

3

Revising the "Wild" West

Big Game Meets the Ultimate Keystone Species

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In the view of historical ecologists, two catastrophes shaped the biogeography of large mammals in the New World. The first was the prehistoric extinction of large animals (megafauna; see Table 3.1). About 13,000 years ago (11,000 radiocarbon years B.P.), the Americas rapidly lost two-thirds of their large mammals, including all species of elephants (*Proboscidea*), horses, glyptodonts, and ground sloths. Not only in America but around the globe in all lands colonized by humans, prehistoric extinctions of land animals large and small, scaling to surface land area, occurred when people arrived (MacPhee and Marx 1997; Martin 1990; Martin and Steadman 1999; Steadman 1995). Despite considerable change in North America over the past 10,000 years (Dickinson 1995), there has been little further loss of large mammals. By then continental extinction had run its course.

The second catastrophe, the Columbian exchange, left its mark especially on the native inhabitants of the New World, as well as on the postextinction biota. Beginning in 1492, any equilibria that may have existed between Native Americans and their environment, including the standing crop of such preferred prey as large ungulates, vanished with the contact. Perhaps the most potent agent of destructive change was disease arriving in various strains from the Old World. Lacking immunity, Native Americans suffered a high mortality rate, as high as 95 percent according to one estimate (Dobyns 1983, 1993), although lower levels have also been posited (e.g., Snow 1995; see also Boyd 1999; Larsen 1994; Ramanofsky 1987; Reff 1991; Verano and Ubelaker 1992). To add to the ferment, contact also brought new drugs, metal weapons including guns, domestic animals, plants, and strange new legal, economic, and religious traditions. We mention these monumental changes to set the stage for a fresh look at allegedly "wild America" and its megafauna at the time of European contact.

Survivors of Two Catastrophes

Since Robert Paine's classic work on the seastar, *Piaster* (Navarette and Menge 1996), ecologists have surmised that the activities of "keystone species," including predators, determine community composition. Recently, Charles Kay (1994, 1998), Michael Alvard (1993, 1995), and others (Kay and Simmons 2002) have reassessed the role of Native Americans in this regard, replacing the concept of an "ecologically noble savage" with that of an "ultimate keystone

Table 3.1

Large (> 40 kilograms) mammals of the Late Quaternary, western United States and northern Mexico

Scientific name	Common name	Scientific name	Common name
<i>Alces alces</i>	Moose, moose deer	† <i>Mammuthus jeffersonii</i>	Jefferson's mammoth
<i>Antilocapra americana</i>	Pronghorn	† <i>Mammuthus primigenius</i>	Woolly mammoth
*† <i>Arctodus simus</i>	Giant short-faced bear	*† <i>Megalonyx jeffersonii</i>	Jefferson's ground sloth
<i>Bison bison</i>	Bison	† <i>Mylohyus</i>	Long-nosed peccary
† <i>Bison</i> spp.	Bison taxa	† <i>Navahoceros fricki</i>	Mountain deer
*† <i>Bootherium bombifrons</i>	Bonnet-headed musk ox	*† <i>Nothrotheriops shastense</i>	Shasta ground sloth
*† <i>Camelops heterenus</i>	Western camel	<i>Odocoileus hemionus</i>	Mule deer
*† <i>Canis dirus</i>	Dire wolf	<i>Odocoileus virginianus</i>	Virginia deer
<i>Canis lupus</i>	Gray wolf	<i>Oreamnos americanus</i>	White-tail mountain goat
<i>Cervus elaphus</i>	Elk, wapiti	*† <i>Oreamnos harringtoni</i>	Harrington's extinct mountain goat
† <i>Equus conversidens</i>	Mexican horse	<i>Ovis canadensis</i>	Bighorn
† <i>Equus occidentalis</i>	Western horse	*† <i>Panthera leo atrox</i>	American lion
*† <i>Equus</i> sp.	Horses, asses	<i>Panthera onca</i>	Jaguar
† <i>Euceratherium collinum</i>	Shrub ox	*† <i>Platygonus compressus</i>	Flat-headed peccary
<i>Felis concolor</i>	Mountain lion	<i>Rangifer tarandus</i>	Woodland caribou
*† <i>Glossotherium harlani</i>	Big-tongued ground sloth	*† <i>Smilodon fatalis</i>	Saber tooth
† <i>Glyptotherium floridanum</i>	Glyptodont	*† <i>Tapirus</i> sp.	Extinct tapir
† <i>Hemiauchenia macrocephala</i>	Long-legged llama	<i>Ursus americanus</i>	Black bear
*† <i>Mammuth americanus</i>	American mastodon	<i>Ursus arctos</i>	Grizzly bear
*† <i>Mammuthus columbi</i>	Columbian mammoth		
† <i>Mammuthus exilis</i>	Dwarf mammoth		

* Youngest radiocarbon dates of ca. 11,000 years a.p.

