and a number of additional loci in central and south-central North Dakota.

Evidence of domestic goose or duck is lacking.

Cathartidae (American vultures)

Two turkey vulture (Cathartes aura) specimens comprise the sample for this Family. Vulture remains occur in low frequency in Native American sites (e.g., Falk 1969; Lehmer, Wood and Dill 1978:171; Parmalee 1980:77). Kurz (1937:329) notes vultures as common in the Fort Union area during his tenure.

Accipitriidae (hawks, eagles)

Fifteen elements represent this Family. Bird hawks (Accipiters) are represented by three elements while the buzzard hawks (Buteos) are represented by four. Golden (Aquila chrysaetos) and bald (Haliaeetus leucocephalus) eagle are present. Finally, a single marsh hawk (Circus cyaneus) is included in the collection.

Few hawks are mentioned by Lewis and Clark. Identified specimens include red-tailed (Buteo jamaicensis) and Swainson's (B. swainsoni) hawks, as well as the marsh hawk. In addition, Lewis and Clark noted the bald

eagle near the mouth of the Yellowstone River in the spring of 1804, not far from the future site of Fort Union; the use of both golden and bald eagle plumage by tribes within the Upper Missouri region was also documented (Burroughs 1961:204, 206).

The remains of this Family are often recovered from Native American sites (e.g., Wood 1967:100; Wood and Woolworth 1964:51; Falk 1969; Thissen 1976:236; Lehmer, Wood and Dill 1978:171; Parmalee 1980:77; etc.), but are unreported from Euroamerican contexts within the state. The presence of a pet eagle at Fort Union has been documented (see Thompson 1968:162).

Falconidae (falcons)

A single sparrow hawk (Falco sparverius) element and one indeterminate specimen (Falco sp.) comprise the only specimens assigned to this Family. This latter specimen is probably sparrow hawk also but identification is uncertain. Elements referred to this Family are not commonly recovered archeologically within the state though specimens are known from the Cross Ranch (Calabrese 1972:32) and Bagnell (Parmalee 1980:77) village sites in Oliver County.

Tetraonidae (grouse)

American grouse are represented at Fort Union by 113 sharp-tailed grouse (Pedioecetes phasianellus) elements and 91 additional specimens referred to the Family. These latter specimens are probably also sharp-tailed grouse, though the close morphological similarity of the sharp-tailed grouse with the greater prairie chicken (Tympanuchus cupido) makes certain identification difficult. Johnson (1964) suggests that the prairie chicken was a relatively recent arrival in North Dakota. Sharp-tailed grouse, on the other hand, were apparently abundant during the early historic period and were frequently noted in the journals of early travelers. Pallisen (1856:82) and Kurz (1937:108) note sharp-tailed grouse in the Fort Union area.

Sharp-tailed grouse are recorded from a number of nearby archeological contexts including Kipp's Post (Woolworth and Wood 1960:301), Like-a-Fishhook Village (Falk 1969), Amahami (Lehmer, Wood and Dill 1978:171),

Bagnell (Parmalee 1980:77), and White Buffalo Robe (Falk, Morey and Angus 1980:571). Prairie chicken or grouse are also reported from Fort Stevenson (Smith 1960:229).

Phasianidae (pheasants, partridge and quail)

Members of this widespread Family are native to both the Old and New Worlds and include quail, pheasants, peacocks, partridges, peafowls, francolins, various jungle fowl, and the domestic chicken -- a modern descendent of the red jungle fowl of Asia.

Seventy-two domestic chicken (Gallus gallus) elements were recovered; these specimens make-up over 9% of the avian sample. Nearly all recovered elements represent mature birds. References to domestic fowl at Fort Union are found in the writings of Kurz (1937:241) and Denig (in Audubon 1897:185). Chicken remains are unreported from either Kipp's Post (ca. 1826-1829/1830) or Fort Stevenson (ca. 1867-1894).

Gruidae (cranes)

Two species of cranes are New World residents: the nearly extinct whooping crane (Grus americanus) and the more common sandhill crane (G. canadensis). Five crane elements were recovered from Fort Union. Three of these appear to be sandhill crane (based on size) while the remaining two are indeterminate.

Sandhill cranes were noted by Lewis and Clark (Burroughs 1961:184) and remains of this migratory species are found in archeological sites (e.g., Woolworth and Wood 1960:184; Falk 1969). Whooping crane are tentatively identified by Parmalee (1980:77) within the Bagnell assemblage.

Rallidae (rails, coots)

Three elements represent the American coot (Fulicia americana). This duck-like form is migratory and North Dakota is well within its extensive breeding range. Coot are known archeologically from the Bagnell (Parmalee 1980:77) and Sakakawea (Falk n.d.) village sites.

Charadriidae (plovers)

A single element is referred to this Family. The specimen appears to represent a killdeer (Charadrius vociferus) though certain identification is precluded by a lack of adequate comparative material.

Scholopacidae (sandpipers)

Sixteen elements are assigned to this grouping which includes various sized waders and shorebirds. Three elements represent the long-billed curlew (Numenius americanus), a large sandpiper which is a summer resident in North Dakota. Remains of this taxon are also known from Like-a-Fishhook Village (Falk 1969).

