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28 April 1988

Dr. Dan Huff, Chief Scientist  
Rocky Mountain Region--National Park Service  
Box 25287  
Denver, CO 80225

Entered.

Armstrong, D.

Adams, R. Final Report.

Dear Dr. Huff:

Bibby, 133515

Per our contract (number MR7-36), I enclose a draft final technical report of our work on vertebrates at Fort Laramie National Historic Site, Wyoming. The report is due 1 May 1988.

I have scheduled with John Burns and Chuck Wahler a presentation based on the enclosed report (as a "project closeout workshop") at Fort Laramie on Thursday, 26 May, at 1 PM, in conjunction with their orientation for seasonal personnel. I will also have a final look at breeding birds that day.

As I understand the provisions of the contract, you will review the enclosed draft. Appropriate comments can then be incorporated into a revised final report of which 15 bound and one unbound copy will be furnished to you, along with an IBM-compatible electronic copy to be written in "WordPerfect." (At present, files are written in "WordStar" and they will need to be translated, presuming that is essential so as to meet your archival needs; hence the delay until comments are received and revisions made.)

I am also preparing for your review an article of ca. 1500 words intended for a lay audience.

I trust that the enclosed meets your immediate needs, and with the draft in hand, final payment can be made to the University of Colorado.

Sincere thanks for your cooperation and support. Looking forward to hearing from you soon.

Cordially,

David M. Armstrong  
Acting Director  
Professor--Natural Science Program

cc: Dr. Kenneth L. Diem; Supt. Gary K. Howe; John Burns; Chuck Wahler; Virginia Hart, CU-OC6; Jan Farrar, CU-OC6; Rick A. Adams, Graduate Research Assistant

# DRAFT FINAL TECHNICAL REPORT

## VERTEBRATES OF FORT LARAMIE NATIONAL HISTORIC SITE, WYOMING:

### AN ECOLOGICAL AND HISTORICAL PERSPECTIVE

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1988

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## INTRODUCTION

Units of the National Park System provide unique opportunities for biological research. In particular, National Historic Sites often are managed to provide visitors with a view of historic conditions, frequently based on analysis of historical documents. Historical records may provide a comparative datum against which to judge the integrity of present-day ecosystems, and a goal for habitat restoration and management.

Fort Laramie National Historical Site (FLNHS) is a small area in a region strongly modified by agricultural and other human activity. However, the area is of ecological interest because it lies on the boundary between the Great Plains and the Southern Rocky Mountains and because the valleys of the North Platte and Laramie rivers have provided corridors for westward movement of vertebrate species of eastern affinities, just as they have provided corridors for human movement.

Fort Laramie National Historic Site was established in 1938 to protect and reconstruct the remains of one of the most important military and commercial outposts along the major pioneer trails westward. Distinct from many units of the National Park System, Fort Laramie was not protected with any particular attention to wildlife values, and wildlife usually has been a minor part of the interpretive program of the site.

However, even the casual visitor is struck by the importance of the native fauna to the history of Fort Laramie.

Terrell (1968) viewed the history of the Mountain West of the first four decades of the 19th Century in terms of economic relationships and systems of transportation, but one might also see the history of southeastern Wyoming as a history of the wildlife and ecosystems of the area and their exploitation by successive waves of humans.

Our original proposal contained the following objectives:

(1) to develop a complete list of vertebrate species for the Site; (2) to establish an information base on vertebrate populations; (3) to identify threatened, endangered, and overpopulated species and recommend applicable management actions; (4) to assess the impact on wildlife populations of current horse grazing operations. Although foreseen as ambitious goals, each has been met to some extent.

More broadly, encompassing the foregoing objectives, the purpose of this report is (1) to describe the extant vertebrate fauna of Fort Laramie National Historic Site; (2) to describe the ecological distribution of the fauna and comment on its status; (3) to review the Pleistocene and Holocene history of the fauna; and (4) to comment on the biogeographic relationships of the area.

#### METHODS

Table 1 is a calendar of field trips to Fort Laramie from December 1986 through April 1988. Approximately 24 person-days were spent in the field, in addition to laboratory/library time invested in background research, analysis, and report preparation. Rick A. Adams did the intensive field work; David

M. Armstrong did seasonal reconnaissance work, reviewed literature, and drafted reports, including the present one.

Field survey methods generally are those employed in earlier work by the senior author in other units of the National Park System (e. g., Armstrong, 1987, in Devils Tower National Monument, and Armstrong, 1988, in Rocky Mountain National Park; also see Armstrong, 1979--CNP). For small mammals, pairs of transects of livetraps were established in each major habitat-type. Transects were run for four days and nights without pre-baiting. Small mammals captured were identified to species, sexed, weighed, aged, their reproductive condition and microhabitat noted, and then individually marked (by toe-clipping) and released.

We originally proposed that reptiles, amphibians, and larger mammals (deer, lagomorphs, carnivores) would be studied on 500 m. belt transects laid out through major habitat-types. However, in the field it soon became apparent that this formal survey was not warranted, because density of these vertebrates was too low. Therefore, the method simply became to cover on foot as much of the Site as practical, recording all animals and sign observed. Bats were captured by mist-netting in all habitat-types utilized. Birds were observed (by sight or sound) in extensive cruises of the study area, rather than during formal observation periods as originally proposed. Fish were sampled by electroshocking by the graduate research assistant, Rick A. Adams, and a subcontractor, Aquatic and Wetland Consultants, Inc., of Boulder, Colorado, under permit from the State of Wyoming, Department of Game and Fish.

Survey of literature was done only in the Libraries of the University of Colorado-Boulder. Only secondary sources--and no manuscript materials--have been consulted. Due to limitations of time and to holdings to a degree inadequate for present purposes, this survey of secondary literature is only a beginning; however, it should be adequate, in broad outline, for present purposes. A thorough literature review and analysis would provide the basis for an excellent graduate thesis for a student interested in the natural and human history of the West.

Quarterly reports were filed as required on 1 August and 1 November 1987 and 1 February 1988, and an annual report was prepared and submitted prior to the deadline of 1 January 1988.

## RESULTS

### Historical Perspective

Prehistory.--The fauna of today is an emerging product of processes of the Quaternary Era (including the Pleistocene and Holocene epochs). The Pleistocene history of Wyoming was reviewed in broad outline by Long (1965). Generally, there was a series of glacial intervals separated by interglacials. Glacial action sculpted the higher mountains (including the Medicine Bow and Snowy ranges), and periglacial climates influenced strongly the landscapes of areas--such as the Laramie Plains, the North Platte Valley, and the Laramie Mountains--that were not actually glaciated.

Obviously, under conditions of recurring environmental change, subsequent events distort or even eradicate evidence of

earlier events (Armstrong, 1972). Therefore, only the most recent of the four major glacial episodes of the Pleistocene is well preserved. Walker (1987) reviewed the Late Glacial-Pre-Boreal (13,000 to 9000 radiocarbon years before present--RCYBP) mammalian fauna of Wyoming, as revealed by fossils from 64 localities. There are several major sites in southeastern Wyoming, among them Bell, Horned Owl, and Little Box Elder caves. In the immediate vicinity of Fort Laramie, mammoth remains have been recovered from Pleistocene gravels. The most complete and extensive of fossil deposits recovered and reported to date is that from Little Box Elder Cave, in southern Converse County, about 60 miles northwest of Fort Laramie. Most recently the fauna of the cave was reviewed and reinterpreted by Indeck (1987).

Little Box Elder Cave is a problematic locality. Material in the cave has been reworked by woodrats, carnivores, and humans, and early excavations of the cave were not pursued with adequate attention to stratigraphic control. Dates cannot be established with great confidence, although faunal correlations suggest an age similar to that of Natural Trap Cave in Bighorn County--that is, the deposits probably provide a record of the past 20,000 years (Walker, 1987).

Little Box Elder Cave includes at least 60 species of mammals in 40 genera representing 20 families. Most of the species are present today in the area, and they represent the expected suite of species from both semiarid grassland and montane woodland habitats. However, a number of extinct taxa of large-sized mammals are known from the cave: Arctodus simus (giant short-faced cave bear), Martes nobilis (noble marten),

Panthera leo atrox (American lion), Equus conversidens (Mexican half-ass), Camelops hesternus (yesterday's camel), and Hemiauchenia sp. (Pleistocene llama) (Indeck, 1987). In addition, two extant species of the modern Arctic, a muskox (Ovibovini indet.) and the collared lemming (Dicrostonyx torquatus), are known from Little Box Elder Cave. Obviously, there has been a dramatic change in the fauna, especially the megafauna, of southeastern Wyoming over the past few millenia. This change doubtless reflects both climatic change and the influence of Paleoindian hunters.

Bell Cave, in the Laramie Mountains, is as yet incompletely excavated. However, preliminary results indicate the presence of 44 species of mammals and 10 kinds of birds, aged at  $12,240 \pm 330$  RCYBP (Walker, 1987). When thoroughly excavated, this site will provide the best available glimpse into the late Pleistocene fauna of the vicinity of Fort Laramie.

Proto-historic and Historic Native Americans.--Faunas change as climate and vegetation change. The most recent vegetational changes--the evolution of present-day landscapes--have been dominated strongly by human beings. The closer we come to the present time, the greater the quantity and quality of data, and yet we still are ignorant in detail about changes in the fauna (although broad outlines can be reconstructed).

Like their Paleoindian forebears, modern Indian groups depended on the native wildlife of the area for food and fiber. Prior to the advent of the Spanish in México, Native North Americans had no domestic mammal other than the dog and they had

no metallurgy. The megafauna of the Great Plains and adjacent mountains--such as bison, wapiti, bighorn sheep, and deer--was hunted on foot with stone tools and fire.

Therefore, the introduction of the European horse to the Great Plains was a revolutionary change. Horses of one kind or another apparently have been a part of ecosystems of the vicinity of Fort Laramie for much of post-glacial time. The paleontologic record (see, e. g., Ineck, 1987) documents the presence of Equus conversidens at Little Box Elder Cave on the order of 20,000 years ago, and that fauna can be taken as suggestive of conditions around Fort Laramie.

European Occupation: General.--A description by John Upton Terrell (1968:211) provides an appropriate epigram for this section: "On a high buffalo grass plain that washed in rough waves against the dark timbered ridges to the west, the Laramie River, swift and clear, came out of the southwest to meet the wide and shallower waters of the North Platte. There, at that unspectacular confluence, for more centuries than may be counted with certainty, was the most important crossroads of the Far West."

Table 2 is a brief timeline of some important events in the history of Fort Laramie through the 19th Century. There is a great deal of published literature on the history of Fort Laramie, much of it summarized by Mattes (1980). Given that, there is remarkably little direct information on historical details of natural history. Fort Laramie was on the principal trails to Oregon, California, and Utah. Scott (1958) described the Oregon Trail through Wyoming, and made continual reference to

Fort Laramie, but included no references to wildlife. Parkman (1916) visited Fort Laramie on his way to Oregon in 1846, and described the structure and "society" of Fort Laramie in intriguing and graphic detail. There is, however, no mention of wildlife or of native ecosystems more generally, except as buffalo robes are mentioned as tradegoods, clothing, and household furnishings. John C. Frémont visited Fort Laramie on 15 July 1842, and described the Fort and environs, with minimal reference to wildlife, except as articles of commerce. "It is hardly necessary to say, that the object of the establishment is trade with the neighboring tribes, who, in the course of the year, generally make two or three visits to the fort. In addition to this, traders, with a small outfit, are constantly kept amongst them. The articles of trade consist on the one side almost entirely of buffalo robes, and on the other, of blankets, calicoes, guns, powder, and lead. . ." (in Jackson and Spence, 1970:219; also see Nevens, 1956).

Frémont expressed the importance of Fort Laramie in the 1840s: "If it is in contemplation to keep open the communications with Oregon Territory, a show of military force in this country is absolutely necessary; and a combination of advantages renders the neighborhood of Fort Laramie the most suitable place, on the line of the Platte, for the establishment of a military post. It is connected with the mouth of the Platte and the Upper Missouri by excellent roads, which are in frequent use, and would not in any way interfere with the range of the buffalo, on which the neighboring Indians mainly depend for

support. It would render any posts on the Lower Platte unnecessary; the ordinary communication between it and the Missouri being sufficient to control the intermediate Indians. It would operate effectually to prevent any such coalitions as are now formed among the Gros Ventres, Sioux, Cheyennes, and other Indians, and would keep the Oregon road through the valley of the Sweet Water and the South Pass constantly open. A glance at the map which accompanies this report, will show that it lies at the foot of a broken and mountainous region, along which, by the establishment of small posts, in the neighborhood of St. Vrain's fort, on the South fork of the Platte, and Bent's fort, on the Arkansas, a line of communication would be formed, by good wagon roads, with our southern military posts, which would entirely command the mountain passes, hold some of the most troublesome tribes in check, and protect and facilitate our intercourse with the neighboring Spanish settlements. The vallies of the rivers on which they would be situated are fertile; the country which supports immense herds of buffalo is admirably suited to grazing, and herds of cattle might be maintained for the posts, or obtained from the Spanish country, which already supplies a portion of their provisions to the trading posts mentioned above" (Jackson and Spence, 1970).