† Extinct or regionally extirpated before the Holocene.

species." Traditionally, zoologists and natural historians have paid little attention to the effect of Native Americans on the distribution and numbers of large animals, even of those that served as preferred prey. We propose, however, that hunting activity by sizable and stable human populations, supported by other resources, drove populations of highly desirable "target species" or "preferred prey" to low levels, or even to local extinction, the end result being game sinks. How, then, could certain regions of North America such as the upper Missouri River, the Yellowstone River, and the Red River of the North manage to support vast herds of game? Ethnohistorians may have the answer.

At least in some regions large numbers of desirable game animals lived in the shelter of a war zone (Hickerson 1965, 1970). For example, west of the Great Lakes in the disputed lands between warring Chippewa and Sioux, the hunters were also the hunted, and game thrived. When hunters no longer had anything to fear in the disputed lands, they

hunted freely and game rapidly declined (Hickerson 1965). We generalize Harold Hickerson's model and apply it to other parts of the West.

After the mammoths and other large Pleistocene herbivores declined or disappeared, the survivors in western North America included bison (*Bison bison*), moose (*Alces alces*), elk, wapiti or red deer (*Cervus elaphus*), white-tailed (*Odocoileus virginianus*) and mule deer (*O. hemionus*), bighorn or mountain sheep (*Ovis canadensis*), mountain goat (*Oreamnos americanus*), pronghorn antelope (*Antilocapra americana*), and caribou (*Rangifer tarandus*). Large predators, scavengers, or omnivores include the gray wolf (*Canis lupus*), grizzly bear (*Ursus arctos*), black bear (*U. americanus*), mountain lion (*Felis concolor*), and jaguar (*Panthera onca*) (see Table 3.2). The herbivores and bears may be considered preferred prey for hunters (Alvard 1995; Kay 1994). Beyond providing many resources, including hides, wool, and bone tools, as well as meat and fat, successful hunters won social benefits,

Table 3.2

Animals killed by the Lewis and Clark expedition,
May 14, 1804, to September 24, 1806

Game	Number killed
Deer (three species)	1,001
Elk (wapiti)	375
Buffalo (bison)	227
Pronghorn antelope	62
Bighorn sheep	35
Brown (grizzly) bears	43
Black bears	23
Beaver	113
Otter	16
Geese and brant	104
Ducks and coots	45
Grouse (all species)	46
Turkeys	9
Plovers	48
Wolves (only one eaten)	18
Indian dogs (purchased and consumed)	190
Horses	12
TOTAL	2,367

Note: After Burroughs 1961.

including mates (Hawkes et al. 1997; for differing views about the degree to which humans were involved in late Quaternary extinctions in various parts of the world, see Grayson 1993; Kay and Simmons 2002; Martin 1990; Martin and Steadman 1999; Stuart 1991, 2002; Ward 1997).

In Search of the Natural

If overkill drove the extinctions, what might account for the survival of the survivors? Although the opportunity for direct comparison between living and lost species ended with prehistoric megafaunal extinctions, the survivors display morphological and behavioral attributes that arguably would reduce their risk to human hunting. Sharp-eyed and swift, pronghorn favor wide-open spaces; moose, elk, and deer are quick to learn the value of cover and are highly effective at blending into it; the movements of bison and barren ground caribou are erratic or unpredictable; and mountain goats and bighorn retreat to rugged canyons and cliffs hazardous or inaccessible to human hunters (Edwards 1967:148).

The destruction of buffalo (bison) and other large animals that accompanied 19th-century Caucasian penetration of the West is widely deplored (Botkin 1995; Dodge 1959; McHugh 1972). In historic times, sport and especially market hunting, farming, heavy grazing by domestic animals, and other consequences of Euro-American settlement upset or transformed the land, severely depleting wildlife. There is no argument about those impacts. The issue is whether Native Americans in either or both historic and prehistoric time reduced the numbers of buffalo and other large animals.

In the intermontane West, historic eruptions of mule deer have been attributed to an increase in woody plants (Gruell 1986) or to predator control, but seldom to the activities of Native Americans themselves. In the Great Basin, deer are scarce in the archaeological record. In the present century they increased, along with one of their predators, the mountain lion. Zooarchaeologist Don Grayson (1993:300) infers that prehistoric rarity of deer "has little or nothing to do with Native American hunting." While agreeing that hunting pressure had a marked effect in other areas, he found it "far more likely that the modern abundance of these animals [deer] in the Great Basin . . . resulted from complex interactions among plants, domestic livestock, and the deer themselves."

To be sure, game animals, no less than other species, are limited by resources, habitat, climate, and disease, as well as predators—human and otherwise. Nevertheless, Dan Flores (1991) and Elliot West (1995) traced the initial collapse of Great Plains bison herds to Indian hunting in the 1820s–1840s. In the Kaibab Plateau in northern Arizona, a classic case of a population eruption of deer has invoked many explanations, including change in predator-prey and competitor dynamics. Few have considered Native Americans to be potential regulators of numbers of deer before the time of Anglo ranching and sheep herding (Kay in Kay and Simmons 2002).