The upland plover (Bartramia longicauda), a smaller sandpiper commonly observed sitting on fence posts throughout the northern Plains during the summer months, is represented by a single element. This bird is known archeologically from the Bagnell site (Parmalee 1980:77).

The remaining 12 elements are unassigned.

Laridae (gulls and terns)

The genus Larus is represented by a single specimen. This element compares favorably with the Franklin's gull (Larus pipixcan) but identification is not certain. Franklin's gull and the ring-billed gull (L. delawarensis) are recorded at Kipp's Post (Woolworth and Wood 1960:301). Franklin's gull and a number of indeterminate gull elements are also reported from the Bagnell site (Parmalee 1980:77).

Columbidae (doves and pigeons)

Two members of this Family were found in the Fort Union area during its occupation: the mourning dove (Zenaidura macroura) and the passenger pigeon (Ectopistes migratorius). Both taxa are represented in the archeological sample recovered from the fort.

Thirty-two elements, including a mix of wing and lower limb elements, represent the now extinct passenger pigeon. Identified remains were compared closely with archeological specimens from the northern Plains as well as with measurements provided by Schrorger (1955). Passenger pigeons are relatively common in the archeological record with elements reported from Bagnell (Parmalee 1980:77), Like-a-Fishhook Village (Falk), Sakakawea (Falk n.d.) and a number of additional locations within the Knife-Heart region (Falk 1968).

Mourning doves are represented by three elements. This taxon is generally unreported from North Dakota locations though several specimens are known from South Dakota sites (e.g., Parmalee 1977:197).

Four additional elements are referred to the Family Columbidae. These specimens are considerably larger than the passenger pigeon remains and probably represent the common domestic pigeon. This taxon was not introduced until the latter portion of the nineteenth century (Audubon 1967: 19-20) and recovered specimens should not be associated with the fort's primary period of occupancy.

Both passenger pigeon and mourning dove were recorded by Lewis and Clark within the upper reaches of the Missouri (Burroughs 1961:233-234) and Kurz (1937:329) provides additional reference for the Fort Union area.

Strigidae (typical owls)

Three specimens are assigned to this Family. The great horned owl (Bubo virginianus), a widespread resident species, is represented by two elements. Great horned owls are known archeologically from Bagnell (Parmalee 1980:77), Sakakawea (Falk n.d.), Like-a-Fishhook (Falk 1969), Huff (Wood 1967:100), and Greenshields (Falk 1968).

An additional element represents either the screech (Otus asio) or burrowing (Speotyto cunicularia) owl.

Picidae (woodpeckers)

A single specimen is assigned to this Family and is most similar to the red-headed woodpecker (Melanerpes erythrocephalus). Woodpecker elements are relatively common from archeological contexts (e.g., Parmalee 1980:77; Falk, Morey and Angus 1980:571; Falk n.d.) -- particularly when finescreen recovery techniques are employed.

Alaudidae (larks)

A single prairie horned lark (Eremophila alpestris) is included in the Fort Union collection. This year-round resident is also known from the Bagnell site in Oliver County (Parmalee 1980:77).

Corvidae (jays, magpies, crows)

This Family is well represented at Fort Union with 40 elements comprising over 5% of the avian sample. Taxa present include the black-gilled magpie (Pica pica: 4 specimens), Northern raven (Corvus corax: 25 elements) and the American crow (Corvus brachyrhynchos: 11 elements).

Lewis and Clark list the magpie as a common form within the Upper Missouri and frequently noted the presence of crow (Burroughs 1961:244-246, 248). Audubon reported ravens to be common within the area and noted that they were frequently seen following hunters for the purpose of feeding on slaughtered game (Audubon 1967:85-89). Rand (1971:181) claims that the crow was not as abundant in earlier times as it is presently.

These taxa are reported from a number of archeological contexts (e.g., Smith 1960:226; Calabrese 1972:32; Wood 1967:100; Thiessen 1976:236; Falk 1969; Parmalee 1980:77; Falk, Morey and Angus 1980:571; etc.).

Icteridae (blackbirds, orioles)

Three elements are assigned to this grouping. Two specimens compare well with the meadow lark (Sternella sp.) while the third is similar to the red-winged black bird (Agelaius phoeniceus). Members of this Family are often recovered from contexts where fine-screen recovery techniques have been employed (e.g., Parmalee 1980:78; Falk, Morey and Angus 1980:571).

Passeriformes (perching birds)

Two unidentified passerine elements are included in the collection.

Mammal Remains

A total of 5607 mammal elements are included in Table 4; this total represents over 71% of the identified assemblage. At least 16 Families are represented.