Considering the importance of wildlife in the history of the region, there are remarkably few detailed accounts of the fauna. This stands in contrast with pioneer reports of natural history of some other areas of North America (such as the Bartrams in the Carolinas or Daniel Drake's observations in the Ohio River Valley, for example). Perhaps this is because, as F. L. Paxson

observed wisely, "Wyoming was a thoroughfare rather than a destination" (Larson, 1977:40). Morgan (1963) compiled and annotated a variety of letters, diaries, and other manuscript materials from the overland trails in 1846. In addition, an immense quantity of unpublished material is available which may prove to be useful (see, for example, Morgan, 1959, for a bibliography of diaries from 1849), but the abundant published material that I have reviewed has remarkably few references to wildlife, even game species, suggesting that either there was little interest in details of the animal life, or very little animal life worthy of comment. Already in Frémont's time, larger species of wildlife apparently were becoming scarce, although it should be noted also that 1842 was a year of "unparalleled drought." A day west of Fort Laramie a pronghorn was killed for food, but there is no mention of wildlife in the immediate vicinity of the Fort.

Despite the paucity of published detail, broad outlines of the history of some wildlife species can be sketched. Indeed, it is possible to divide early European occupation into two overlapping periods based on the wildlife species exploited.

European Exploitation: the Beaver Period.--Wildlife drew the first small wave of Europeans to Fort Laramie. Almost from the beginning of permanent occupation, Fort Laramie itself was sufficiently remote from any bountiful wildlife populations that it pursued a service and trade economy, the services of the Fort supporting the exploitation of wildlife elsewhere.

Numerous authors have written of the fur-trade and fur-

traders of Rocky Mountains in the early 19th Century, providing chronicles of one of the most fascinating chapters in the exploitation of the North American landscape. From a scientific standpoint, Gunderson's (1976) account is brief but particularly useful. Larson (1977) provided a good account of the fur-trade in Wyoming and its influence on exploration. The principal object of the fur-trappers' efforts was, of course, the beaver, whose dense underfur was raw material for the beaver-felt hats then in fashion. Sandoz (1964) provided a readable review of the importance of the beaver in the exploration of the West.

Although the beaver was the stimulus to the earliest serious European exploration of the vicinity of Fort Laramie, the "beaver period" was remarkably short-lived, beginning in earnest about 1820, and giving way to the "bison period" by 1840. Indeed, by the early 1830s, the Rockies were already becoming a "fur desert" (Gunderson, 1976).

The initial European exploration of the Southern Rockies and the upper reaches of the North Platte River was by American and French-Canadian fur-trappers. The Laramie River was first discovered and reported by Europeans in December of 1812, by one Robert Stuart (see Table 2), an employee of William Ashley of the American Fur Company. Stuart was exploring a route from Astoria, in what is now Oregon, to Saint Louis. He reported that "...a well wooded stream apparently of considerable magnitude came in from the South West" (Mattes, 1980:2). Stuart noted the presence in the vicinity of buffalo, antelope, and wild horses.

Jim Bridger and Jedediah Smith, also employees of Ashley, visited the area in 1823. Fort William--the first "Fort

Laramie"--was built by William Sublette in 1834 as a depot for beaver furs from the mountains to the south and west. But by the time the fort was established, the beaver hat already was falling from fashion, with the ascendancy of silk hats in popular favor.

Extirpation of beaver from native ecosystems had effects that are only now coming to be understood. Parker et al. (1985) and Parker (1986), for example, have pointed out the importance of beaver dams to the hydrologic regime, water quality, and the general integrity of riparian ecosystems. In the past few decades, beaver have been reestablished over much of their primeval range, a success story in the conservation of a valuable, harvested species relieved of the pressure of unregulated commercial pursuit. Beaver are present, at least occasionally, along the length of the Laramie River, including the reach preserved in Fort Laramie National Historic Site, as well as on tributaries (including Deer Creek), and on irrigation canals and ditches.

The first wagon caravan passed the confluence of the Laramie and the North Platte in 1830. William Sublette's company of mountain men built Fort William in 1834 and in 1836 they sold it to the American Fur Company. William Anderson provided a first-hand account of the founding of Fort William, soon to be known as Fort Laramie, in 1834 (Morgan and Harris, eds., 1967). Lucien Fontenelle reported in 1834 to Pierre Chouteau that Sublette's new fort "on Laramie's Fork of the River Platte. . .can make it a central place for the Sioux and Cheyenne trade. He has now men running after these Indians to bring them to the River Platte.

Buffalo is in abundance on that river during all seasons of the year, and the situation may turn out to be an advantageous one for trade" (Terrell, 1968:240). Very soon, however, wildlife would become scarce.

In the 1840s, Fort Laramie watched the westward movement of Bidwell-Bartleson party (1841) and the Whitman-Burnett Party (1843) to Oregon, and Brigham Young (1847) to Deseret. In 1848, gold was discovered at Sutter's Mill in California, and what had been a trickle of westbound migration became a torrent.

By the time John C. Frémont began to pass back and forth through Fort Laramie, wildlife apparently was scanty, and there is essentially no mention of even the larger and potentially more conspicuous species in his reports. On his famous maps (Section III), Frémont noted, "Game--East and West of this section more or less buffalo and antelopes, but 50 miles from Fort Laramie each way no game is to be found" (in Jackson and Spence, 1970).

European Occupation: the Bison Period.--The second broad phase of the history of Fort Laramie might be termed the "bison period." Fort Laramie was established in the waning days of the beaver trade and just as trade in buffalo products was on the increase. Buffalo robes quickly became the important trade item at the Fort (Mattes, 1980).

It is impossible to overestimate the importance of the bison in the native ecology and economy of the western Great Plains. Throughout the later Quaternary and into Holocene times, tool- and fire-making human beings were part of the fauna of what is now southeastern Wyoming. There are indications of Paleoindian occurrence there 20,000 or more years ago (Larson, 1977). The

record of that occupation is sketchy, although in the immediate vicinity of Fort Laramie are quartzite pits that were a source of material for crafting stone blades. The Stone Age people of the Laramie Plains were migratory hunters. The bison was the mainstay of their economy. Nadeau (1967) provided some details on Native American techniques of hunting bison. Local lore has it that the name Chugwater, which labels a town and a creek southwest of Fort Laramie, was so named because of the sound made when Native Americans stampeded thousands of bison over the 200-foot bluffs into the water (Garretson, 1938:182).

Uses for bison were numerous and varied. Beyond meat, which might be eaten fresh, jerked and dried, or pounded into pemmican, hides were used for lodges, clothing, beds, and blankets, footwear, rope, and sewing materials. Horns made cups, ladles, and other containers. Bones made saddle trees, war clubs, mallets, and scrapers. The bladder made a waterbag, and the dung--"bois de vache" in polite and euphemistic parlance--was a source of fuel (Nadeau, 1967).

The bison clearly was a keystone species in the ecology of the prehistoric North American prairie. Bison wandered through what is now southeastern Wyoming in vast herds. Wolves preyed on them, and the grizzly bear took them on the hoof or as carrion. Naturalist J. K. Townsend, accompanying would-be mountain man Nathaniel Wyeth toward Fort Laramie in May of 1834 noted that, at the forks of the Platte, "the whole plain, as far as the eye could discern, was covered by one enormous mass of buffalo. . . ." (Nadeau, 1967:15)

In the wake of the bison herds, the prairie was transformed. Species of successional or disturbed prairie--such as black-tailed prairie dogs (and their black-footed ferret predators), black-tailed jackrabbits, Ord's kangaroo rat, northern grasshopper mouse, 13-lined ground squirrel, badger, horned lark and western meadowlark--would prosper for a time, as species of unbroken prairie (such as Franklin's ground squirrel and white-tailed jackrabbits) went into temporary decline. The full story of the ecology of bison will never be known, because quantitative details were not recorded when bison were sufficiently abundant to play their central, natural role in the system. There are numerous books on North American bison, of which Garretson (1938) remains a readable and generally reasonable example, providing a chronicle of the demise of the species as an ecological and economic force on the Great Plains.

The demise of the bison is a story frequently told. In a sense it is the most recent episode in a series of megafaunal extinctions that traces back to the entry of humans into the Americas during the last ice age. (See, for example, Martin and Wright, 1967, and a host of articles since.) There is no firm consensus on the absolute importance of humans in megafaunal extinction generally, but there can be no doubt about the importance of humans in the demise of the bison.

Precolonian Native Americans on the Great Plains may have been in equilibrium with the bison. Although they had developed effective techniques for hunting bison on foot, either singly or as entire herds, the advent of the horse in the 17th Century allowed a dramatic change. A mounted hunter was a more effective

hunter and a safer one as well. The horse transformed the hunting economy of the Great Plains, moving the aborigines by a quantum leap through the Neolithic Revolution. Through the 18th Century, another technical revolution occurred, with the introduction of industrial-age firearms, replacing paleolithic weapons like the spear and bow-and-arrow. Whether the bison herds could have withstood subsistence hunting by Native Americans armed with rifles and mounted on horses is unknown. The market economy did not allow the experiment to run. Almost immediately, Native Americans began to harvest bison beyond subsistence needs to raise the cash needed to participate in the newly established market economy of the Great Plains. Fort Laramie was at the center of that revolution.

Bison not only supported the natives, but the invaders as well. Nadeau (1967) provided a sense of the former importance of the bison in the western Great Plains. "Beyond the forks of the Platte, the bill of fare. . .for all the early expeditions into the Rockies--consisted almost entirely of buffalo meat. It was customary for the parties to carry enough salt pork and other unperishable items to last until they reached the buffalo country, after which they would have more food than they could eat (Nadeau, 1967:15). The early migrants made wide use of bison: in a letter home in 1846, a pioneer opined "I think. . . that it is rather a hard matter that the Buffalo should furnish the meat and then the Fuel to Cook it with but nature seems to have so ordered" (Morgan, 1963:565).

"It has been commonly believed that the buffalo were

plentiful until the professional white hunters began slaughtering them for the hide market in the early 1870s. But the Indians themselves, responding to demand for robes among the white men, had started the annihilation decades before. As early as the 1830s, the buffalo had retreated, under the onslaught of the Pawnee and other tribes, west of the forks of the Platte River" (Nadeau, 1967:23). \* \* \* "Fort William introduced to the high central plains the social pattern then shaping in the West--the diversion of the native races from their own ecology to dependence on the white man" (Nadeau, 1967:24). Fort Laramie ". . . put a permanent society of white men in the heart of the buffalo country" (Nadeau 1967:19).

Not all bison were killed for subsistence or market. Some were destroyed for "sport." Irish adventurer Sir George Gore was one of the storied buffalo hunters. He and his army of 40 servants wintered at Fort Laramie in 1854-55, and with Jim Bridger as guide they hunted most of Wyoming, reportedly harvesting ". . . 40 grizzly bears, 2,500 buffalo, and numerous elk, deer, antelope and other small game" (Garretson, 1938:101).

In 1846, the "Snively Guide" for emigrants painted a sanguine picture of the buffalo population: "143 miles up North Platte to Fort Larima [sic], up a valley similar to the South fork (thousands of buffalo.)" However, an emigrant on the scene in July 1846 noted that during the whole distance from Fort Laramie west to Fort Bridger they had not seen more than a dozen bison (Morgan, 1963:622). Johnson (1978) noted that overgrazing by resident horses and cattle and livestock of migrant parties meant that forage for bison was essentially absent by 1850.

Wolves were noted around Fort Laramie in the 1850s (Johnson, 1978), but the bison upon which they had depended was largely gone, so they would turn instead to livestock--and then be persecuted nearly to extinction for their "wanton" depredation.

Once the process of market-hunting bison began, the demise of the bison was swift and sure. Apparently the animals ceased to winter on the Laramie Plains after 1844-1845. Protection of the bison came late, for the bison was seen--and rightly so--as a mainstay of a Native American culture that some sought to eradicate. For example, the Texas legislature considered a bill to protect the bison in 1875. General Philip Sheridan spoke against it as a sentimental mistake, arguing that the state should thank the buffalo hunters and "let them kill, skin and sell until the buffalo is exterminated, as it is the only way to bring about a lasting peace and allow civilization to advance" (Garretson, 1938:128). Bison were extirpated from southwestern Wyoming by 1880. The meager remnant band of bison that eventually was preserved in Yellowstone National Park around the turn of the century had to include animals from Montana and Texas (Long, 1965; Bailey, 1930).

From the standpoint of ecological impact, surely the greatest change in the wildlife of the Laramie Plains since the advent of paleolithic hunters (with fire, stone tools, and language) well over 10,000 years ago, was the extirpation of the bison. One cannot really understand the prairie ecosystem in the absence of bison. Cattle--even cattle on open range--and bison are not quite interchangeable herbivores. Cattle do not

thrive as well on native grasses and they do not survive (and calve) as well in snowy springs.