Properly interpreted, historic documents that make reference to land, native people, and wildlife offer untapped resources for assessing wildlife dynamics. In the journals of Meriwether Lewis and William Clark, which document environmental conditions along a previously unexplored and unknown transect across western North America, Dan Botkin (1995:3) finds "our best contact with reality of nature." Supplemental natural history data come from journals kept by other members of the party, especially those

of Sergeants John Ordway and Patrick Gass. Beginning in 1983, Gary Moulton (1983–2001) and a variety of professional advisers skillfully edited and annotated the Lewis and Clark journals. For those who may wish to consult earlier editions of the journals (such as those of Coues [1893] or Thwaites [1959]), we cite passages by date rather than page number.

In the realm of large animal ecology, other important records were kept by the Northwest, Hudson's Bay, and Pacific Fur companies. Traders had a good opportunity to witness seasonal movements of game and to learn more of the hunting practices of different tribes of Indians. They soon saw that heavy grazing by herds of buffalo seriously depleted pasture for their horses. They traded within game-rich war zones (Henry on the Red River in Coues 1897).

The Ferment of Contact

With the arrival of the conquistadors, new pandemic diseases swept into the New World in advance of a syndrome of cultural-ecological upsets triggered by new domestic animals, weeds, pests, drugs (distilled spirits, laudanum), metals, and new weapons, especially guns (Crosby 1986; Diamond 1997; Dobyns 1983; Ramanofsky 1987). Native Americans suffered a succession of traumas and challenges, especially episodic population crashes driven by pestilence, followed in some cases by cyclic reinfections (Boyd 1999; Dobyns 1993; Dunnell 1991; Larsen 1994; Reff 1991; Verano and Ubelaker 1992). Along the Columbia River, archaeological evidence indicates a decrease in volume of cultural material being deposited after, compared with before, the time of the first hypothetical onslaught of disease (Campbell 1990). Sara Campbell concluded that the human population of the region declined significantly in the centuries immediately before historic contact with the foreign invaders in the 1700s. Soon after first contact by Captains George Vancouver and Robert Gray, the native population of the Northwest Coast declined by 75 percent (Boyd 1990). Any assumption that historic observations must reflect a "stable" or "typical" cultural environment is flawed.

In the upper Columbia early in the 19th century, the horse herds of the Okanogan attracted packs of wolves (Cox [1831]1957). In southern California, at a time that the native populations were in eclipse, the unappropriated carcasses of semiwild cattle slaughtered for hides along with free-ranging

horses and sheep added to the rich natural supply of acorns, plant bulbs, and spawning salmon available for grizzly bears (Storer and Tevis 1955:128). It was a good time for grizzlies (see Preston in Kay and Simmons 2002).

Early 19th-century accounts of the wildlife in some regions west of the Mississippi mention substantial numbers of both native and nonnative large mammals. The mix reflects unsettled times. On his 1807 map of the internal part of Louisiana, which included central Texas, Zebulon Pike filled empty spaces with the legend "wild horses" (Coues 1987). Along with numerous buffalo, both Robert Stuart in 1812 (Rollins 1995) and Edwin James in 1819 (James 1905:260) found wild horses in western Nebraska, "apparently wilder than any of the native occupants of the country." In his 1830 sketch of wild animals of the prairies, Josiah Gregg ([1845] 1905:259–261) began with the mustang despite the fact that it is not a native species.

In southern Arizona in the 1840s both military parties and forty-niners battled wild bulls on the San Pedro River (Davis 1982). In his chronicle of buffalo and other wild game in the 1870s, Colonel Richard Dodge included wild cattle. In the brush country of south Texas travelers stalked the wild cattle. "The domestic cattle of Texas, miscalled tame, are fifty times more dangerous to footmen than the fiercest buffalo" (Dodge 1959). Under the turbulence of contact, after disease blighted Indian cultures and before extensive Anglo encroachment, cattle and horses ran wild. Hunters, predators, and scavengers benefited.

Rodents and Rabbits in the Southern West

Unlike the upper Missouri River in the early 1800s, the conifer parklands and prairies of the Colorado Plateau and the southern Rockies supported comparatively few elk and buffalo. In their seven years of wandering from the Texas Coast west into Sinaloa, where they reunited with their countrymen, Cabeza de Vaca and his three companions rarely reported big game—bison or deer (Adorno and Pautz 1999). Three centuries later, Anglo explorers of Arizona "complained that game was scarce and wary, and some were forced to kill and eat their horses and mules" (Carmony and Brown in Davis 1982:188). Kit Carson claimed no party ever left the Gila River without being half starved. James Ohio Pattie, the first trapper to write about the Gila, once sacrificed one of his beloved dogs for food to keep his father alive

(Pattie 1905:107–108). On another occasion, in search of food Pattie and his ravenous party were reduced to attacking an Indian (probably Apache) camp of women and children: "Having no disposition to harm them, we fired a gun over their heads, which caused them instantly to fly. . . . Hunger knows no laws." The trappers devoured roast mescal (*Agave*) and grass seed, of which they made a mush. They had trapped out the beaver (*Castor canadensis*) and could find no deer or other game larger than quail and rabbits.