Leporidae (hares and rabbits)

Four hundred forty-four elements assigned to the Family Leporidae represent 5.6% of the total Fort Union collection. The majority of these (88%) are referred to the genus Sylvilagus. Three species within this genus are found in the general region: S. floridanus (eastern cottontail), S. audubonii (desert cottontail), and S. nuttallii (Nuttall's or mountain cottontail). Comparison of cranial elements (n=6) suggests that most specimens are eastern cottontail. This assessment is based on certain characteristics of the supraorbitals (Ingles 1965:134; Hoffman and Pattie 1968:19). Unfortunately adequate comparative materials for the desert

and mountain cottontails were not available. Further, postcranial elements recovered from Fort Union were generally smaller than those of available modern comparative examples -- drawn primarily from the central and eastern portions of the Plains. Given the size overlap of these three forms (Burt and Grossenheider 1976:208-209) and the lack of systematic comparative data for postcranial elements an identification beyond the generic level is inappropriate. It is also noted that Lewis and Clark did not differentiate between the three forms, though Allen (in Burroughs 1961:123) presumes that all cottontails observed east of the Rockies were S. floridanus.

There is some evidence that rabbit skins were sought as trade items at Fort Union (Audubon 1897:19; Abel 1932:97) and Palliser (1856:82) reports hunting rabbits in the vicinity of the fort in the mid-nineteenth century.

An additional 52 elements are assigned to the genus Lepus. These specimens are referred to L. townsendii (white-tailed jack rabbit) based on geographical range (see Hoffman and Pattie 1968:20, 85) and a characteristic simple groove on the anterior face of the upper incisors (Hall and Kelson 1959:281). The black-tailed jack rabbit (L. californicus) is found to the south and west of the general fort area and the snowshoe hare (L. americanus) is markedly smaller in size (Ingles 1965:144). However, Olson (1942:90) reports this taxon from the nearby Hagen site in eastern Montana. It should also be noted that Burroughs (1961:122) attributes all references by Lewis and Clark to jack rabbit to L. townsendii on the basis of modern distributions.

Cottontail and jack rabbit remains are relatively common in archaeological contexts throughout the region (Smith 1960:229; Wood 1967:100; Angus 1975:22; Falk 1969, n.d.; Falk, Morey and Angus 1980:571; etc.).

Sciuridae (squirrels)

A single member of this Family is included in the Fort Union collection. Twenty-two elements are identified as thirteen-lined ground squirrel (Spermophilus tridecemlineatus). Neither the larger Richardson's ground squirrel (S. richardsonii) nor the smaller least chipmunk (Eutamias minimus) are recorded, though both are relatively common in the area. The

black-tailed prairie dog (Cynomys ludovicianus), a common species throughout southwestern North Dakota, is also absent.

The thirteen-lined ground squirrel was described by Lewis and Clark in 1805 and was considered a common Dakota resident (Burroughs 1961:101). Remains of this taxon, as well as those of many of the smaller rodents considered below, are consistently recovered from archeological contexts when fine-screen recovery techniques are utilized (e.g., Semken and Satorius 1980:622). Many of these specimens are of probable non-cultural origin.

Geomidae (pocket gophers)

A single element represents the northern Plains pocket gopher (Thomomys talpoides). The origin and association of this specimen is uncertain.

Castoridae (beavers)

One hundred ten beaver (Castor canadensis) elements are included in the collection. As noted in an earlier section of this report, beaver were exploited primarily for their hide but were also consumed on a fairly regular basis.

Though not always recorded in high frequency, beaver remains are a consistent feature of archeological assemblages recovered within the region (e.g., Hartle 1960:179; Woolworth and Wood 1960:301; Wood 1967:100; Falk 1968, 1969; Angus 1975:22; Lehmer, Wood and Dill 1978:169; Falk, Morey and Angus 1980:571; etc.).

Cricetidae (New World rats and mice)

Twenty-four elements represent at least four taxa. Small mouse remains include those of the deer mouse (Peromyscus sp.), the northern grasshopper mouse (Onychomys leucogaster), and an unidentified vole (Microtus/Pedomys). The northern grasshopper mouse is represented by 11 partially articulated elements from a single (intrusive?) individual.

An additional 11 elements represent muskrat (Ondatra zibethicus). Muskrat were abundant and commonly trapped within the Upper Missouri region (Phillips 1961:415). Archeological remains are reported from Kipp's Post (Woolworth and Wood 1961:301) and Fort Stevenson (Smith 1960:229), as well as from a number of Native American sites throughout the state

e.g., Wood and Woolworth 1964:51; Falk 1968; Semken and Satorius 1980: 622).

Muridae (Old World rats and mice)

Two hundred forty Norway rat elements are included in the Fort Union collection.

The Norway rat was introduced to the United States in the latter portion of the eighteenth century and rapidly spread across the continent. This animal was a common pest in the early trading posts of the region and was noted by Chardon (Abel 1932:193) and Maximillian (Thwaites 1904-1906, XXIII:235-236) at Fort Union.

A second Old World pest, the common house mouse (Mus musculus) is also well represented. Forty-nine elements are assigned to this species. The house mouse was introduced to North America at an early date and, like the Norway rat, followed westward expansion. This aggressive mouse has a tendency to displace native species (Ingles 1965:256) which may partially explain the abundance of this taxon, and the relatively low frequency of various New World forms, within the present sample.