There have been more recent, important changes in the ecology of the area, but we do not examine them in any detail. After the great seasonal cattle drives from Texas to Montana ceased in the 1880s, the open range was fenced, and grazing could be controlled (although not always very carefully). Furthermore, development of irrigation works allowed farmers to break the prairie and plant row crops and hay (whose demand for water was well beyond the natural carrying capacity of the land). Locally, the greatest change in the native vegetation after the demise of the bison probably stemmed from the construction of the Laramie River Canal. The canal was built around the turn of the 20th Century (L. L. Armstrong, pers. comm.) to provide irrigation water to the rich bottomlands around Torrington.

#### Potential Natural Fauna

For ease of interpretation, this final report is, in part, subdivided taxonomically. However, it is important to recognize that in reality, in a dynamic biotic community, the vertebrate classes interact with each other and with other groups of organisms. To talk only about birds or amphibians misses the eventual point; so, too, does speaking only about vertebrates or only about animals. Owls eat mice. Flickers and horned lizards both eat ants (and thereby reduce the ants' competitive impact on pocket mice and finches, and their predation on plants).

Treeholes excavated by woodpeckers and enlarged by fungi are used by fox squirrels. Vacant magpie nests are usurped by raccoons. Eventually what we really would like to understand is ecosystems

perspective, it is obvious that a single field season tells at most 1 percent, and more accurately a vanishingly small fraction of 1 percent, of the relevant and interesting story.

Our goal is to place the fauna of Fort Laramie National Historic Site in ecological and historical contexts and thereby to provide a conceptual tool for interpreters and managers. We therefore discuss not only what actually is to be seen today, but also the prehistoric fauna, the historic fauna, and both actual and potential natural contemporary faunas.

Potential natural fauna is a concept analgous to the potential natural vegetation of Küchler (1967). The potential natural fauna is an educated guess as to what the fauna of a particular place would be if ecological succession were telescoped into a single moment and human influence were removed. (In the present study we deviate slightly from this characterization of the potential natural fauna and exclude only industrialized, "civilized" human influence--not the influence of Native Americans, who have been an important part of the natural fauna of southeastern Wyoming at least since the last full glacial interval. Also, we include in Appendix I introduced species, duly noted as such.)

Appendix I includes all species known to occur (or to have occurred within historic time) in Goshen County (and adjacent counties in Wyoming and Nebraska) which occupy habitats present in the immediate vicinity of Fort Laramie. Sources of data are cited in the appendix. Because of the continual possibilities of wandering individuals, the list of birds is deliberately less conservative (and therefore relatively more extensive) than those

and their relationships and their development in space and time. Simplifying is a dangerous but essentially convenience.

The term "wildlife" is used in this report to connote the entire fauna--in particular, of course, the vertebrate fauna--of the study region, not merely harvestable species. As such, "wildlife" is a term analogous to (and coordinate with) "vegetation." Vegetation and wildlife together comprise the biotic community, the living component of the ecosystem. Vegetation and wildlife each have a structure, and their individual structures interact. Biotic communities are structured by flows of energy (sun to plant ("producer") to herbivore (primary consumer) to carnivore (secondary consumer) and other symbiotic relationships.

In addition to their ecological dynamic day-to-day, biotic communities have a history on scales of ecological (moments to millenia) and evolutionary (moments to tens of millions of years) time. The wildlife of a particular place is a dynamic entity, continually changing ecologically and probably genetically as well. The wildlife of a place is not a state of being, it is a process, a "happening" in space and time.

This dynamism is particularly important to bear in mind. The present study has been limited to a single year, with some field work being done each quarter. However, the fauna we see today is a result of historical processes over the past few centuries, processes that have intensified and changed dramatically over the past 150 years, as well as geo-ecological processes active over the past 10-20,000 years. In that

that Native American groups did not domesticate the horse. The domestic horse arrived in the New World with the Spaniards in the 16th Century, their use by Native Americans spreading northward from México. Among Plains Indians, the Utes and Comanches traded with the Navajo in New Mexico and secured their first horses perhaps as early as 1660. Best estimates are that most plains groups had horses by the 1750s at the latest (Haines, 1976).

When Robert Stuart first described the Laramie River in 1812, wild horses were part of the scene (Mattes, 1980:2). Each wave of European invaders to the region brought horses with them. The mountain men arrived on horseback, and so did the traders in buffalo hides. Successive waves of migrants brought horses as well as oxen and hand-carts.

High Plains Indians were invited to a treaty council at Fort Laramie to begin on 1 September, 1851. An estimated 10,000 Native Americans arrived in response. "The shortage of grass around the fort made it necessary to move the council thirty-six miles down the Platte, to the mouth of Horse Creek in Nebraska," to hear Superintendent of Indian Affairs D. D. Mitchell remark that the government was prepared to provide compensation for the fact that "your buffalo and game are driven off, and your grass and timber consumed by the opening of roads and the passing of emigrants through your country" (Larson, 1978:14).

The re-introduction of horses to the North American grassland was a revolutionary event in cultural evolution, changing dramatically the mobility of individuals and groups and altering the techniques of warfare, strategies for hunting, especially hunting bison, and quite generally changing the way

of other classes.

The concept of potential natural fauna is important for interpretation and management. It allows one to look beyond what is and to imagine what might have been or what might be. In short, the potential natural community provides a sort of theoretical "baseline of normality" (in the sense of Aldo Leopold (1949) against which to judge the health of present-day communities and toward which management efforts might be directed.

Horses.--From the standpoint of potential natural fauna, the presence of horses at Fort Laramie is a problem. At the present time, about 20 to 30 horses are pastured at Fort Laramie from September until late May or early June. Five of the horses belong to the National Historic Site (and remain there year around). The others belong to Rocky Mountain National Park and are taken there for the summer months (J. Burns, pers. comm.). It is reasonable to wonder what is the effect of those horses on the landscape at Fort Laramie.

By way of historical perspective, we must recall that horses of one kind or another apparently have been a part of ecosystems of the vicinity of Fort Laramie for much of post-glacial time. The paleontologic record (see, e. g., Ineck, 1987) documents the presence of Equus conversidens at Little Box Elder Cave on the order of 20,000 years ago, and that complex fauna can be taken of suggestive of conditions around Fort Laramie.

When native North American horses became extinct in southeastern Wyoming is not known. It is well known, however,

people interacted with and influenced their environment.

In some ways it would be difficult to argue that horses are not part of the "native," natural fauna of the vicinity of Fort Laramie. They have been there--with interruptions of unknown length--as long as humans have been. The question is perhaps not one of the presence of horses but of how many horses, pastured under what conditions. That is, the question is not about natural ecosystems but about carrying capacity.

Apparently there is no thorough record of grazing history at the National Historic Site and no documentation of any rotation schedule. It is known that horses from Rocky Mountain National Park have been pastured at the Site since 1981 (J. Burns, pers. comm.). During the course of field survey, careful attention was paid to the general condition of the range, with the question in mind of the effect of horses on native mammals of the area. Our general impression is that, although there are certainly areas of heavy use, there are few examples of serious overgrazing that will lead to long-term degradation of range except for very local patches (less than 100 square meters each), especially on sandy soils along terraces above the Laramie River, where some grasses have been cropped down beyond the basal meristem, tree seedlings have been cropped, and regeneration will be impaired. Also there are occasional places where apparent heavy grazing has promoted proliferation of such species as pricklypear and curly dock. Thus, along the Laramie River, grazing pressure could--in the long run--preclude the regeneration of the riparian ecosystem and consequently inhibit its rich vertebrate fauna, including winter

habitat for the endangered bald eagle.

Probably it would be worthwhile to keep a record of grazing by horses, both location and intensity (stocking rate). Furthermore, it would probably be worthwhile to rotate horses through the area, if possible, rather than allowing them the general run of the Site. At a minimum, access by horses to riparian woodland should be limited by fencing.

History of Scientific Research.--Clark and Stromberg (1987) presented information on the history of formal research on the mammalian fauna of Wyoming and, by extension, their account encompasses the rest of native wildlife as well. For a history of North American mammalogy generally, the interested reader might consult Gunderson (1976) and for that of birds, Coues' (1874) classic is strongly recommended.

In broad outline, the history of knowledge of the natural history of any particular area may be outlined as follows: (1) folk knowledge (first archeologic--derived from artifacts--and ethnologic--derived from oral traditions--and then written historical accounts from travelers, hunters, trappers, and traders); (2) formal, systematic study, in the present case begun by governmental agencies (first the War Department and later the Department of Agriculture, both with the stimulus and support of the Smithsonian Institution, especially the U. S. National Museum). For this study, we have reviewed the formal literature more thoroughly than we have the folk knowledge, although thorough study of the latter is to be strongly encouraged.

Viola (1987) provided a beautifully illustrated, general account of the various expeditions of the U. S. Army Corps of

Topographic Engineers and of the various pioneering surveys which eventually coalesced into the U. S. Geological Survey, including an appreciation of their patron, stimulus, and frequent reporter, Spencer Fullerton Baird, first the Assistant and then the successor to Joseph Henry as Secretary of the Smithsonian Institution.

According to Johnson (1978), one Franklin Tubbs, a soldier who was stationed at Fort Laramie in 1865, spent much of his time shooting animals, which were skinned and stuffed by the surgeon, and then sent to the Smithsonian for study. These specimens postdate Baird's monumental publications but were of use to mammalian systematists in preparing a number of taxonomic revisions in the late 19th and early 20th centuries, and specimens from Fort Laramie in the U. S. National Museum all were examined and reported by Long (1965).

Despite its interest, a thorough survey has not been completed of primary materials for the "folk knowledge" stage of our understanding of the fauna of the vicinity of Fort Laramie. An archeologic and ethnographic study of Plains Indian knowledge of zoology (pure and applied) would be fascinating. Also, there must be numerous references to wildlife in unpublished archival records of earlier travelers, migrants, settlers, and military personnel. Unfortunately, we have not had time to begin to discover and interpret this material. Johnson (1978), as part of his excellent environmental interpretive plan for the National Historic Site, did consult some of that primary material, and provides a hint that there may be unreported riches available--

and an excellent thesis topic for an enterprising graduate student. Mattes (1980) provided little information on wildlife--in part because Fort Laramie itself was, by early in its history, essentially bereft of conspicuous wildlife species.

#### Accounts of Vertebrate Classes

Fishes.--From the standpoint of ecological and biogeographic distribution, fish are--because of their narrow range of ecological tolerance--potentially particularly valuable, as indicators of habitat quality and past conditions. However, fish also are particularly susceptible to disturbance, both with changes in water quality and quantity and via introductions, deliberate and inadvertant. Therefore, we actually have learned little from our brief field survey of the ichthyofauna.

There is minimal mention of fish in the vicinity of Fort Laramie in the early days, although Mattes (1980) did relate some anecdotes of fishing as an activity of military personnel stationed at the Fort. Systematic study of fishes of the area is quite recent. Canaday (1983) reviewed two studies of fish to that time. Table 3 includes her data, as well as information produced by the present survey, by graduate assistant Rick A. Adams and two fisheries biologists from Aquatic and Wetland Consultants, Inc., of Boulder, Colorado, who visited the National Historic Site on 13 November 1987, under permit from the State of Wyoming, Department of Game and Fish.

Appendix I indicates the potential natural fish fauna of Fort Laramie National Historic Site; as indicated in Table 4, a total of 50 percent of the potential natural fish fauna was observed in the course of this survey.

Amphibians.--There are few published records of amphibians from Fort Laramie, although Canaday (1983:123) noted the presence of bullfrogs, leopard frogs, and boreal chorus frogs, and Baxter and Stone (1980) mapped Fort Laramie as a locality for a number of species, although they did not actually list specimens examined. The potential natural amphibian fauna of the National Historic Site includes just six species (see Appendix I), of which three were observed in the course of this survey. Baxter and Stone (1985) provided an excellent summary of the natural history of amphibians of Wyoming.

Habitat for several amphibians has been modified strongly during the past 150 years. In particular, fluctuating water levels in the Laramie River, due to impoundment and diversion, can either desiccate or inundate breeding habitat, thereby affecting populations negatively. A counterbalancing trend, however, might be the great expansion of wetlands over the past 80 to 90 years, due to seepage from the Laramie River Canal.

Reptiles.--Cope (1900) was the first to prepare a complete synopsis of North American reptiles, and thus to publish on pioneer collections from Fort Laramie. Only two species were reported, Phrynosoma douglassi, the eastern short-horned lizard, and Eutaenia (= Thamnophis) sirtalis, the red-sided garter snake. The absence from the treatise of records from Fort Laramie of such abundant reptiles as the prairie rattlesnake, the gopher snake, and the prairie lizard, suggests that the collections were not very thorough. Baxter and Stone (1985) used collections in the U. S. National Museum among others in preparing their

monograph, although individual specimens examined were not listed.