Even on the Colorado Plateau, which today offers thousands of elk a productive habitat, including ponderosa pine (*Pinus ponderosa*) parklands and mixed conifer forests and meadows, 19th-century travelers in Arizona rarely mentioned elk (Davis 1982). Far to the east, in the 1830s, Gregg found elk and deer to be somewhat abundant along the Arkansas River as high as the Santa Fe road, "but from thence westward they are both very scarce, for these animals do not resort to the high prairie plains" (Gregg 1905:225). Faunal remains in archaeological sites suggest that elk populations in the Jemez Mountains of New Mexico were low from ca. A.D. 1200 to ca. 1900, when they were extirpated (Allen 1996).

Early in the 20th century, Yellowstone elk were reintroduced to New Mexico and many other parts of the West, and despite off-take in hunting seasons they proliferated. Between 1980 and 1990 the Arizona herd grew from 10,000 to 30,000, while sustaining a hunt that rose from 2,000 to 6,000 animals harvested yearly (Lee 1992). By 1994, the animals shot in the Arizona elk hunt had doubled to 12,000 (*Arizona Daily Star*, July 27, 1995). Beyond the installation of cattle tanks to improve elk habitat, a major cultural change—a regulated hunt—may be at least partly responsible for the explosive increase in elk in both Arizona and New Mexico (Allen 1996; Truett 1996). Given the recent success of free-ranging bison herds introduced in Arizona, overhunting may explain the absence of bison in earlier times (Truett 1996).

While relatively scarce in the 19th century, large game in the Southwest may have been even less numerous at an earlier time. Prehistoric pueblos, canals, ball courts, and an abundance of other archaeological remains dating from A.D. 1000 to at least 1400 indicate a sizable Native American population along the rivers of the borderlands. Their kitchen gardens and small floodplain fields, even along densely inhabited riparian corridors, provided habitat for small game and birds (Emslie 1981; James 1994; Rea 1983,

1998). Hohokam sites in southern Arizona studied by zooarchaeologists have yielded 50,000 identifiable individual specimens, mainly rabbit (lagomorph) and artiodactyl (deer, antelope, mountain sheep) remains plus a variety of small rodents (Szuter 1991). Sites near canals such as Pueblo Grande have yielded abundant remains of small fish (James 1994). Rats and rabbits are thought to have been popular food items among Sonorans in the 18th century (Pfefferkorn 1989).

By contrast, large mammals (preferred prey) were probably at risk on the prehistorically irrigated floodplain around Phoenix, which was occupied by upward of 70,000 people (Fish and Fish 1992). The bones of large mammals are relatively scarce in their fossil sample and are primarily those of mule deer. Most records of mountain sheep and pronghorn come from peripheral localities at higher elevations beyond the major riparian settlements. These include the Sonoran Desert near Ventana Cave, the lower slopes of the Santa Rita Mountains, and other mountainous areas beyond the Gila River (Bayham 1982; Szuter 1991; Szuter and Bayham 1989).

Bones of elk, beaver, and bear are very rare in Hohokam deposits; some bones may reflect trading activity. In a summary of 50,000 determinations, Christine Szuter (1991) reported no bones of wolves, or of animals highly attractive to hunters and available now in protected riparian or desert scrub habitats of the borderlands (Hoffmeister 1996; Rea 1998) such as javelina (*Pecari tajaca*), raccoon (*Procyon lotor*), coati (*Nasua nasua*), and porcupine (*Erethizon dorsatum*). We propose that hunting forays by the Hohokam and other farmers, their numbers supported by irrigated agriculture, would have easily suppressed local populations of the larger animals favoring the riparian habitat, animals whose ranges should have extended into the region prehistorically, as they do at present, despite urbanization, in the case of javelina and raccoon.

Various cultural practices could reduce the number of large carnivore bones to be expected in archaeological sites. Even dog bones may have been consigned to flowing water rather than dumped in the nearest kitchen midden (Haury 1976). Nevertheless, the record from the Southwest seems unduly rich in small game, with larger species unaccountably scarce (Linskey 1975:258). For example, the collared peccary or javelina is virtually unknown in the archaeological record of southern Arizona (Szuter 1991) and Texas (Toomey 1993). In 1690, when the Spaniards first arrived in