Erethizontidae (New World porcupines)

Twenty-six elements are identified as porcupine (Erethizon dorsatum). This taxon is reported from Kipp's Post (Woolworth and Wood 1960:301), Rock Village (Hartle 1960:179), and at several locations within the general Knife-Heart region (Falk 1968; Calabrese 1972:35).

Canidae (canids)

This Family is well represented at Fort Union with 1195 elements (15.1% of the total collection); at least five taxa appear to be represented.

Eighty-five elements represent coyote (Canis latrans). These identifications are based on the uniformly smaller size and somewhat gracile character of materials examined.

A series of eight small, yet robust, postcranial elements are tentatively identified as domestic dog (C. familiaris). These specimens compare favorably with a number of small modern breeds represented in available comparative collections.

The remainder of the sample -- 690 elements -- is referred to the genus Canis. The difficulties encountered in separating the various species of this genus within faunal assemblages from Plains sites have been recently addressed (Parmalee 1979:206-211; see also Lawrence 1967, 1968) and in the present context little effort has been directed toward this end. Examination of scant cranial remains, however, suggests that both domestic dog and wolf (C. lupus) are present.

Coyotes and wolves were frequently reported by Lewis and Clark (Burroughs 1961:85, 88-89) and are regularly noted in various historic accounts of the Fort Union area. Large canid remains are commonly reported from nearly every major excavation within the region -- often second in relative frequency to bison (e.g., Angus 1975:23; Falk, Morey and Angus 1980:571; etc.).

Smaller canids are also well represented with all specimens referred to the genus Vulpes. The swift fox (V. velox) is dominant with 341 elements while the larger red fox (V. vulpes) is also present with 71 elements. Both animals were commonly trapped during the first half of the nineteenth century (Thwaites 1904-1906, XXIII:380; Denig 1930:411; Kurz 1937:329). Swift fox are consistently recovered from archeological sites within the region (e.g., Calabrese 1972:32; Angus 1975:23; Falk 1968, 1969, n.d.; Falk, Morey and Angus 1980:571).

Ursidae (bears)

Sixteen elements are included in the sample representing this Family. All specimens are referred to the genus Ursus. The grizzly bear (U. arctos) is represented by a portion of one mandible cut from the remainder of the jaw with a metal saw. This specimen is distinguished from the black bear (U. americanus) on the basis of P₄ which exhibits medial cusps and a posterior sulcus characteristic of the grizzly (see Hall and Kelson 1959:865).

The remaining elements may represent either U. arctos or U. americanus. A calcaneum and accessory carpal from a mature animal compare favorably with U. arctos. However, sexual dimorphism, overlap in size range between the two species and an inadequate reference collection preclude positive identification. The remaining elements (vertebra,

phalanges, metapodials) are even more difficult to treat given the immaturity of several specimens and the lack of comparative materials.

Early accounts indicate that the black bear was relatively scarce in the Upper Missouri region. The grizzly bear was frequently encountered, however, from the mouth of the Yellowstone (near Fort Union) to the Rocky Mountains (Burroughs 1961:53, 59).

To date, bear remains are not commonly reported from archeological contexts. Examples are known from Amahami (Lehmer, Wood and Dill 1978: 179), Rock Village (Hartle 1960:179) and Like-a-Fishhook Village (Falk 1969).

Mustelidae (mustelids)

Seventy-eight mustelid specimens comprise less than 1% of the Fort Union collection. Three taxa are present: long-tailed weasel (Mustela frenata), badger (Taxidea taxus) and striped skunk (Mephitis mephitis).

A single mandible comprises the weasel sample. The winter pelt of this taxon was highly valued by both Native Americans and Euroamericans during the early trade period (Ewers 1977:255). Weasel remains are rarely reported from area sites, though two specimens are reported from the Knife-Heart region (Falk 1968).

Badgers are represented by 50 elements. Denig (1930:411) notes that badger were occasionally taken in trade at Fort Union.

Twenty-seven striped skunk specimens were identified. The spotted skunk (Spilogale putorius) is found in eastern North Dakota: the relative sizes of these two taxa make separation of the larger striped skunk remains relatively easy however. The striped skunk is mentioned by Lewis and Clark for the general area (Burroughs 1961:80-81).

Badger and striped skunk remains are relatively common archeologically.

Felidae (cats)

Two elements are referred to the genus Felis and appear to represent the bobcat (F. rufus). Unfortunately, lynx (F. lynx) materials were not available for comparison and the possibility that this taxon is represented should not be completely discounted.

Interestingly, the bobcat is not mentioned by Lewis and Clark. Denig (1930:411) notes an occasional occurrence during his stay at Fort Union.

Bobcat remains are reported from Kipp's Post (Woolworth and Wood 1960: 301), Like-a-Fishhook Village (Falk 1969), and Sakakawea (Falk n.d.).

Domestic cat (F. catus) remains are well represented with 134 elements identified. The majority of these specimens appear to be from the nearly complete skeleton of a single individual. Cats were apparently common at nineteenth century fur trade posts (to combat rodents) and are recorded by Maximillian (Thwaites 1904-1906, XXIII:235-236) for Fort Union.