Remarkably few reptiles were observed in the present field survey (Appendix I), even considering that fact that the active season for ectothermic vertebrates in southeastern Wyoming is quite short. Only two of 17 species of the potential natural fauna actually were seen (Table 4).

Birds.--The avifauna was of special interest to a number of the earliest naturalists at Fort Laramie. The first scientific reports of birds in the vicinity were presented by Baird (1858b). Results of his research are indicated in Table 5. A total of 211 species of birds were noted from the immediate vicinity of Fort Laramie and an additional 11 species were recorded from Laramie Peak, at the northern terminus of the Laramie Mountains--the "Black Hills" or even "Black Snake Hills"--of early maps, west of the present-day town of Dwyer, some 30 miles west of Fort Laramie. Coues (1874) added to the above list (as Archibuteo lagopus) the rough-legged hawk (collected at Fort Laramie on 2 February 1860 by F. V. Hayden). Baird (1858b) listed in his Appendix B six species taken in the general vicinity of Fort Laramie. We probably should note that these collections, however extensive for their time, were not sufficiently thorough to allow any inference from the absence of a particular species from the collection. One is, nonetheless, surprised not to see in the collection such common wetland species as red-winged blackbirds and such abundant grassland species as the western meadowlark. On the positive side, however, there are some interesting reports that give broad hints at conditions in the vicinity of the Fort.

Canaday (1983:120) provided a list of nearly 60 species of birds seen in the vicinity of Fort Laramie. A National Park Service interpretive handout entitled "Wildlife Potentially Seen at Fort Laramie National Historic Site" listed about three dozen species. The potential natural avifauna of the site includes some 234 species (after Oakleaf et al., 1982). In the course of the present field survey, 56 species of birds (27 percent of the potential natural avifauna) were observed, along with three introduced species. The potential natural avifauna is composed of approximately 27 percent permanent residents (breeders), 53 percent summer residents (possible or probable breeders), 16 percent seasonal migrants, and 4 percent winter visitors.

237  
 27  
 1659  
 474  
 6399

Of species observed in the course of this survey, 36 percent were residents; residents are observed in disproportionate numbers not only because many are abundant, but because one has two or three times more field opportunity to observe them. Considering the fact that many of the species listed in Appendix I would be expected only occasionally (and not as resident or breeding populations) on the National Historical Site, the number of species actually observed in the course of this study was gratifying. Also, with this preliminary checklist of the potential natural avifauna, we hope that other observers will add to the list. Appendix I is not annotated with estimates of abundance, because that could be misleading or mistaken, based on such a short field survey. However, Oakleaf et al. (1982) did provide notes on abundance and general status in Wyoming.

Mammals.--The first comprehensive study of mammals of North

America appeared as an adjunct of the reports to Congress on exploration of the several reports of the Pacific Railroad Surveys. Baird (1858a) is a classic in mammalogy. Among other things, it provided a list of all specimens of mammals in the U. S. National Museum (and some other museums as well) as of the date of publication. Specimens had been sent to Baird from Fort Laramie especially by Lt. F. T. Bryan, who in 1856 was engaged in surveying a wagon road from Fort Riley, Kansas Territory, to Bridger's Pass. From Fort Laramie, Baird (1858a:133) reported a "cross fox" (as Vulpes macrourus = Vulpes vulpes) collected by Col. S. Cooper. In addition, he reported (p. 679) three bighorn sheep (as Ovis montana = Ovis canadensis) collected by Capt. S. Van Vliet and Maj. J. H. Carleton. From "Laramie river, Neb.," Baird reported a long-tailed weasel (as Putorius longicauda = Mustela frenata) and a montane vole (as Arvivola montana = Microtus montanus), both collected by Lt. F. T. Bryan. At least the latter species probably was collected higher on the Laramie River than Fort Laramie. The record of occurrence nearest Fort Laramie reported by Long (1965:651) was from a place 30 mi. N and 10 mi. E Laramie, Albany Co., Wyoming, and habitat at Fort Laramie is unsuitable today and presumably was 130 years ago.

In addition to those records, Long (1965) reported specimens from Fort Laramie (all in the U. S. National Museum) of the following species: Eptesicus fuscus, Sylvilagus audubonii, Spermophilus spilosoma, Canis latrans, and Ursus arctos. Furthermore, the type locality for the black-footed ferret has been designated as Fort Laramie. Actually, Audubon and Bachman (1851) named the species (as Putorius nigripes) based on a

specimen from "the lower waters of the Platte River." Hayden (1863) restricted the type locality to Fort Laramie.

Results of survey of the mammalian fauna of the National Historic Site are more thorough than for other groups for several reasons. First, the mammalian fauna--especially the beaver and the bison--was critical to the initial establishment of Fort Laramie. Second, most of the conspicuous, large animals of the site are mammals. Third, because mammalian species often are nocturnal and secretive, a special effort must be made to document them, and that effort was made. Fourth, we must admit, this probably reflects the biases of the authors. Hopefully the first two considerations above will justify that bias in this case. Long (1965) published a distributional study of Wyoming mammals, and Clark and Stromberg (1987) provided accounts of natural history. The regional book by Jones et al. (1983) furnishes still more detail on local species.

Canaday (1983:118-119) listed 23 mammalian species at Fort Laramie National Historic Site, whereas an undated handout entitled "Wildlife Potentially Seen at Fort Laramie. . ." listed 14 species. Overall, 20 species of mammals were documented by observations of animals or their undoubted sign in the course of the field work, 34 percent of the potential natural mammalian fauna.

Results of our work on small mammals are presented in Table 6. A total of 19 transects were run. Numbers of small mammals captured was low, and there was no difference between live-trapping and snap-trap assessment lines.

## Endangered Species

One of the tasks of this study was to investigate the presence at Fort Laramie, actually or potentially, of endangered species. Endangered species are so defined by federal statute and listed by federal regulation. The state of Wyoming does not maintain a separate list of endangered species (vide A. Longston, Wyoming Game and Fish Department, pers. comm.).

According to the Endangered Species Act (1973: sec. 1532), an endangered species is ". . .any species which is in danger of extinction throughout all or a significant portion of its range." A threatened species is ". . .any species which is likely to become endangered within the foreseeable future throughout all or a significant portion of its range."

As we have noted repeatedly, the fauna of any area is a dynamic system. Species evolve and they decline to extinction. There can be no doubt that humans have altered processes of faunal evolution, promoting changes in species' ranges and populations, deliberately or not, hastening the natural process of extinction, and directing the process of evolution by artificial selection. Our concern here is mostly with the process of decline toward extinction, the process of endangerment.

Of the fauna of Fort Laramie National Historic Site, one species has become extinct within historic time--the passenger pigeon, which disappeared entirely by 1914. A number of additional species that once occurred at or near Fort Laramie have been extirpated from southeastern Wyoming, although they do occur elsewhere. Among them are the gray wolf, grizzly bear,

black-footed ferret, river otter, wapiti (American elk), bison, and bighorn sheep. Of the species noted above, one is considered endangered throughout its range and two others are listed as threatened in the "lower 48" states.

At the present time and under present circumstances, Fort Laramie provides habitat for no endangered species on a continual basis. However, a number of species are worthy of comment.

The Whooping Crane (Grus americanus) is not considered a member of the potential natural avifauna of Fort Laramie National Historic Site. The species is known historically (as a non-breeding visitor in 1950) from latilong block 28 (Cheyenne), according to Oakleaf et al. (1982), but is unreported from latilong block 21 (Fort Laramie). These birds are observed in migration in northwestern Wyoming and along the Platte River in central Nebraska.

The Bald Eagle (Haliaeetus leucocephalus) is listed as an endangered species. The principal threats to its well-being have been accidental electrocution on high-tension transmission wires, hunting, and chronic poisoning by organochlorine biocides (especially as they are concentrated through aquatic foodchains leading to the fish upon which the Bald Eagle feeds).

There is no evidence of nesting by Bald Eagles in the North Platte Valley of southeastern Wyoming (see Oakleaf, 1982:23), but observations of wintering and migrating birds are increasingly common. On our February field trip, for example, one Bald Eagle was seen west of the North Platte Bridge (U. S. Highway 85) in Torrington, and another was observed in a stubblefield south of

Torrington. The species should be expected at Fort Laramie in winter. A critical feature of winter habitat is old-growth riparian woodland with snags for roosting. Such trees probably should be an object of continual monitoring. A substantial increase in beaver activity along the Laramie River could threaten the woodland, and beaver can (and at Fort Laramie do) fell or at least girdle and kill, remarkably large trees. Also, grazing by horses along the Laramie River is heavy and regeneration of trees is poor in spots. For the long-term health of the riparian system, such grazing should be controlled.

The Peregrine Falcon (Falco peregrinus) is a federally-listed endangered species and the object of extensive and creative recovery efforts in various parts of the country, including Wyoming. Oakleaf et al. (1982) indicated breeding in latilong block 21, which includes Fort Laramie. The immediate vicinity of the National Historic Site, however, does not include the inaccessible high cliffs, usually above water, that comprise suitable breeding habitat.

There is, nonetheless, the remote possibility that peregrines would forage in the neighborhood of Fort Laramie, however--given their dietary preference for pigeon- to duck-sized avian prey--the reservoirs of eastern Wyoming provide better foraging habitat. One should be alert to the occasional presence of the Peregrine Falcon at Fort Laramie, but these beautiful birds provide no particular management concern or opportunity at the Historic Site.

The gray wolf (Canis lupus) is listed as threatened in the conterminous United States. The species was observed at Fort

Laramie at least until the 1850s (see Johnson, 1978), but they depended on bison and the demise of the bison eventually meant the demise of the wolf. Wolves turned opportunistically from bison to the domestic livestock that replaced them, and therefore found themselves the target of one of the most intensive programs ever undertaken to eradicate a native mammal. Ernest Thompson Seton reported that bounties were paid on over 4000 wolves in eastern Wyoming in 1897-98 alone (Clark and Stromberg, 1987). Eradication efforts were quite successful, and the wolf was essentially extirpated from Wyoming by 1940.

Wolves--pack-hunting and wide-ranging--were coevolved with a prairie ecosystem that has vanished. To re-establish that ecosystem somewhere in the West would be a worthy goal and an exciting challenge, but it surely is not going to happen at Fort Laramie.

Ursus arctos, the grizzly bear, is listed by the U. S. Fish and Wildlife Service as threatened in the "lower 48" states. The early specimen reported by Long (1965) may or may not actually have been taken at Fort Laramie. Often, in the early days, specimens were labeled with reference to a general area (because there were not all that many named points of reference in southeastern Wyoming a century and a half ago), or even were labeled with reference to the place where obtained rather than the place, often unknown, where actually captured. Given the wide range of habitats occupied, and the propensity of grizzly bears to feed on bison carrion, there is no reason to think that the animals did not once occur at Fort Laramie. Of course,

grizzly bears are gone now from southeastern Wyoming, and there is not room enough to reintroduce them.

The black-footed ferret (Mustela nigripes) is often considered the most seriously endangered mammal in North America. As of this writing, all known living individuals are in captivity, taken in 1985 from the last known wild population, along the Graybull River near Meeteetse, Wyoming, to prevent their eradication by distemper and to allow captive breeding in a last-ditch campaign to preclude their extinction.

As noted elsewhere, the type locality of Mustela nigripes is given is Fort Laramie. However, there is no direct evidence that the species ever was observed at the Fort. Audubon and Bachman (1851) described the species from "the lower waters of the Platte River." Hayden (1863) restricted the type locality to Fort Laramie.

Black-footed ferrets are almost completely dependent for food (as well as shelter) on prairie dogs. Although the black-tailed prairie dog is a member of the potential natural mammalian fauna of the study area, and surely was present there prior to human settlement, the species never has been actually reported from Fort Laramie (see, e. g., Long, 1965).

In the absence of prairie dogs, and given the intense agricultural and industrial development around the confluence of the Laramie and North Platte rivers, reintroduction of black-footed ferrets probably would be impossible, even if stock were available.

In summary, unfortunately or not, endangered and threatened vertebrate species are not a management concern at Fort Laramie.

It would be exciting to recreate a presettlement landscape with great herds of bison, grizzly bears, gray wolves, black-tailed prairie dogs, and black-footed ferrets, but Fort Laramie is not the place for that. Practically it is too small (by several orders of magnitude) to support it; philosophically, it might even be inappropriate. An intent is to show the visitor Fort Laramie as it was in the 1840s to 1860s. Fort Laramie even then was not a pristine piece of wilderness prairie, but a bustling hub of commercial and military activity, the native landscape already transformed and degraded by intensive human use.

#### Biogeography

From a biological standpoint, one of the most intriguing features of Fort Laramie National Historic Site is its biogeographic situation. Indeed, Fort Laramie is for natural history a "gateway" along a "corridor," just as it has been for human history.