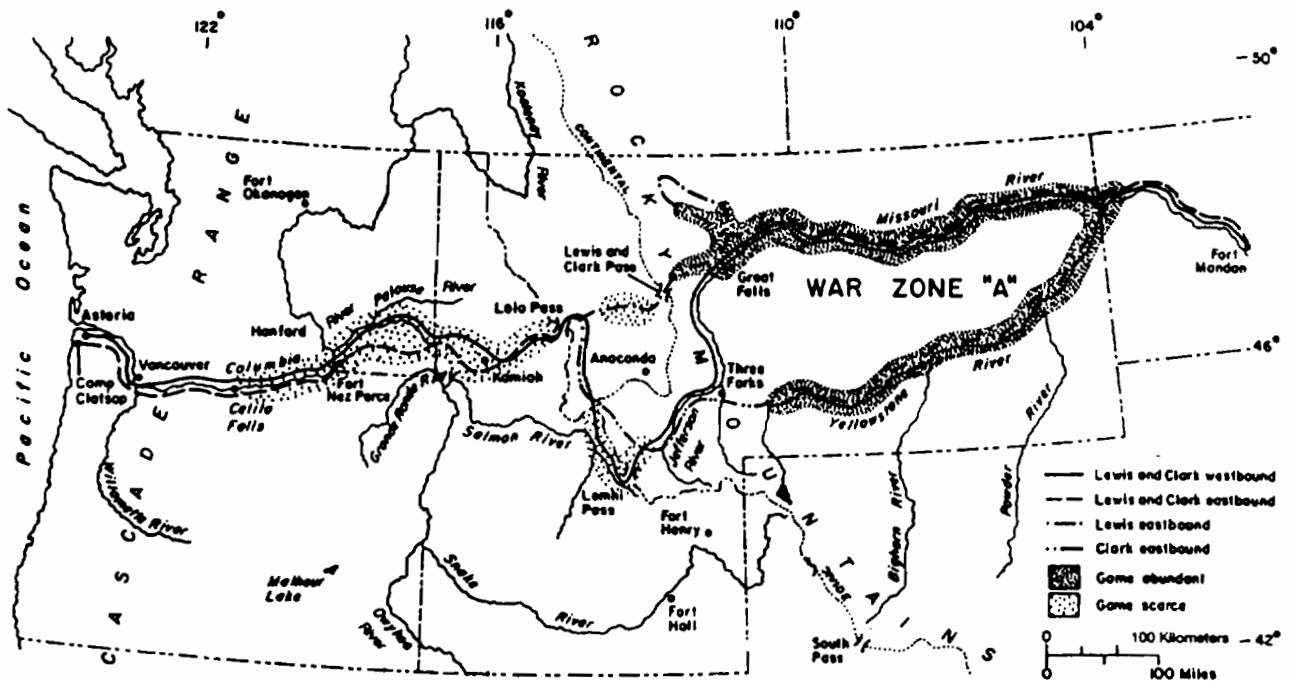


Figure 3.1. Route of Lewis and Clark, 1805–1806, showing regions of abundant and scarce game, including War Zone "A" between the upper Missouri and the Yellowstone. For a more detailed treatment see Lyman and Wolverton (2002).

Gileño country, javelinas were already there (Rea 1998). They are mentioned in the historical record: the Jesuit missionary Ignaz Pfefferkorn (1989) sighted javelinas on the Sonoran borderlands in the mid-1700s. Pike also found them in south Texas in 1807 (Coues 1897); Thomas Nuttall in north Texas in 1819 (Lottinville 1980); and Pattie on the Gila in 1825. Javelina are now game animals in Arizona, New Mexico, and Texas, with the Texas population alone estimated at 200,000 (Sowls 1997:245). Amadeo Rea (1998) discounts the possibility of a taboo on prehistoric hunting of peccary (see also Linskey 1975). Presumably the absence of bones from both cultural and natural fossil deposits of the borderlands means scarcity or absence of this species until it spread north from Mexico in the past 300 years.

Lewis and Clark in a Hunter's Paradise

As mentioned earlier, the most detailed and authentic records of environmental conditions at the time of early Anglo exploration are found in the journals of Lewis and Clark. They witnessed the West at a time not of stasis but of rapid change. To varying degrees, guns, horses, copper pots, metal tools, European garb and distilled spirits, and especially lethal new

diseases, had penetrated at least parts of the Northwest in advance of the Corps of Discovery, a party of 31 men along with a Shoshone woman, Sacagawea, and her infant.

Along their route (Figure 3.1) Lewis and Clark reported regularly on the numbers and behavior of game along with the daily bag they relied on for their food supply. In the summers of 1805 and 1806 along the upper Missouri River and the Yellowstone River in Montana, the party found bison, elk, deer, wolves, and grizzly bears to be both abundant and tame. They enjoyed an abundant supply of meat. West of the Continental Divide, conditions were different. Until they reached the Cascades, big game was scarce and wary or, more often, simply absent. Lewis and Clark offered no explanations for this extraordinary change, and neither do historians. To be sure, such an investigation was not an objective of the expedition. We review the evidence and attempt to account for it (see Martin and Szuter 1999a, 2002).

Although early explorers reported finding many large animals in parts of the West (not in Arizona and New Mexico, as we have seen), "it is impossible for any person now alive to comprehend the abundance of game that once populated the plains of the west. Only on the African veldt in the pioneering days of Speke, Grant, Harris, and Cumming

Table 3.3

Lewis and Clark's game bag, 1805-1806

Game	Upper Missouri River (outbound) April 25 to June 13, 1805	Columbia River (outbound) September 18 to November 6, 1805	Camp Clatsop January 1 to February 19, 1806	Columbia River (Inbound) March 23 to May 11, 1806	Upper Missouri River (Inbound) June 30 to August 8, 1806
Deer	79	28	8	38	191
Elk	50	0	51	22	51
Bison	44	0	0	0	55
Antelope	8	0	0	0	9
Brown bear	12	0	0	1	12
Domestic dog	0	101+	5	83+	0
Ration units ^a	114	7	41	26	154

Note: Each sample spans 50 days (from Moulton 1983 edition); for more details see Lyman and Wolverton (2002).