Equidae (horses)

Four elements representing horse or mule are included in the collection. Both animals are included in Fort Union inventories reproduced by Thompson (1968:144).

Suidae (pigs or hogs)

Four hundred sixty-six elements are referred to the domestic hog (Sus scrofa), a descendent of wild hogs found throughout Europe, North Africa, a much of Asia. Evidence developed during the course of this study suggests that both local and imported pork was utilized at Fort Union.

There is documentary evidence for the consumption of cured or barreled pork as well as fresh meat at the fort (see, for example, Thompson 1968:144, 156). Further, examination of the hog remains included in the Fort Union sample and comparison of these materials with an archeologically recovered sample of barreled pork from the Steamboat Bertrand also suggests that many of the hog remains from Fort Union represent mass butchered and processed pork.

During the eighteenth and nineteenth centuries cured or barreled pork was a staple for soldiers and travelers alike since it was easily transported and relatively imperishable. The introduction of the steamboat provided easy and wide distribution to the western frontier and was a major influence on the expansion of the swine industry (Towne and Wentworth 1950:149, 192-194).

In 1865 the Steamboat Bertrand sank in the Missouri River near modern Omaha, Nebraska (see Petsche 1974). The boat was loaded with supplies for Fort Benton, Montana Territory. Evaluation of the cargo over

100 years later, in conjunction with archeological exploration of the wreck, resulted in the recovery of several kegs of barreled pork (Petsche 1974:56). A preliminary analysis of these remains (Collett and Falk n.d.) has been employed to facilitate the present discussion.

The Bertrand elements show smooth, straight-line or sawed cuts located in approximately the same position on equivalent elements. A total of 118 picnic shoulder hams are represented by distal (glenoid) scapulae, complete humeri and proximal radii and ulnae. In this cut the forelimb is removed just above the neck of the scapula and below the proximal ends of the radius and ulna. A second group of hams (hind cut) is represented by posterior innomates, complete femora and proximal tibiae and fibulae. These hams were prepared with a cut just behind the anterior portion of the ilium and just above the distal ends of the tibia and fibula. Fifteen loin cuts are represented by ilia uniformly cut above the acetabula.

In addition, nearly all of the elements (95.3%) from the Bertrand were from immature individuals -- based on a consideration of epiphyseal fusion. Animals killed appear to have been between one and three-and-one-half years of age, suggesting intentional selection of certain age groups for slaughter. The weight of each ham was ca. 15 lbs. and it is estimated that these animals weighed ca. 180 lbs. prior to butchering.

Finally, the Bertrand hams were probably packed in a salt solution as a preservative. As a partial result of such packing the bone appear to have been left with a dark discoloration and marked brittle quality.

Comparison of the Bertrand materials with those from Fort Union reveals some interesting parallels in terms of elements and portions of elements represented, specimen coloration, and age class. Table 5 summarizes select suid elements from Fort Union -- specifically those elements which were recovered from the Bertrand. These specimens total over 51% of the total suid collection from Fort Union. The relative frequencies of elements exhibiting sawing and discoloration similar to the Bertrand specimens are indicated. Information presented in Table 5 suggests that a minimum of 48 hind cuts, seven loin cuts and six shoulder picnic ham cuts are present in the Fort Union sample.

Table 5. Summary of select Sus elements from Fort Union Trading Post, Williams County, North Dakota.

<u>Cut/Element</u>	Number of Elements	<u>Sawed</u>		<u>Discolored</u>	
		Number	%	Number	%
<u>Picnic Shoulder</u>					
scapula (distal)	9	3	33.3		
humerus	15	3	20.0	6	40.0
radius (proximal)	8	1	12.5	<u>3</u>	37.5
ulna (proximal)	10	2	20.0	1	10.0
<u>Hind</u>					
innominate (posterior)	51	44	86.3	41	80.4
femur	46	1	2.2	27	58.7
tibia (proximal)	67	18	26.9	<u>48</u>	71.6
fibula (proximal)	26	2	7.7	<u>16</u>	61.5
<u>Loin</u>					
ilium (anterior)	9	<u>7</u>	77.8	4	44.4

NOTE: highest frequency of sawing or discoloration (underscored) used to calculate minimum number for each type of cut.

Table 6 summarizes epiphyseal fusion for 170 specimens with a known rate of fusion. Rates are taken from Silver (1969:252). These data reveal that nearly all elements are from animals less than 42 months of age and greater than 12 months of age. These general age estimates compare well with the information presented above for the Bertrand sample.

Two lines of evidence suggest that hogs were raised at the Fort -- presumably for meat consumption. First of all, slightly less than half of the sample lacks the distinct discoloration noted above and element preservation is consistent with the non-suid remains. The assumption here, of course, is that discoloration implies shipped, barreled pork and that the absence of such discoloration implies locally produced and/or butchered animals.

Table 6. Age estimates for select Sus elements based on postcranial fusion rates; Fort Union Trading Post, Williams County, North Dakota.