Biogeography is the description and analysis of the geographic distribution of organisms, a study of patterns in the landscape in space and time. This biogeographic discussion emphasizes the mammalian fauna for reasons more compelling than mere professional prejudice. Mammals are particularly good biogeographic indicators. Unlike birds, most species show fairly low vagility; that is, they do not easily and readily cross barriers of unsuitable habitat, and hence do not often occur as "accidentals." Unlike reptiles and amphibians, whose distribution is influenced strongly by the physical substrate, many species of mammals show strong fidelity to patterns in

vegetation. Unlike fishes, broad distributional patterns of most mammalian species are not influenced by extralimital introduction and transplantation by humans. Finally, the presence of fairly solid bone and very durable teeth allows, in suitable depositional environments, an excellent and extensive fossil record.

Fort Laramie is situated at the confluence of the North Platte (which heads in North Park, Jackson County, Colorado) and Laramie (which heads in western Larimer County, Colorado) rivers. As Frémont noted in 1842, the character of the country changes dramatically at Fort Laramie. In a biological sense, there is a transition there from a biota characteristic of the Great Plains to one more typical of the Wyoming Basin. The valley of the North Platte River provides a forested finger-like extension of eastern forest habitat westward across the plains, carrying some eastern species of vertebrates to their westernmost extremes at this latitude. To a lesser extent, the valley of the Laramie River carries riparian and woodland species of the Southern Rockies onto the High Plains.

Dice (1943) published the classic work on the biotic provinces of North America. On his map, Fort Laramie would lie almost precisely at the intersection of three biotic provinces, the Saskatchewan--encompassing the northern High Plains and the Upper Missouri Basin, the Kansan--encompassing the High Plains, and the Coloradan--corresponding with the physiographic Southern Rocky Mountains.

Hagmeier (1966) performed a numerical analysis of North

American mammals and defined "mammal provinces," analogous to Dice's biotic provinces but derived by numerical methods and based on the geographical distribution of a single class of animals. He, too, saw a major biogeographic intersection in the vicinity of Fort Laramie, and named his provinces using Dice's earlier adjectives. Long (1965) described biotic regions of Wyoming roughly analogous to Dice's biotic provinces but based on mammalian distributions only. He placed Fort Laramie in the Cheyenne Plains Division of the Great Plains Faunal Area (1965:725). Although that designation obviously is accurate in broad outline, it probably does not reflect adequately the biogeographic distinctiveness of the North Platte Valley through the Goshen lowlands.

The important point of this review is that all authors imply Fort Laramie as a point of important biotic transitions. This biogeographic transition is important not only from theoretical, biological view point, but also as a fact of human history. Fort Laramie provided a spot where travelers stopped to renew themselves and replenish their supplies before setting out on a journey through a different kind of country. Frémont (in Jackson and Spence, 1970:235) noted the transitional nature of the ecology in the vicinity of Fort Laramie in 1842. "With the change in the geological formation, on leaving Fort Laramie, the whole face of the country has altered its appearance. Eastward of that meridian, the principal objects which strike the traveller are the absence of timber, and the immense expanse of prairie, covered with the verdure of rich grasses, and highly adapted for pasturage. Wherever they are not disturbed by the

vicinity of man, large herds of buffalo give animation to this country. Westward of Laramie river, the region is sandy and apparently sterile; and the place of the grass is usurped by the artemisia and other odoriferous plants, to whose growth the sandy soil and dry air of this elevated region seem highly favorable."

#### Ecological Distribution

Cary (1917) described environmental pattern in Wyoming in terms of C. H. Merriam's system of life zones, which is essentially a system descriptive of ecological distribution (see Armstrong, 1972). Fort Laramie was mapped as a collecting locality; individual specimens of vertebrates were not listed. However, Cary described the vertebrate fauna and some of the vascular flora of the so-called Great Plains Division of the Upper Sonoran Zone.

The ecological distribution of the potential natural fauna of vertebrates of Fort Laramie National Historic Site is indicated in Appendix I in four broad habitat-types: aquatic (both standing and flowing water), wetlands (including sand- and gravel bars), riparian woodland and brush, and grassland/steppe (including both native and tame pastureland).

Table 7 compiles data on ecological distribution of vertebrate species by habitat-type. Some relationships are self-evident: fish are wholly aquatic, and amphibians mostly are restricted by their reproductive processes to aquatic or subaquatic habitats. Grassland habitats have the richest potential reptilian fauna and also provide habitat for half of the mammalian fauna. However, the habitat richest in avian and

mammalian life is riparian woodland.

That is particularly noteworthy given the fact that, by area, riparian woodland surely is the least extensive of local, terrestrial habitat-types. The richness of the woodland doubtless stems from the fact that it provides a ribbon of three-dimensional habitat through a largely two-dimensional landscape. The importance of the riparian system, both as corridor and habitat, should not be underestimated. Tubbs (1980) noted that, among birds, obligate riparian species outnumbered grassland obligates by seven-fold. He also noted that grazing, water diversion, and land conversion were the most destructive human impacts on the Great Plains at the present time, and that describes well the situation at Fort Laramie.

Riparian habitat allows further faunal enrichment by providing habitat for numerous migratory birds and a corridor westward for a number of species of eastern affinities, several of which reach western limits at this latitude in the vicinity of Fort Laramie (including the bullfrog, prairie-lined racerunner, many-lined skink, northern prairie lizard, common garter snake, red-headed woodpecker, eastern phoebe, bluejay, purple martin, mockingbird, orchard oriole, dickcissel, field sparrow, Virginia opossum, eastern mole, red bat, eastern cottontail, fox squirrel, and plains pocket gopher. Baird (1858b) noted an orange-shafted flicker from Fort Laramie as Colaptes hybridus, thereby tacitly pointing up the situation of Fort Laramie as a point of contact between eastern and western avifaunas.

The riparian woodland probably has been augmented some in the past 150 years, particularly by control of floods (through

impoundment and diversion for agricultural purposes) and fire. Given their wildlife diversity, it is gratifying to note that riparian ecosystems in the West are beginning to receive deserved research attention. For example, see recent symposia edited by Brosz and Rodgers (1986), DeGraff and Tilghman (1980), and Johnson et al. (1985).

Each of the habitat-types at Fort Laramie has undergone changes since the time of permanent European settlement a century and a half ago. The flow regime of the Laramie River probably has changed greatly, with lower high flood stages and lower low water due to impoundment and diversion for agricultural uses. Natural flooding has been controlled to some extent by the construction of dams and reservoirs. The serious decline and subsequent recovery of the beaver has also had an influence here as elsewhere in the West.

Wetlands in the study area once were largely restricted to successional marshlands in cutoff meanders. Such natural situations persist along the Laramie River, but they have been augmented greatly by seepage from the Laramie River Canal, which apparently began about the turn of the 20th Century (L. L. Armstrong, pers. comm.).

Grasslands have been altered by the demise of the bison, the diminution of grazing pressure, the fencing of once-open range, and the control of fire. Brushy edge situations probably have increased--influenced by those same forces--at the contact between riparian woodland and grassland.

The riparian woodland probably has been stabilized, through

control of floods and suppression of fires, and surely provides "better" (e. g., more stable and probably more diverse--albeit less "natural") habitat than it did 150 years ago.

#### SUMMARY AND CONCLUSIONS

Fort Laramie National Historic Site is a fascinating location for studies of human and natural history and their interaction. The major crossroads for pioneer trails west, Fort Laramie, at the confluence of the Laramie and North Platte rivers, also is in a natural zone of juxtaposition, overlap, and interaction between faunas of the Great Plains to the east and the mountains and semidesert basins to the west. The rivers provide a corridor through the area, leading eastern species westward, just as they led human settlers.

The potential natural fauna of the immediate vicinity of Fort Laramie is a rich and complex one, with some 16 species of fish, six amphibians, 17 reptiles, perhaps 226 kinds of birds, and some 58 species of mammals, a total of 323 species, of which 27 percent were observed in the course of a single years' field survey. The large potential fauna is allowed by the mosaic of local ecosystems, which includes aquatic systems, wetlands, riparian deciduous woodland and brush, and grasslands (including natural and tame pasturelands). Of these habitat-types, riparian woodland is richest in vertebrate species, but each habitat-type contributes uniquely to overall species richness.

The environment in the vicinity of Fort Laramie has undergone dramatic change in the past two or three centuries. Among the major influences have been: (1) the reintroduction of

the horse in the 17th Century, following by several millenia the extinction of native North American horses; (2) exploitation and virtual extirpation of the beaver, with dramatic consequences for riparian ecosystems; (3) exploitation and near extinction of the bison, with even more dramatic consequence for the grassland ecosystem; (4) diversion and impoundment of rivers, with change in the hydrologic regime producing substantial change in the seasonality of aquatic habitats; (5) fencing of range and concentration of grazing by domestic livestock, contemporary with the construction of diversion canals and ditches to support irrigated agriculture, eventually subsidized by fossil fuels and petrochemical fertilizers and biocides.

The list will continue. Change is a certainty. If not human-induced, it will happen by the inherent dynamic of ecosystems in ecological and evolutionary time. The question for managers is not whether change, but change in what direction.

Specific observations and recommendations are made at appropriate points in the preceding text. Our overall recommendation is to continue to include dynamic natural systems in the interpretive program of the National Historic Site. The natural history of the native fauna is an integral part of the dramatic human history of Fort Laramie.

Table 1. Calendar of activities during course of project.

(Initials of personnel: AWC = Aquatic and Wetland  
Consultants, Inc.; RAA = Rick A. Adams; DMA = David M.  
Armstrong; WCS = William C. Sears.)

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1986

13 December--Pre-proposal visit to Site--DMA

1987

27 May--field conference DMA, RAA, NPS Personnel

4-8 June--intensive field study--RAA

13-17 July--intensive field study--RAA

8 August--reconnaissance--DMA

11-15 September--intensive field study--RAA

13 November--fish survey--RAA and AWC

1988

21 January--reconnaissance--DMA and WCS

21 April--reconnaissance--DMA

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Table 2. Time-line of events important to the recent history of the fauna of Fort Laramie, Wyoming, 1800-1900.

---

1800

1805

1810

1812--Stuart Party discovers Laramie River

1815

1820

1821--Jacques LaRamie (Laramie) killed by Arapaho

1823--Jedediah Smith, Jim Bridger visit Laramie River

1825

1830--First wagon train passes Fort Laramie

1834--Fort William erected by William Sublette's men

1835

1836--Fort William sold to American Fur Company

1840

1841--Fort Platte erected; Bidwell-Bartleson Party

1842--John C. Frémont's first visit to Fort Laramie

1843--Whitman-Burnett Party to Oregon

1845--Col. Kearney's dragoons arrive at Fort Laramie

1847--Brigham Young and "Saints" enroute to Deseret

1848--Gold discovered at Sutter's Mill, California

1849--Fort Laramie sold to U. S. Army

1850

1851--10,000 Indian ponies move through Fort Laramie

1853--Cattle first wintered in Laramie Valley

1854--Indian war begins with death of Conquering Bear

1855

1856--First Mormon handcart party passes Fort Laramie

1858--Gold discovered on Clear Creek, Colorado

1860--Pony Express established, passing through Fort Laramie

1861--Transcontinental telegraph established; Pony Express abandoned

1865

1867--Union Pacific Railroad reaches Cheyenne

1869--Transcontinental railroad completed

1870

1874--Gold discovered in Black Hills, South Dakota

1875--Old Army Bridge built across North Platte

1876--Battle of the Little Bighorn

1880

1885

1889--7th Infantry transferred to Fort Logan, Colorado

1890--Fort Laramie buildings auctioned, proceeds, \$2500.

1895

1900--(approx.) construction of Laramie River Canal

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References: Johnson (1978); Mattes (1980).

Table 3. Results of fish survey, November 1987, compared with results of earlier reported surveys (Source: Canaday, 1983).

| Species            | Present Survey | 1981 Survey | 1974 Survey<br>North Platte River |
|--------------------|----------------|-------------|-----------------------------------|
| Rainbow Trout*     | Absent         | Few         |                                   |
| Brown Trout*       |                |             | Few                               |
| Carp               | Few            | Common      | Present                           |
| Fathead Minnow     | Absent         | Few         |                                   |
| Suckermouth Minnow |                |             | Rare                              |
| Brassy Minnow      |                |             | Rare                              |
| Creek Chub         | Common         | Common      | Present                           |
| Red Shiner         |                |             |                                   |
| Bigmouth Shiner    |                |             | Rare                              |
| Sand Shiner        |                |             | Rare                              |
| Hornyhead Chub     |                |             | Rare                              |
| Longnose Dace      | Common         | Absent      | Present                           |
| Stoneroller        | Few            | Common      | Present                           |
| Longnose Sucker    | Common         | Common      | Present                           |
| White Sucker       | Numerous       | Numerous    | Present                           |
| Catfish*           |                |             | Unknown                           |
| Green Sunfish      |                |             | Few                               |
| Johnny Darter      | Rare           |             |                                   |
| Yellow Perch       | Rare           | Common      | Absent                            |

\*Introduced species.