^aExcluding dog; deer = ¼, elk = ¼, bison = 1, antelope = ¼, bear = ¼.

has there been anything comparable" (Cutright 1969:142). In June 1805 near Great Falls, Montana, Lewis and Clark reported local herds of bison numbering 10,000. In South Dakota along the Missouri River near the confluence of the White River, Clark estimated 20,000 bison (August 29, 1806). According to faunal accounts and the total game bag obtained from the journals and annotated by Burroughs (1961), the Corps of Discovery shot more than 1,000 deer, 375 elk, 227 bison, and hundreds of individuals of other species (see Table 3.3), not an excessive number for a two-year expedition when one considers the size of the party and its reliance on wild game for subsistence. Kill records, as Burroughs (1961) notes, "can be misleading unless they are interpreted in terms of the distribution and seasonal abundance of the species involved." In this case, kill records are supplemented by frequent, if not daily, observations on numbers and activity of game.

Indians, explorers, and traders alike provisioned themselves on buffalo tongues and buffalo hump, seemingly wasting the rest of the carcass. In some cases, waste may have been more apparent than real. Depending on the season, the critical dietary requirement for human nutrition would be limited to fat from the hump, the tongue, and bone marrow (Speth 1983). Spring-killed buffalo could be unfit to consume (Clark, April 17, 1805).

In four months of the spring and summer of 1805, between the time they left the vicinity of the Hidatsa-Mandan villages north of modern Bismarck, North Dakota, and their rendezvous with Shoshone hunters at Lemhi Pass on the

Continental Divide in western Montana, the Corps of Discovery encountered no other Indians. For the first hundred miles upstream, in Hidatsa and Mandan hunting grounds, game was scarce. Then, approaching the mouth of the Yellowstone River near the modern town of Williston, North Dakota, conditions changed. Lewis reported that "the whole face of the Country was covered with herds of Buffalo, Elk & Antelopes . . . so gentle that we pass near them while feeding . . . when we attract their attention, they frequently approach us more nearly to discover what we are and in some instances pursue us a considerable distance" (April 25, 1805).

On May 4, Lewis saw "immence quantities of buffalo in every direction . . . they are extremely gentle the bull buffalo particularly will scarcely give way to you." The wolves, "those faithful shepherds" on the skirts of the herds, were ever "ready to attend to the sick and wounded." The following day he found "Buffaloe, Elk and goats or Antelopes feeding in every direction; we kill whatever we wish." And the day after: "It is now only amusement for Capt. C. and myself to kill as much meat as the party can consume." On May 8, Lewis claimed: "We can send out at any time and obtain whatever species of meat the country affords in as large quantities as we wish." On May 9, he added: "We saw a great quantity of game today particularly of Elk and Buffaloe, the latter are now so gentle that the men frequently throw sticks and stones at them in order to drive them out of the way." Wolves feeding on drowned buffalo were so tame that Clark speared one with his espatoon.

The following year, returning down the Yellowstone River, Clark found game equally abundant with wolves attending the buffalo as usual. Clark canoed past "emenc [sic] number of Deer Elk and buffaloes on the banks." On July 24 between present-day Laurel and Billings, Clark felt that "for me to mention or give an estimate of the different species of wild animals on this river particularly Buffalo, Elk Antelopes & Wolves would be incredible. I shall therefore be silent in the subject further." His promise of silence on the subject proved impossible to keep.

The next night the grunting noise of males in the herds of buffalo in rut, around their camp, ruined sleep. The men fired shots to scare the animals away. On July 27 buffalo and elk were "astonishingly numerous" but so gentle that the party passed within 20 or 30 paces without alarming the elk. On a 117-kilometer canoe run in what is now Rosebud County, elk were so abundant on the banks of the river that they were never out of sight. The Americans were not the first to report a game park in Montana. Ten months earlier the Northwest Company trader Francoise-Antoine Larocque returned this way from a trip into the Big Horn Mountains accompanying a large hunting party of Crow Indians. Along the Yellowstone, he wrote, "Elk and Buffaloes we found in great plenty" (Wood and Thiessen 1985:194).

We are grateful to Dave Neeley of the University of Alabama for pointing out that in 1876, 70 years after the time of Lewis and Clark, the famous paleontologist Edward Drinker Cope found a war zone around the mouth of the Judith River in central Montana: "The plains of this region are neutral ground between the Crow and Sioux Indians, who are ever at war; and they have not been regarded as a safe abode for white settlers. . . . [T]he country is practically left to the game, which is here unmolested excepting by occasional hunting bands of Indians" (Cope 1879).

Devoid of settlements and rich in wildlife, the "wild" America revealed in the journals has long been considered pristine by managers and conservationists alike. To be sure, while they saw no Indians, Lewis and Clark found signs of them. On May 4 they discovered two abandoned Blackfeet war lodges. Besides the Blackfeet, which engaged Lewis on his return trip, and the closely related Gros Ventre (Atsina), they also feared unfriendly contact with Assiniboine Indians. Twice the exploring party found stray Indian dogs. They found two empty liquor kegs from a Canadian trading company. Southwest of Great Falls, as they entered country that

Sacagawea recognized, Lewis and Clark reported brush huts used by the Shoshone. On their return a year later they lost horses to unseen Indian horse thieves, probably the Crow. Nevertheless, limited Indian activity did not seriously reduce the numbers of wild game or make the animals wary.