Age at Fusion ^a	Element	Epiphysis	Number Fused	Number Unfused
0-12 months	scapula	distal	3	
	humerus	distal	1	2
	radius	proximal	5	3
	2nd phalanx	proximal	6	
12-27 months	1st phalanx	proximal	3	9
	metapodial	distal	3	15
	tibia	distal	2	9
27-42 months	humerus	proximal	1	4
	radius	distal		8
	ulna	proximal		5
	femur	proximal		27
	tibia	proximal		40
	femur	distal		24

NOTE: fetal/neonatal specimens omitted.

^abased on Silver (1969:252).

Secondly, consideration of age classes based on dental eruption and attrition supports the notion that at least some of the animals represented in the archeological collection were locally produced. Table 7 summarizes age classes for available mandibular and maxillary elements. Although limited in number these specimens reflect an age range from fetal/neonatal to at least three years of age and probably reflect local production. (It should be noted that dental eruption rates for the hog have changed considerably over the last 100 years -- primarily due to extensive inbreeding and cross-breeding. Consequently we have chosen to use a nineteenth century reference (Youatt and Martin 1855) as a source for aging this sample. This source corresponds closely with the late eighteenth century eruption rates cited by Silver (1969:264) and provides eruption rates for deciduous teeth as well.)

Hog remains are known archeologically from at least two contexts which post-date Fort Union. These include Fort Stevenson (Smith 1960: 229) and Like-a-Fishhook Village (Falk 1969).

Table 7. Age estimates for select Sus elements based on patterns of tooth eruption; Fort Union Trading Post, Williams County, North Dakota.

Element	Age Estimate ^a	Frequency
mandible	fetal-neonatal	2 (1 individual)
	1 to 3 or 4 months	2
	4 to 12 months	2 (1 individual)
	18 to 24 months	2
	24 to 36 months	
maxilla	4 to 12 months	1
	18 to 24 months	2
	greater than 36 months	1

^abased on Youatt and Martin (1855).

Cervidae (cervids)

Wapiti (American elk) and deer are included within the Fort Union sample. Wapiti (Cervus elaphus) appear to have been fairly common during the early nineteenth century. Lewis and Clark frequently noted (and utilized) this animal throughout their visit to the Upper Missouri region (Burroughs 1961:133) and pelts were a common trade item (e.g., Kurz 1937:329). Both mule or black-tailed deer (Odocoileus hemionus) and white-tailed deer (Odocoileus virginianus) may be expected in this portion of North Dakota (Hoffman and Pattie 1968:67, 125-126) and both species were undoubtedly available to hunters from Fort Union. Lewis and Clark recorded mule deer infrequently. It has been suggested that this apparent scarcity may have been a function of habitat preference: mule deer prefer rougher, higher ground away from the path often followed by early explorers (Reid and Gannon in Burroughs 1961:131). Kurz (1937:329), however, states that mule deer were less common than either elk or white-tailed deer which tends to confirm Lewis and Clark's observations. Like the wapiti, deer were a common item of trade as well as a source of food at Fort Union (Kurz 1937:329).

Three hundred seven pieces of wapiti bone were recovered from the archeological investigation of Fort Union. Elk are common within

regional assemblages and occasionally occur in relatively high frequency (e.g., White 1955:175-178; Angus 1975:24).

Five hundred four elements are referred to the genus Odocoileus. A lack of adequate comparative material hindered certain separation of the two forms. Both species appear to be represented, with white-tailed deer (O. virginianus) dominating. Eight elements are tentatively identified as mule deer (O. hemionus). Additional, more systematic, study of this problem is required. Preliminary assessment of the relative frequencies of these two taxa are, however, consistent with historic observations.

Deer remains are a constant feature of archeological assemblages within the region.

Antilocapridae (pronghorn)

Pronghorn antelope (Antilocapra americana) materials include 187 identified elements. The close morphological similarity between many pronghorn and deer elements precluded certain assignment of many fragmented elements; these specimens (n=233) have been included under a combined 'deer/antelope' heading in Table 4 above.

Lewis and Clark reported this open grassland species to be extremely common along the Missouri River from the Dakotas westward (Burroughs 1961: 142-145). In addition to the use of the pronghorn as a food source, hides were highly sought as trade items (Kurz 1937:329).

Pronghorn antelope are commonly reported from archeological sites throughout the region.

Bovidae (bovids)

This Family group includes bison (Bison bison) and domestic cattle (Bos tarus). These two genera are very similar in skeletal morphology and differentiation of taxa often requires consideration of several 'diagnostic' features. Consequently, many of the elements recovered during the investigation of Fort Union remain unidentified beyond the Family assignment. These specimens (n=1011) are considered under the heading Bovidae in Table 4.

Domestic cattle do not appear to have been numerous at Fort Union during any period. Limited inventory data summarized by Thompson (1968:

142) for the years 1831 and 1832 list only two bulls and 1 "ox." Also during these years (1831-1832) Maximillian noted that there were an "...inconsiderable number of cattle, swine, goats and domestic animals" (Thwaites 1904-1906, XXII:380). By 1845 the inventories included a few more cattle (see Table 3 above), though this listing may include buffalo cows and calves which were sometimes captured and raised at the Fort (Denig in Audubon 1897:185).