Table 4. Extent to which the potential natural vertebrate fauna (PNVF) has been observed in the course of fieldwork in Fort Laramie National Historic Site.

| CLASS       | SPECIES IN<br>PNVF | SPECIES<br>OBSERVED | % OBSERVED |
|-------------|--------------------|---------------------|------------|
| OSTEICHTYES | 16*                | 8                   | 50         |
| AMPHIBIA    | 6                  | 3                   | 50         |
| REPTILIA    | 17                 | 2                   | 12         |
| AVES        | 226**              | 56***               | 25         |
| MAMMALIA    | 58                 | 20                  | 34         |
| TOTAL       | 323                | 89                  | 27         |

\* = plus three introduced species; \*\* = plus five introduced species; \*\*\* = plus two introduced species.

Table 5. Birds listed by S. F. Baird as examined from Fort Laramie and vicinity (Baird, 1858b). (Initials of collectors: FTB = F. T. Bryan; JGC = J. G. Cooper; FVH = F. V. Hayden; WMM = W. M. Magraw; WSW = W. S. Wood.)

| Current Name<br>(Baird Name)                                        | Locality                      | Date                      | Page | Coll.      |
|---------------------------------------------------------------------|-------------------------------|---------------------------|------|------------|
| <u>Circus cyanaeus</u><br>( <u>Circus hudsonius</u> )               | right fork<br>Laramie river   | 4 Aug. 1856               | 40   | WSW        |
| <u>Picoides pubescens</u><br>( <u>Picus gairdneri</u> )             | Laramie River<br>Fort Laramie | Aug. 1856<br>28 Oct. 1857 | 92   | WSW<br>JGC |
| <u>Picoides tridactylus</u><br>( <u>Picoides dorsalis</u> )         | Laramie Peak                  | 25 Aug. 1857              | 101  | FVH        |
| <u>Sphyrapicus thyroideus</u><br>( <u>Sphyrapicus williamsoni</u> ) | Laramie Peak                  | 24 Aug. 1857              | 104  | FVH        |
| <u>Melanerpes lewis</u><br>( <u>Melanerpes torquatus</u> )          | Laramie Peak                  | 24 Aug. 1857              | 116  | FVH        |
| <u>Colaptes auratus</u><br>( <u>Colaptes mexicanus</u> )            | Fort Laramie                  | 11 Sept. 1857             | 122  | JGC        |
| <u>Chordeiles minor</u><br>( <u>Chordeiles popetue</u> )            | Fort Laramie                  | 16 Sept. 1857             | 153  | JGC        |
| <u>Tyrannus tyrannus</u><br>( <u>Tyrannus carolinensis</u> )        | Fort Laramie                  | 27 Aug. 1857              | 172  | JGC        |
| <u>Tyrannus verticalis</u><br>( <u>Tyrannus verticalis</u> )        | Fort Laramie                  | 27 Aug. 1857              | 174  | JGC        |
| <u>Catharus ustulatus</u><br>( <u>Turdus swainsoni</u> )            | Fort Laramie                  | 10 Sept. 1857             | 216  | JGC        |
| <u>Sialia currucoides</u><br>( <u>Sialia arctica</u> )              | Main Fork,<br>Laramie R.      | 6 Aug. 1856               | 225  | WSW        |
| <u>Geothlypis trichas</u><br>( <u>Geothlypis trichas</u> )          | Fort Laramie                  | 17 Sept. 1855             | 242  | JGC        |
| <u>Opornis tolmei</u><br>( <u>Geothlypis macgillivrayi</u> )        | Fort Laramie                  | 31 Aug. 1857              | 245  | JGC        |
| <u>Dendroica coronata</u><br>( <u>Dendroica audubonii</u> )         | Laramie Peak                  | no date                   | 274  | FVH        |

|                                          |              |               |     |     |
|------------------------------------------|--------------|---------------|-----|-----|
| <u>Wilsonia pusilla</u>                  | Fort Laramie | 27 Aug. 1857  | 294 | JGC |
| ( <u>Myiodioides pusillus</u> )          | Fort Laramie | 8 Sept. 1857  | 294 | JGC |
| <u>Piranga ludoviciana</u>               | Laramie Peak | 24 Aug. 1857  | 304 | FVH |
| ( <u>Piranga ludoviciana</u> )           | Fort Laramie | 8 Sept. 1857  | 304 | FVH |
|                                          |              | 17 Sept. 1857 | 304 | FVH |
| <u>Hirundo pyrrhonota</u>                | W Fork,      | 22 July 1857  | 310 | WSW |
| ( <u>Hirundo lunifrons</u> )             | Laramie R.   |               |     |     |
| <u>Myadestes townsendii</u>              | Fort Laramie | 5 Oct. 1857   | 322 | JGC |
| ( <u>Myiadeses townsendii</u> )          |              |               |     |     |
| <u>Lanius excubitor</u>                  | Fort Laramie | 9 Sept. 1857  | 328 | JGC |
| ( <u>Collyrio excubitoroides</u> )       |              |               |     |     |
| <u>Troglodytes aedon</u>                 | Fort Laramie | 18 Sept. 1857 | 368 | JGC |
| ( <u>Troglodytes parkmanni</u> )         |              |               |     |     |
| <u>Carduelis tristis</u>                 | Fort Laramie | 8 Sept. 1857  | 422 | JGC |
| ( <u>Chrysomitris tristis</u> )          |              |               |     |     |
| <u>Loxia curvirostra</u>                 | Laramie Peak | 1857          | 427 | FVH |
| ( <u>Curvirostra americana</u> )         |              |               |     |     |
| <u>Loxia leucoptera</u>                  | Laramie Peak | 25 Aug. 1857  | 428 | FVH |
| ( <u>Curvirostra leucoptera</u> )        |              |               |     |     |
| <u>Poocetes gramineus</u>                | Fort Laramie | 26 Aug. 1857  | 448 | JGC |
| ( <u>Pooetes gramineus</u> )             |              |               |     |     |
| <u>Junco hyemalis</u>                    | Laramie Peak | 25 Aug. 1857  | 468 | FVH |
| ( <u>Junco caniceps</u> )                |              |               |     |     |
| <u>Melospiza lincolni</u>                | Fort Laramie | 10 Sept. 1857 | 482 | JGC |
| ( <u>Melospiza lincolni</u> )            |              |               |     |     |
| <u>Passerina amoena</u>                  | Laramie Peak | 24 Aug. 1856  | 505 | FVH |
| ( <u>Cyanospiza amoena</u> )             |              |               |     |     |
| <u>Pipilo erythrophthalmus</u>           | Fort Laramie | 12 Sept. 1857 | 515 | JGC |
| ( <u>Pipilo arcticus</u> )               |              |               |     |     |
| <u>Chlorura chlorura</u>                 | Laramie Peak |               | 520 | FVH |
| ( <u>Pipilo chlorurus</u> )              |              |               |     |     |
| <u>Dolichonyx oryzivorus</u>             | 50 mi. E.    | 20 Aug. 1856  | 523 | JGC |
| ( <u>Dolichonyx oryzivorus</u> )         | Fort Laramie |               |     |     |
| <u>Xanthocephalus</u>                    |              |               |     |     |
| xanthocephalus                           | Fort Laramie | 12 Sept. 1857 | 532 | JGC |
| ( <u>Xanthocephalus icterocephalus</u> ) |              |               |     |     |
| <u>Euphagus cyanocephalus</u>            | Fort Laramie | 12 Sept. 1857 | 553 | JGC |
| ( <u>Scolecophagus cyanocephalus</u> )   |              |               |     |     |

|                                                                      |                                 |               |     |     |
|----------------------------------------------------------------------|---------------------------------|---------------|-----|-----|
| <u>Corvus corax</u><br>( <u>Corvus carnivorus</u> )                  | Fort Laramie                    | 13 Sept. 1857 | 563 | WMM |
| <u>Perisoreus canadensis</u><br>( <u>Perisoreus canadensis</u> )     | Laramie Peak                    |               | 591 | FVH |
| <u>Charadrius vociferus</u><br>( <u>Aegialitis vociferus</u> )       | Laramie River                   | Aug. 1858     | 692 | WSW |
| <u>Recurvirostra americana</u><br>( <u>Recurvirostra americana</u> ) | Platte R.<br>below Fort Laramie | 23 July       | 703 | WSW |
| <u>Capella gallinago</u><br>( <u>Gallinago wilsonii</u> )            | Fort Laramie                    | 20 Sept. 1857 | 711 | JGC |
| <u>Iringa melanoleuca</u><br>( <u>Gambetta melanoleuca</u> )         | Laramie River                   |               | 731 | FTB |

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Table 6. Number of individual small mammals captured on transects in each of three major habitat-types.

|                                     | Riparian Woodland |      |      | Shortgrass Prairie |      |      | Pasture/Sagebrush |      |      |
|-------------------------------------|-------------------|------|------|--------------------|------|------|-------------------|------|------|
|                                     | June              | July | Sept | June               | July | Sept | June              | July | Sept |
| # of Transects<br>(200 trap nights) | 2                 | 2    | 2    | 1                  | 4    | 2    | 2                 | 2    | 2    |
| Deer Mouse                          | 4                 | 2    | 2    | -                  | -    | 6    | 2                 | 2    | 1    |
| Western Harvest Mouse               | -                 | -    | -    | -                  | -    | 1    | 1                 | -    | -    |
| Plains Harvest Mouse                | -                 | -    | -    | -                  | -    | -    | -                 | -    | 2    |
| Prairie Vole                        | -                 | 1    | 4    | -                  | -    | 3    | -                 | -    | -    |

\*Traps pulled after three nights if no captures recorded.

Table 7. Summary of ecological distribution of potential natural vertebrate fauna in four habitat types.

| Class (no. spp.) | Aquatic | Wetland | Riparian<br>Woodland | Grassland/<br>Pasture |
|------------------|---------|---------|----------------------|-----------------------|
| Fishes (16)      | 16      | --      | --                   | --                    |
| Percentage       | 100     |         |                      |                       |
| Amphibians (6)   | 5       | 5       | 2                    | 1                     |
| Percentage       | 83      | 83      | 33                   | 17                    |
| Reptiles (17)    | 6       | 3       | 7                    | 9                     |
| Percentage       | 35      | 18      | 41                   | 53                    |
| Birds (231)      | 44      | 84      | 137                  | 51                    |
| Percentage       | 19      | 36      | 59                   | 22                    |
| Mammals (58)     | 4       | 11      | 31                   | 29                    |
| Percentage       | 7       | 19      | 53                   | 50                    |

## APPENDIX I

### POTENTIAL NATURAL VERTEBRATE FAUNA OF FORT LARAMIE NATIONAL HISTORIC SITE, GOSHEN COUNTY, WYOMING

(So that this may function as a field checklist, introduced species are included. Annotations: \* = species observed in course of fieldwork, 1987-1988; ecological distribution: A = aquatic; W = wetlands, shoreline; R = riparian woodland, brush; G = grassland and steppe, including native and tame pasturelands; seasonal status (shown in parentheses for birds only), (R) = resident, year-around; (W) = winter visitor; (S) = summer resident, possible or probably breeder; (M) = migrant; data mostly after Baxter and Stone, 1985; Oakleaf et al., 1982; Clark and Stromberg, 1987.)