Between April 25 and June 13, 1805, in 50 days of travel along the upper Missouri between Williston, North Dakota, and the mouth of the Marias River, Montana, Lewis and Clark and their hunters killed 79 deer, 50 elk, 44 bison plus 7 calves, 8 antelope, and 12 brown (grizzly) bears (Table 3.3). In addition, they killed nine mountain sheep and three wolves, took many beaver, and caught or killed a variety of small game. "We eat an immensity of meat" Lewis wrote (July 13); "it requires 4 deer, an elk and a deer, or one buffalo, to supply us plentifully 24 hours. Meat now forms our food principally as we reserve our flour, parched meal and corn as much as possible for the rocky mountains which we are shortly to enter, and where from the Indian account game is not very abundant." They also killed elk and deer for hides to trade, to cover an ill-fated iron-frame boat, and for moccasins and clothing.

To Lewis's daily ration units (ru) with bison set at 1.0, elk at 0.75, and deer at 0.25 we add bear at 0.75 and antelope at 0.12. Their 50-day yield of these species alone was 114 ru. This means that while outward bound on the upper Missouri their hunters brought in an average of two units of game per day (Table 3.3), or twice Lewis's estimate of their daily requirement. Some meat could have been dried and stored for the scarcity that they knew loomed ahead, but this was too much to expect of the men. On July 31 near Three Forks, Montana, game decreased. Lewis complained: "Nothing killed today and our fresh meat is out. When we have a plenty of fresh meat I find it impossible to make the men take any care of it, or use it with the least frugality."

Paradise Lost

As their Hidatsa Indian informants at Fort Mandan predicted, numbers of buffalo decreased upstream from Great Falls. Further upstream along the Jefferson River, near present-day Whitehall, Montana, they found only buffalo bones and dung (*bois de vache*). On August 2, 1805, or thereabouts, the party killed its last elk in Missouri drainage. From here on the hunters found mainly deer and antelope, these in diminishing numbers. Except at the foot of Mount

Hood, elk were scarce or absent from here to Tongue Point, near Astoria, on the mouth of the Columbia. Near Travelers Rest, south of Missoula, they managed to kill one elk in the headwaters of the Columbia River. They and other explorers to follow did not find large numbers of elk. Now the animals range not only throughout the Rockies but also into treeless regions of Great Basin sagebrush (*Artemisia*) such as the Hanford, Washington, reserve near Yakima, a habitat only recently thought of as attractive to elk (see the following discussion).

The vegetation on both sides of Lemhi Pass—where spacious grassy valleys laced by streams nestle between forested north slopes and sagebrush-clad south slopes—would seem ideal for bison, and 20 years later it was overrun by them. Despite the attractiveness of the habitat on both sides of the Continental Divide, the Corps of Discovery found buffalo and other game abundant only on one side (around Great Falls, Montana) and scarce on the other (in Idaho along the Salmon and Clearwater Rivers and in the Bitterroots).

West of Lemhi Pass the Corps of Discovery exhausted their dry cornmeal and other stored supplies of food. Scouting down the Salmon River, Clark discovered that the Indians were right about the poor prospect of canoeing on the wild "River of No Return." Crossing Lolo Pass into the Bitterroots, the captains hunted game, but without success. To survive, they killed and ate colts and a horse. Cameahwait, the Shoshone chief and Sacagawea's brother, had warned them to expect scarcity. But Lewis reasoned that if the Indians with their women and children could make it over the mountains, the explorers could as well. Furthermore, if there were large numbers of Indians living on the river below the mountains, "they must have some means of subsistence which would be in our power to procure in the same country" (Lewis, August 14, 1805). He was in for a very unpleasant surprise.

On September 20 an advance party led by Clark left the Bitterroots. They entered a beautiful, level pine country whose friendly inhabitants, the Nez Perce (Chopunish), shared their traditional resources. These included dried fish (from the salmon season), berries, roots (bulbs) of camas or pasigoo (*Camassia*), and even a small piece of buffalo meat. The expedition had overcome the expected scarcity of provender and the unexpectedly wretched crossing of "those dismal and horrible mountains" (Gass 1958, September 22, 1805).

In his journal entry for the day, his last for the next few months, Lewis allowed himself the rare luxury of a pat on the back: "The pleasure I now felt in having triumphed [*sic*] over the rocky [*sic*] Mountains and descending once more to a level and fertile country where there was every rational hope of finding a comfortable subsistence for myself and party can be more readily conceived than expressed, nor was the flattering prospect of the final success of the expedition less pleasing." Despite his rational hopes, Lewis found no "comfortable subsistence." He had little to eat besides his words. Many members of the party became seriously ill on the new diet, Lewis included.