A total of 59 elements have been referred to the genus Bos; criteria presented by Olsen (1960) and Lawrence (1951), were utilized in addition to limited comparative materials to facilitate identifications. Nearly 25% (n=14) of these specimens evidence butchering with a metal saw. In addition over half (n=33) of the Bos sample was recovered from the ice house excavations (Catalog lots 7078, 7079). Refuge from the upper levels of this feature post-date the occupation of the fort (Husted 1971:37), suggesting that much of the Bos sample is not directly associated with the fur trade period.

Domestic cattle are also represented archeologically at Fort Stevenson (Smith 1960:229) and Like-a-Fishhook Village (Falk 1969). Both sites post-date Fort Union. Bos remains are absent from the Kipp's Post assemblage which generally pre-dates construction of Fort Union.

If domestic cattle were not intensively utilized as a meat source at Fort Union, bison certainly were. The size of the bison herds seen by Lewis and Clark were so great that they were unable to provide an accurate estimate of the numbers (Burroughs 1961:147) and bison was surely the principle source of meat for Native Americans and Euroamerican traders alike. As noted above, Maximillian remarked that 600-800 buffalo a year were consumed by personnel at Fort Union. In the 1840s Kurz writes that 15,000 lbs. of cured buffalo meat was purchased from the Assiniboins for personnel and families at the fort. He also estimated that around 60 lbs. of this meat was rationed each day (Kurz 1937:124, 271).

Buffalo robes were also the greatest source of profit for the fur trade companies (Phillips 1961:415). Denig (1930:410) estimated that more than 150,000 buffalo were killed annually throughout the trade network. The 1849 inventory from Fort Union includes 966 packs of buffalo robes, 457 loose robes and 82 packages of buffalo tongues (Thompson 1968:157).

Four hundred seventy-five bison elements are represented in the Fort Union collection. In addition, it is probable that most of the materials considered under the heading Bovidae (see above) is bison.

Bison have been recovered archeologically from virtually every excavated site within the Missouri basin of North Dakota. It is not surprising that nearly every treatment of the topic suggests that bison comprise the single most significant meat source represented in the archeological record (see Falk 1977:155).

SUMMARY AND CONCLUSIONS

In many respects summary discussion of the results of the examination of the Fort Union faunal assemblage is difficult. The primary difficulty lies with an inability to associate recovered remains with the several episodes in the history of the fort or, for that matter, to separate fort-period materials from those more properly associated with more recent activities. (These and related issues are addressed in the other reports in this series.) Given the character of available provenience information we have found it most practical to treat the recovered sample as a single analytic unit with minimal consideration of intra-site context. The following attempts to summarize general inferences concerning use of the major vertebrate groups by those living and working in and around Fort Union during its primary historic occupation. Primary interest is directed toward subsistence behavior.

Fish

Fish remains comprise 18.8% of the assemblage and specimens referred to the genus Ictalurus (e.g., channel catfish) make-up over 99% of the piscian sample. Use of catfish at Fort Union has been historically documented and the archeological evidence seems consistent with that documentation. A number of additional taxa are represented in the sample though frequencies are markedly low, suggesting that these forms were little used. Cod, recovered in some numbers from the Steamboat Bertrand (Petsche 1974:51; Collett and Falk n.d.), are not represented. While this absence

may be due to factors of preservation it is more likely that this food item was relatively scarce during the primary occupation of the fort.

Reptile

Few reptilian specimens were recovered (0.06% of the sample). Neither snake nor turtle appear to have been significant resources at Fort Union and identified remains may be of non-cultural origin.

Bird

Recovered avian materials (n=799) account for 10.1% of the sample. Considerable taxonomic diversity is reflected with at least 25 genera recorded (see Table 4 above). With exceptions, most taxa are poorly represented. These exceptions include: native waterfowl (swans, ducks and geese), upland game birds (sharp-tailed grouse, mourning dove), passenger pigeon and domestic chicken. Taken together these taxa make-up over 87% of the identified bird sample. Limited historical documentation has been offered which suggests that these bird groups were utilized by fort personnel. This use was undoubtedly seasonal in the case of the migratory species. Resident bird populations were probably hunted on a more regular basis while domestic chicken were available within the confines of the fort. Whether chickens were kept primarily for eggs or meat is unclear; nearly all recovered elements reflect mature individuals implying that few young individuals were butchered (see Angus and Falk 1981).

Mammal

A total of 5607 mammal elements are included in the Fort Union sample. These specimens comprise 71% of the full collection. At least 26 genera are represented.

The mammal sample includes a number of small native rodents (e.g., northern pocket gopher, thirteen-lined ground squirrel, deer mice, northern grasshopper mouse and several unidentified forms). These animals are poorly represented and are of uncertain origin. Old World taxa,

Norway rat and house mouse, occur in higher frequency and together make-up 3.6% of the total vertebrate sample (Table 4). The majority of these animals are probably associated with the primary occupation of the fort and are clearly referenced in the historic record. The archeological recovery of domestic cat is partially explained as a response to these rodent pests.