#### CLASS OSTEICHTHYES--BONY FISHES

##### FAMILY SALMONIDAE--SALMON AND ALLIES

- Rainbow trout--Salmo gairdneri (introduced), A
- Brown Trout--Salmo trutta (introduced), A

##### FAMILY CYPRINIDAE--MINNOWS AND ALLIES

- ✓\*Carp--Cyprinus carpio, A
- Fathead Minnow--Pimephales promelas, A
- Suckermouth Minnow--Phenacobius mirabilis, A
- Brassy Minnow--Hybognathus hankinsoni, A
- ✓\*Creek Chub--Semotilus atromaculatus, A
- Red Shiner--Notropis lutrensis, A
- Bigmouth Shiner--Notropis dorsalis, A
- Sand Shiner--Notropis stramineus, A
- Hornyhead Chub--Nocomis biguttatus, A
- ✓\*Longnose Dace--Rhinichthys cataractae, A
- ✓\*Stoneroller--Campostoma anomalum, A

##### FAMILY CATOSTOMIDAE--SUCKERS

- ✓\*Longnose Sucker--Catostomus catostomus, A
- ✓\*White Sucker--Catostomus commersoni, A

##### FAMILY ICTALURIDAE--NORTH AMERICAN CATFISHES

- Catfish--Ictalurus sp. (introduced), A

##### FAMILY CENTRARCHIDAE--SUNFISHES

- Green Sunfish--Lepomis cyanellus, A

##### FAMILY PERCIDAE--PERCHES

- ✓\*Johnny Darter--Etheostoma nigrum, A
- ✓\*Yellow Perch--Perca flavescens, A

#### CLASS AMPHIBIA--AMPHIBIANS

##### FAMILY AMBYSTOMATIDAE--SALAMANDERS

- Tiger Salamander--Ambystoma tigrinum, A, W

FAMILY PELOBATIDAE--SPADEFEET

Plains Spadefoot--Scaphiopus bombifrons, G

FAMILY BUFONIDAE--TOADS

✓\*Woodhouse's Toad--Bufo woodhousei, A, W, R

FAMILY HYLIDAE--TREE FROGS

✓\*Boreal Chorus Frog--Pseudacris triseriata, A, W, R

FAMILY RANIDAE--TRUE FROGS

✓\*Leopard Frog--Rana pipiens, A, W  
Bullfrog--Rana catesbeiana, A, W

CLASS REPTILIA--REPTILES

FAMILY TRIONYCHIDAE--SOFT-SHELLED TURTLES

Western Spiny Softshell--Trionyx spinifera, A

FAMILY EMYIDIDAE--POND TURTLES

Ornate Box Turtle--Terrepenne ornata, G

Western Painted Turtle--Chrysemys picta, A

FAMILY CHELYDRIDAE--SNAPPING TURTLES

✓\*Common Snapping Turtle--Chelydra serpentina, A

FAMILY TEIIDAE--RACERUNNERS

Prairie Lined Racerunner--Cnemidophorus sexlineatus, G

FAMILY SCINCIDAE--SKINKS

Many-lined Skink--Eumeces multivirgatus, R

FAMILY IGUANIDAE--IGUANID LIZARDS

Sagebrush Lizard--Sceloporus graciosus, G

Prairie Lizard--Sceloporus undulatus, G

Eastern Short-horned Lizard--Phrynosoma douglassi, G

FAMILY COLUBRIDAE--COLUBRID SNAKES

Yellow-bellied Racer--Coluber constrictor, R

Hognosed Snake--Heterodon nasicus, R, G

Milk Snake--Lampropeltis triangulum, R, G

✓\*Bullsnake--Pituophis melanoleucus, R, G

Plains Garter Snake--Thamnophis radix, A, W, R

Wandering Garter Snake--Thamnophis elegans, A, W, R

Red-sided Garter Snake--Thamnophis sirtalis, A, W, R

(catenifer) entered as is but may have wrong species name

FAMILY VIPERIDAE--VIPERS

Prairie Rattlesnake--Crotalus viridis, G

CLASS AVES--BIRDS

FAMILY GAVIIDAE--LOONS

Common Loon--Gavia immer, A, W (M)

FAMILY PODICIPEDIDAE--GREBES

- Red-necked Grebe--Podiceps grisgena, A, W (M)
- Horned Grebe--Podiceps auritus, A, W (M)
- Western Grebe--Aechmophorus occidentalis, A, W (S)
- Eared Grebe--Podilymbus nigricollis, A, W, (M)
- Pied-billed Grebe--Podilymbus podiceps, A, W, (S)

FAMILY PELECANIDAE--PELECANUS

- White Pelican--Pelecanus erythrorhynchos, A, W (S)

FAMILY PHALACROCORACIDAE--CORMORANTS

- Double-crested Cormorant--Phalacrocorax auritus, A, W (S)

FAMILY ARDEIDAE--HERONS AND BITTERNS

- ✓\*Great Blue Heron--Ardea herodias, A, W, R (S)
- Snowy Egret--Egretta thula, A, W, R (S)
- ✓\*Black-crowned Night Heron--Butorides striatus, A, W, R (S)
- American Bittern--Botaurus lentigenosus, A, W (S)

left out due  
to Z different  
birds:

nycticorax nycticorax

green-backed heron

FAMILY THRESKIORNITHIDAE--IBISES

- White-faced Ibis--Plegadis chihi, A, W (S)

FAMILY ANATIDAE--DUCKS

- Whistling Swan--Olor columbianus, A, W (M)
- ✓\*Canada Goose--Branta canadensis, A, W (R)
- White-fronted Goose--Anser albifrons, A, W (M)
- Snow Goose--Chen caerulescens, A, W (M)
- ✓\*Mallard--Anas platyrhynchos, A, W (R)
- Gadwall--Anas strepera, A, W (R)
- ✓\*Northern Pintail--Anas acuta, A, W (R)
- ✓\*Green-winged Teal--Anas crecca, A, W (R)
- Blue-winged Teal--Anas discors, A, W (S)
- American Widgeon--Anas americana, A, W (R)
- Northern Shoveler--Anas clypeata, A, W (S)
- Wood Duck--Aix sponsa, A, W (S)
- Redhead--Aythya americana, A, W (S)
- Ring-necked Duck--Aythya collaris, A, W (S)
- Canvasback--Aythya valesinieria, A, W (S)
- Greater Scaup--Aythya marila, A, W (M)
- Lesser Scaup--Aythya affinis, A, W (S)
- Common Goldeneye--Bucephala clangula, A, W (R)
- Bufflehead--Bucephala albeola, A, W (R)
- Ruddy Duck--Oxyura jamaicensis, A, W (S)
- ✓\*Common Merganser--Mergus merganser, A, W (R)
- Red-breasted Merganser--Mergus serrator, A, W (S)

FAMILY CATHARTIDAE--VULTURES

- Turkey Vulture--Cathartes aura, R, G (S)

FAMILY ACCIPITRIDAE--HAWKS

- Goshawk--Accipiter gentilis, R, G (S)
- Sharp-shinned Hawk--Accipiter striatus, R, G (S)
- ✓\*Cooper's Hawk--Accipiter cooperii, R (S)
- ✓\*Red-tailed Hawk--Buteo jamaicensis, R, G (R)

Swainson's Hawk--Buteo swainsoni, R, G (S)  
 Rough-legged Hawk--Buteo lagopus, R (W)  
 Ferruginous Hawk--Buteo regalis, R (R)  
 ✓ \*Golden Eagle--Aquila chrysaetos, R, G (R)  
 Bald Eagle--Haliaeetus leucocephalus, R (R)  
 Northern Harrier=Marsh Hawk--Circus cyaneus, W (S)

#### FAMILY PANDIONIDAE--OSPREY

Osprey--Pandion haliaetus, A, W (S)

#### FAMILY FALCONIDAE--FALCONS

Prairie Falcon--Falco mexicanus, G (R)  
 Peregrine Falcon--Falco peregrinus, A, W (R)  
 Merlin--Falco columbarius, R (R)  
 ✓ \*American Kestrel--Falco sparverius, R (S)

#### FAMILY TETRAONIDAE--GROUSE

Sharp-tailed Grouse--Podioecetes phasianellus, G (R)  
 Sage Grouse--Centrocercus urophasianus, G (R)  
 Bobwhite--Colinus virginianus (introduced), G, R (R)

#### FAMILY PHASIANIDAE--PHEASANTS

Ring-necked Pheasant--Phasianus colchicus (introduced), G (R)  
 Gray Partridge--Perdix perdix (introduced), G, R (R)

#### FAMILY MELEAGRIDAE--TURKEYS

✓ \*Turkey--Meleagris gallopavo, R (R)

#### FAMILY GRUIDAE--CRANES

Sandhill Crane--Grus canadensis, W (S)

#### FAMILY RALLIDAE--RAILS AND ALLIES

Virginia Rail--Rallus limnicola, W (S)  
 Sora--Porzana carolina, W (S)  
 ✓ \*American Coot--Fulica americana, A, W (S)

#### FAMILY CHARADRIIDAE--PLOVERS

✓ \*Semipalmated Plover--Charadrius semipalmatus, W (M)  
 ✓ \*Killdeer--Charadrius vociferus, W, G (S)  
 Piping Plover--Charadrius melodus, W, G (M)  
 Mountain Plover--Charadrius montanus, W, G (S)  
 Black-bellied Plover--Pluvialis squatarola, W (M)

#### FAMILY SCOLOPACIDAE--SANDPIPERS AND ALLIES

Common Snipe--Gallinago gallinago, W (S)  
 Long-billed Curlew--Numenius americanus, W (S)  
 Upland Sandpiper--Bartramia longicauda, G (S)  
 ✓ \*Spotted Sandpiper--Actitis macularia, W (S)  
 Solitary Sandpiper--Tringa solitaria, W (M)  
 Willet--Catoptrophorus semipalmatus, W (S)  
 Greater Yellowlegs--Tringa melanoleuca, W (M)  
 Lesser Yellowlegs--Tringa flavipes, W (M)  
 Pectoral Sandpiper--Calidris melanotos, W (M)  
 Dunlin--Calidris alpina, W (M)

Semipalmated Sandpiper--Calidris pusilla, W (M)  
Western Sandpiper--Calidris mauri, W (M)  
White-rumped Sandpiper--Calidris fuscicollis, W (M)  
Baird's Sandpiper--Calidris bairdii, W (M)  
Least Sandpiper--Calidris minutella, W (M)  
Stilt Sandpiper--Micropalama himantopus, W (M)  
Long-billed Dowitcher--Limnodromus scolopaceus, W (M)  
Marbled Godwit--Limosa fedoa, W (M)

**FAMILY RECURVIROSTRIDAE--AVOCETS AND STILTS**

American Avocet--Recurvirostra americana, W (S)  
Black-necked Stilt--Himantopus mexicanus, W (M)

**FAMILY PHALAROPIDAE--PHALAROPES**

Wilson's Phalarope--Phalaropus tricolor, W (S)  
Red-Necked Phalarope--Phalaropus lobatus, W (M)

**FAMILY LARIDAE--GULLS**

Herring Gull--Larus argentatus, W, G (M)  
California Gull--Larus californicus, W, G (S)  
Ring-billed Gull--Larus delewarensis, W, G (S)  
Franklin's Gull--Larus pipixcan, W, G (S)  
Caspian Tern--Sterna caspia, W (S)  
Forster's Tern--Sterna forsteri, W, G (S)

**FAMILY COLUMBIDAE--DOVES**

Rock Dove--Columba livia (introduced), R (R)  
✓ \*Mourning Dove--Zenaida macroura, R (S)  
Passenger Pigeon--Ectospistes migratorius--extinct, R (S)

**FAMILY CUCULIDAE--CUCKOOS**

Yellow-billed Cuckoo--Coccyzus americanus, R (S)  
Black-billed Cuckoo--Coccyzus erythrophthalmus, R (S)

**FAMILY STRIGIDAE--OWLS**

Barn Owl--Tyto alba, R (S)  
✓ \*Western Screech Owl--Otus kennicottii, R (R)  
✓ \*Great Horned Owl--Bubo virginianus, R (R)  
Burrowing Owl--Athene cunicularia, G (S)  
Long-eared Owl--Asio otus, R (R)  
Short-eared Owl--Asio flammeus, R (R)  
Northern Saw-whet Owl--Aegolius acadicus, R (R)

**FAMILY CAPRIMULGIDAE--GOATSUCKERS**

Poorwill--Phalaenoptilus nuttallii, R (S)  
✓ \*Common Nighthawk--Chordeiles minor, R (S)

**FAMILY APODIDAE--SWIFTS**

White-throated Swift--Aeronautes saxatilis, A, W, R (S)

**FAMILY TROCHILIDAE--HUMMINGBIRDS**

Broad-tailed Hummingbird--Selasphorus platycercus, R (S)

**FAMILY ALCEDINIDAE--KINGFISHERS**

✓ \*Belted Kingfisher--Ceryle alcyon, A, W, R (R)

FAMILY PICIDAE--Woodpeckers

- ✓\*Northern Flicker--Colaptes auratus, R, G (R)
- ✓\*Red-headed Woodpecker--Melanerpes erythrocephalus, R (S)
- Lewis' Woodpecker--Melanerpes lewis, R (S)
- Yellow-bellied Sapsucker--Sphyrapicus varius, R (S)
- ✓\*Hairy Woodpecker--Picoides villosus, R (R)

FAMILY TYRANNIDAE--FLYCATCHERS

- ✓\*Eastern Kingbird--Tyrannus tyrannus, R (S)
- ✓\*Western Kingbird--Tyrannus verticalis, R (S)
- Cassin's Kingbird--Tyrannus vociferans, R (S)
- Eastern Phoebe--Sayornis phoebe, R (S)
- ✓\*Say's Phoebe--Sayornis saya, R (S)
- Least Flycatcher--Empidonax minimus, R (S)
- Hammond's Flycatcher--Empidonax hammondi, R (S)
- Western Flycatcher--Empidonax difficilis, R (S)
- Western Wood Pewee--Contopus sordidulus, R (S)
- ✓\*Olive-sided Flycatcher--Contopus borealis, R (S)

FAMILY ALAUDIDAE--LARKS

- Horned Lark--Eremophila alpestris, G (R)

FAMILY HIRUNDINIDAE--SWALLOWS

- ✓\*Violet-green Swallow--Tachycineta thalassina, A, W (S)
- Tree Swallow--Tachycineta bicolor, W, R (S)
- Bank Swallow--Riparia riparia, W, R (S)
- Northern Rough-winged Swallow--Stelgidopteryx serripennis, A, W (S)
- ✓\*Barn Swallow--Hirundo rustica, A, W, R (S)
- ✓\*Cliff Swallow--Hirundo pyrrhonota, A, W, R (S)
- Purple Martin--Progne subis, W, R (S)