Several medium to large-sized mammals may be evidence of subsistence and/or non-subsistence (e.g., preparation of skins) activities. These taxa include at least two lagomorphs (cottontail, white-tailed jack rabbit), several large rodents (beaver, muskrat, porcupine) and a number of carnivores (large canids, fox, bear, weasel, badger, skunk, and bobcat). A limited review of historic records suggests that most of these animals played a role, however minor, in the commercial life of the fort (Denig 1930:410-411; Kurz 1937:329; etc.). A number of sources have also been cited which suggest that some of these taxa were consumed on at least an occasional basis (especially lagomorphs, beaver, bear). An unknown number of these specimens may have entered the archeological record as a result of processes not directly associated with the operation of the fort (e.g., introduced by carnivores, natural mortality of local populations).

Domestic pig remains have been discussed in some detail. It is suggested that many recovered elements represent animals raised at the fort while others reflect use of barreled pork -- presumably brought up the Missouri River on an annual basis. Maintenance of swine at the fort, as well as the transport and consumption of salt pork, are well documented in fort records and in other accounts. The importance of pork as an emergency ration and/or dietary supplement and its precise dietary contribution is not currently understood. Suid elements make-up 5.9% of the Fort Union sample.

Deer, antelope and wapiti are well represented in the collection. These animals not only provided a source of trade skins but were most certainly utilized as food when locally available. The remains of these taxa comprise 15.6% (n=1231) of the sample.

Identified bovid remains (n=1545) make-up nearly 20% of the collection (and 27.6% of the mammal sample). Domestic cattle are present but in low frequency (n=59). Limited evidence indicates that much of the

Bos sample may be associated with post-fort activities. Four hundred twenty-five bison elements have been identified and it has been suggested that much of the unassigned bovid collection represents this taxon. The apparent dominance of this large bodied ruminant is consistent with a wealth of historic documentation attesting to important commercial and subsistence roles.

These general comments do not address many aspects of vertebrate use at the fort. Important topics to be considered include seasonal variability in the use of specific resources, and the dynamics of vertebrate use through three decades of occupation -- particularly given probable increases in the availability of imported food stuffs and the likely decline of local game populations. These topics as well as a more systematic treatment of the cultural and non-cultural origins of recovered remains may provide a focus for further research efforts.

Conclusions

This report provides a preliminary consideration of vertebrate materials recovered during the archeological investigation of Fort Union Trading Post National Historic Site during the period 1968-1972. Additional descriptive information and raw data are provided elsewhere (Angus and Falk 1981). Preliminary conclusions are summarized below.

1. A total of 7895 elements were identified. Fish (n=1484) make-up 18.8% of the sample. Four turtle shell fragments and a single snake vertebra constitute the reptilian sample and contribute 0.06% to the total. Seven hundred ninety-nine avian elements make-up 10.1% of the collection while 5607 mammal specimens comprise 71.03% of the total.

2. The origin and cultural associations of identified remains have not been systematically considered, primarily due to a lack of adequate provenience information. Reptile materials, and some small native birds and rodents, are of probable non-cultural origin and not directly associated with human use of the area.

3. Fish remains are of probably cultural origin and are likely associated with primary occupation of the fort. Catfish dominate the fish sample and almost certainly represent a food source.

4. Over 87% of the identified avian sample consists of native waterfowl, upland game birds, passenger pigeon and domestic chicken. Historic accounts indicate that many of these taxa were consumed at the fort on a more-or-less regular basis. Domestic chickens were maintained for egg production and mature animals were probably eaten on occasion.

5. Mammal remains dominate the Fort Union sample. Ruminants and domestic pigs dominate the mammal collection. Domestic cattle and pigs were raised at the fort, though in low frequencies. The use of barreled pork is also inferred on the basis of a comparison of Fort Union remains with those from the salvaged Steamboat Bertrand. Cattle appear to have been little used as a food source and it is suggested that specimens recovered archeologically are of probable post-fort origin.

6. Wapiti, deer, antelope and bison are well represented. Bison in particular appears to have been a resource -- based on review of historic accounts and the relative frequency of recovered elements. Each of these animals were important commercially with bison again dominant.

7. Small mammals include cottontail, jack rabbit, beaver, muskrat, porcupine, large canid (dog, wolf, coyote), fox, bear, weasel, badger, skunk and bobcat. These animals were of varying commercial value and many provided an occasional food source.

8. Preliminary consideration of available data suggests that native animals provided the majority of meat consumed at the fort. Domestic animals, and in particular the hog, were also utilized.

9. Additional research questions include: a) refinement of taxonomic assignments (e.g., Ictalurus, Sylvilagus, Canis and Odocoileus); b) detailed consideration of the possible non-cultural origin of some recovered remains; and c) finally, consideration of variability (including seasonal) in the use of key resources through the full occupational sequence. Pursuit of these and other research questions will require development of a more complete understanding of site archeology and specimen provenience.

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