FAMILY CORVIDAE--JAYS AND ALLIES

- ✓\*Blue Jay--Cyanocitta cristata, R (R)
- ✓\*Steller's Jay--Cyanocitta stelleri, R (R)
- ✓\*Black-billed Magpie--Pica pica, R, G (R)
- ✓\*Common Raven--Corvus corax, R, G (R)
- ✓\*Common Crow--Corvus brachyrhynchos, R, G (R)
- Pinyon Jay--Gymnorhinus cyanocephalus, R (R)

FAMILY PARIDAE--TITS

- Black-capped Chickadee--Parus atricapillus, R (R)
- Mountain Chickadee--Parus gambeli, R (R)
- ✓\*Plain Titmouse--Parus inornatus, R (R)

FAMILY SITTIDAE--NUTHATCHES

- White-breasted Nuthatch--Sitta carolinensis, R (R)
- Red-breasted Nuthatch--Sitta canadensis, R (R)
- Pygmy Nuthatch--Sitta pygmaea, R (R)

FAMILY CERTHIIDAE--CREEPERS

- ✓\*Brown Creeper--Certhia familiaris, R (R)

FAMILY CINCLIDAE--DIPPER

American Dipper--Cinclus mexicanus, R (R)

FAMILY TROGLODYTIDAE--WRENS

- ✓\*House Wren--Troglodytes aedon, R (S)
- Long-billed Marsh Wren--Telmatodytes palustris, W (S)
- Canyon Wren--Catherpes mexicanus, R (S)
- ✓\*Rock Wren--Salpinctes obsoletus, R (S)

FAMILY MIMIDAE--MOCKINGBIRDS AND ALLIES

- ✓\*Northern Mockingbird--Mimus polyglottos, R (S)
- Gray Catbird--Dumatella carolinensis, R (S)
- ✓\*Brown Thrasher--Toxostoma rufum, R (S)
- ✓\*Sage Thrasher--Oreoscoptes montanus, R (S)

FAMILY TURDIDAE--THRUSHES

- Swainson's Thrush--Catharus ustulatus, R (S)
- Gray-cheeked Thrush--Catharus minimus, R (M)
- Veery--Catharus fuscescens, R (S)
- ✓\*American Robin--Turdus migratorius, R, G (R)
- Eastern Bluebird--Sialia sialis, R, G (S)
- Western Bluebird--Sialia mexicana, R, G (S)
- Mountain Bluebird--Sialia currucoides, R, G (S)
- Townsend's Solitaire--Myadestes townsendi, R (R)

FAMILY SYLVIIDAE--OLD WORLD WARBLERS

- Blue-gray Gnatcatcher--Polioptila caerulea, R (S)

FAMILY MOTACILLIDAE--PIPITS

- Sprague's Pipit--Anthus spragueii, G (M)

FAMILY BOMBYCILLIDAE--WAXWINGS

- Bohemian Waxwing--Bombycilla garrulus, R (W)
- Cedar Waxwing--Bombycilla cedrorum, R (R)

FAMILY LANIIDAE--SHRIKES

- Northern Shrike--Lanius excubitor, G, R, (W)
- ✓\*Loggerhead Shrike--Lanius ludovicianus, G, R (S)

FAMILY STURNIDAE--STARLING

- ✓\*Starling--Sturnus vulgaris (introduced), R, G (R)

FAMILY VIREONIDAE--VIREOS

- Solitary Vireo--Vireo solitarius, R (S)
- Red-eyed Vireo--Vireo olivaceus, R (S)
- Warbling Vireo--Vireo gilvus, R (S)

FAMILY PARULIDAE--WARBLERS

- Black-and-White Warbler--Mniotilta varia, R (M)
- ✓\*Yellow Warbler--Dendroica petechia, R (S)
- Yellow-rumped Warbler--Dendroica coronata, R (S)
- ✓\*MacGillivray's Warbler--Oporhis tolmiei, R (S)
- Common Yellowthroat--Geothlypis trichas, R (S)
- ✓\*Yellow-breasted Chat--Icterna virens, R (S)
- Wilson's Warbler--Wilsonia pusilla, R (S)
- Tennessee Warbler--Vermivora peregrina, R (M)

Northern Parula--Parula americana, R (M)  
 Magnolia Warbler--Dendroica magnolia, R (M)  
 Blackpoll Warbler--Dendroica striata, R (M)  
 Palm Warbler--Dendroica palmarum, R (M)  
 Ovenbird--Seiurus aurocapillus, R (S)  
 Northern Waterthrush--Seiurus novaboracensis, R (M)  
 American Redstart--Setophaga ruticilla, R (S)

#### FAMILY PLOECIDAE--WEAVER FINCHES

✓\*House Sparrow--Passer domesticus (introduced), R, G (R)

#### FAMILY ICTERIDAE--ORIOLES

Bobolink--Dolichonyx oryzivorus, G (S)  
 ✓\*Western Meadowlark--Sturnella neglecta, G (S)  
 ✓\*Yellow-headed Blackbird--Xanthocephalus xanthocephalus, W (S)  
 ✓\*Red-winged Blackbird--Agelaius phoeniceus, W (S)  
 Orchard Oriole--Icterus spurius, R (S)  
 ✓\*Northern Oriole--Icterus galbula, R (S)  
 Rusty Blackbird--Euphagus carolinus, R, G (M)  
 ✓\*Brewer's Blackbird--Euphagus cyanocephalus, G (S)  
 ✓\*Common Grackle--Quiscalus quiscula, R, G (S)  
 ✓\*Brown-headed Cowbird--Molothrus ater, R (S)

#### FAMILY THRAUPIDAE--TANAGERS

✓\*Western Tanager--Piranga ludoviciana, R (S)  
 Scarlet Tanager--Piranga olivacea, R (S)

#### FAMILY FRINGILLIDAE--SPARROWS AND ALLIES

Rose-breasted Grosbeak--Pheucticus ludoviciana, R (M)  
 Black-headed Grosbeak--Pheucticus melanocephalus, R (S)  
 Blue Grosbeak--Guiraca caerulea, R (S)  
 Lazuli Bunting--Passerina amoena, R (S)  
 Dickcissel--Spiza americana, G (S)  
 Evening Grosbeak--Coccothraustes vespertina, R (R)  
 Cassin's Finch--Carpodacus cassinii, R (R)  
 ✓\*House Finch--Carpodacus mexicanus, R (R)  
 Pine Grosbeak--Pinicola enucleator, R (R)  
 Gray-crowned Rosy Finch--Leucosticte tephrocotis, G, R, (R)  
 Common Redpoll--Carduelis flammea, R (W)  
 Pine Siskin--Carduelis pinus, R (W)  
 ✓\*American Goldfinch--Carduelis tristis, G (R)  
 Red Crossbill--Loxia curvirostra, R (R)  
 White-winged Crossbill--Loxia leucoptera, R (R)  
 Green-tailed Towhee--Chlorura chlorura, R (S)  
 ✓\*Rufous-sided Towhee--Pipilo erythrophthalmus, R (S)  
 Lark Bunting--Calamospiza melanocorys, G (S)  
 Grasshopper Sparrow--Ammodramus savannarum, G (S)  
 ✓\*Vesper Sparrow--Pooecetes gramineus, G (S)  
 ✓\*Dark-eyed Junco--Junco hyemalis, R, G (R)  
 American Tree Sparrow--Spizella arborea, R (W)  
 Clay-colored Sparrow--Spizella pallida, R, G (S)  
 Field Sparrow--Spizella pusilla, G (S)  
 Harris' Sparrow--Zonotrichia querula, R, G (S)  
 ✓\*White-crowned Sparrow--Zonotrichia leucophrys, R, G (R)

184 possible breeders  
58 observed  

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32% documented

- Fox Sparrow--Passerella iliaca, R, G (R)  
✓ \*Song Sparrow--Melospiza melodia, W, R (R)  
✓ Lapland Longspur--Calcarius lapponicus, G (W)  
Snow Bunting--Plectrophenax nivalis, R (W)

## CLASS MAMMALIA--MAMMALS

### FAMILY DIDELPHIDAE--OPOSSUMS

- ✓ \*Virginia Opossum--Didelphis virginiana, R

### FAMILY SORICIDAE--SHREWS

- Masked Shrew--Sorex cinereus, W  
Merriam's Shrew--Sorex merriami, G

### FAMILY TALPIDAE--MOLES

- ✓ \*Eastern Mole--Scalopus aquaticus, R, G

### FAMILY VESPERTILIONIDAE--COMMON BATS

- Long-eared Myotis--Myotis evotis, R  
Small-footed Myotis--Myotis leibii, R  
✓ \*Little Brown Bat--Myotis lucifugus, R  
Fringed Myotis--Myotis thysanodes, R  
Long-legged Myotis--Myotis volans, R  
Silver-haired Bat--Lasionycteris noctivagans, R  
Big Brown Bat--Eptesicus fuscus, R  
Red Bat--Lasiurus borealis, R  
Hoary Bat--Lasiurus cinereus, R  
Townsend's Big-eared Bat--Plecotus townsendii, R

### FAMILY LEPORIDAE--RABBITS AND HARES

- ✓ \*Desert Cottontail--Sylvilagus audubonii, G  
Eastern Cottontail--Sylvilagus floridanus, R  
White-tailed Jackrabbit--Lepus townsendii, G  
Black-tailed Jackrabbit--Lepus californicus, G

### FAMILY SCIURIDAE--SQUIRRELS

- Spotted Ground Squirrel--Spermophilus spilosoma, G  
✓ \*13-lined Ground Squirrel--Spermophilus tridecemlineatus, G  
Black-tailed Prairie Dog--Cynomys ludovicianus, G  
✓ \*Fox Squirrel--Sciurus niger, R

### FAMILY GEOMYIDAE--POCKET GOPHERS

- ✓ \*Plains Pocket Gopher--Geomys bursarius, G

### FAMILY HETEROMYIDAE--POCKET MICE AND ALLIES

- Olive-backed Pocket Mouse--Perognathus fasciatus, G  
✓ \*Hispid Pocket Mouse--Perognathus hispidus, G — invalid use, should be  
✓ \*Ord's Kangaroo Rat--Dipodomys ordii, G *chaetodipus hispidus*

### FAMILY CASTORIDAE--BEAVER

- ✓ \*Beaver--Castor canadensis, A, W, R

### FAMILY MURIDAE--RATS AND MICE

- ✓ \*Western Harvest Mouse--Reithrodontomys megalotis, G  
✓ \*Plains Harvest Mouse--Reithrodontomys montanus, G

- ✓\*Deer Mouse--Peromyscus maniculatus, R, G
- Northern Grasshopper Mouse--Onychomys leucogaster, G
- ✓\*Prairie Vole--Microtus ochrogaster, W, G
- ✓\*Muskrat--Ondatra zibethicus, A, W
- ✓Sagebrush Vole--Lemmys curtatus, G
- House Mouse--Mus musculus (introduced), R, G

#### FAMILY ZAPODIDAE--JUMPING MICE

- Meadow Jumping Mouse--Zapus hudsonicus, W

#### FAMILY ERETHIZONTIDAE--PORCUPINES

- ✓\*Porcupine--Erethizon dorsatum, R

#### FAMILY CANIDAE--DOGS AND ALLIES

- ✓\*Coyote--Canis latrans, R, G
- Gray Wolf--Canis lupus--extirpated, G
- Swift Fox--Vulpes velox, G
- ✓\*Red Fox--Vulpes vulpes, W, R, G
- Gray Fox--Urocyon cinereoargenteus, R

#### FAMILY PROCYONIDAE--RACCOONS AND ALLIES

- ✓\*Raccoon--Procyon lotor, W, R

#### FAMILY URSIDAE--BEARS

- Grizzly Bear--Ursus arctos--extirpated, R, G

#### FAMILY MUSTELIDAE--WEASELS AND ALLIES

- ✓\*Long-tailed Weasel--Mustela frenata, W, R, G
- Black-footed Ferret--Mustela nigripes--extirpated, G
- Mink--Mustela vison, A, W
- Badger--Taxidea taxus, G
- ✓\*Striped Skunk--Mephitis mephitis, W, R, G
- ✓\*Western Spotted Skunk--Spilogale gracilis, R → invalid name, should be spilogale putorius (eastern or garter)
- River Otter--Lutra canadensis--extirpated, A, W

#### FAMILY FELIDAE--CATS

- Mountain Lion--Felis concolor, R
- Bobcat--Felis rufus, R

#### FAMILY CERVIDAE--DEER

- Elk, or Wapiti--Cervus elaphus--extirpated, R, G
- ✓\*Mule Deer--Odocoileus hemionus, R
- ✓\*White-tailed Deer--Odocoileus virginianus, R

#### FAMILY ANTILOCAPRIDAE--PRONGHORN

- Pronghorn--Antilocapra americana, G

#### FAMILY BOVIDAE--CATTLE AND ALLIES

- Bison--Bison bison--extirpated, G
- Bighorn Sheep--Ovis canadensis--extirpated, R

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