The explorers could not stomach the rations of dry fish and roots that they could readily obtain from the Nez Perce. Although sick himself and vomiting (September 21), Clark managed to maintain his journal. "Captain Lewis, several men very sick [September 25];" "several men bad, Captain Lewis sick, I am a little unwell [September 26]." Similar entries continue into October at their "Canoe Camp," where those who could hacked canoes out of trees. Clark killed a horse to make soup for the sick men. Nevertheless, their troubles persisted: "Nothing to eat but dried roots dried fish, . . . which filled us so full of wind, that we were scarcely able to Breathe all night" (Clark, October 4, 1805). The switch to a diet of salmon also sickened other early travelers, including David Thompson (Belyea 1994:172-173), David Douglas (Lavender 1972:163), and various members of the Wyeth party (Townsend 1839:141). Vulnerability to spoilage may explain the sickness of the Anglos. In February 1827, Peter Skene Ogden found the natives in northern California harvesting numerous dead salmon in all the small rivers. "The Indians even go so far as to select them in a putrid state giving them the preference . . . but we Christians are of a far different opinion" (Davies and Johnson 1961:78). The salmon offered to Lewis and Clark "we had every reason to believe was taken up on the shore dead" (Clark, October 18, 1805).

Fresh meat was now at a premium. Apart from a few deer, they found no game in the dry hills above the Clearwater (Clark, October 5). Downstream, even the deer disappeared. During the 50 days the Corps of Discovery canoed and camped on the Clearwater, the Snake, and the Columbia, they killed only 28 deer (Table 3.3), half of these animals on the upper Clearwater and the rest over 320 kilometers to the west in forested parts of the lower Columbia

between Celilo (Great) Falls and the Cascades. Besides ducks, geese, and swans, they shot and ate a coyote (*Canis latrans*). But game birds and a coyote were not enough. Their total kill of big game (Table 3.3) averaged 0.15 ru a day, less than a fifth of their desirable daily ration and over an order of magnitude less than their 50-day bag on the upper Missouri. Despite the efforts of their best hunters, for 26 days beginning September 30 they found no big game (no bison, deer, elk, or pronghorn).

While game was scarce, natives were not. It was the reverse of what they found in Montana. Lewis and Clark contacted them daily and camped with or near the natives every night. From the bank, large numbers of Indians watched the explorers' boats float down the river. Some followed on horseback. Besides those Indians they encountered first (the Shoshone, Flat Heads, and Nez Perce), the tribes mentioned included Palus, Yakama, Wanapam, Cayuse, Umatilla, Okanogan, Clatsop, and other Chinookans; in aggregate it was a population of about 80,000 (Lewis and Clark, Moulton ed., vol. 7:488). However, a demographic disaster was soon to erupt (Boyd 1999).

According to Governor George Simpson of the Hudson's Bay Company, "The population on the banks of the Columbia River is much greater than in any other part of North America that I have visited." (Merk 1968:94). The Indians there captured and dried vast quantities of salmon, trading the surplus. They also gathered quantities of wild roots and berries for food and trade. In August 1812 on the Snake River at the confluence of the Boise, "immense numbers of salmon are taken, forming after the [esculent] roots, the principal article of food which the natives of this Barren Tract possess" (Stuart in Rollins 1995:83, italics added). For Native Americans along the Columbia River, the annual caloric yield from "roots" (underground storage organs) appears to have exceeded that from salmon (Hunn 1990).

Besides deer and antelope, the Columbia Plateau supported free-ranging horses, some of them wild. Lewis and Clark found the local villagers dressed in skins of buffalo, elk, wolf, deer, and mountain goat, some skins traded from east of the Bitterroots. On their trip down the Columbia, Lewis and Clark mentioned that local hunters had gone out for antelope. Nevertheless, the pronghorn were "by no means as plenty on this side of the Rocky Mountains as on the other" (February 22, 1806). As mentioned, they obtained no elk between Travelers Rest (near Missoula) and the Cas-

cadés and no deer from the mouth of the Snake River to Celilo (Great) Falls.

Unable to stomach the standard native diet of dry fish and roots and unable to find enough game, the Corps of Discovery, followed by the Astorians and other fur traders, turned not surprisingly to domestic animals of the local people. They bought and ate dogs and horses.

Dining on Dogs

Beginning on October 9 (October 4 according to Ordway in Moulton 1995:vol. 9), their journals report that the explorers began to buy and eat dogs. On October 17 they obtained all the dogs they could. We do not learn how many. On October 18, in exchange for "beads, wire and other trinkets of little value," Clark acquired 40 dogs. "The Indian dog is usually small or much more so than the common cur" (February 16, 1806). Ross Cox ([1831]1957:370) adds: "with curled-up tail, small ears, and pointed nose." In New Caledonia (British Columbia) early in the 19th century, fur trader David Harmon and his Canadian voyagers "along with the Indians" (tribe not mentioned) frequently ate the flesh of dogs. "These dogs are small; and, in shape, very much resemble the wolf" (Harmon in Lamb 1957:207). Dogs that Alexander Henry bought on the Columbia River were killed with a knock on the head with an axe (Coues 1897:802).

On their voyage down the Columbia, the Corps of Discovery acquired over 100 dogs, and 80 more on their return (Table 3.3). On April 13 Lewis wrote, "The dog now constitutes a considerable part of our subsistence and with most of the party [Clark excluded] has become a favorite food; certain I am that it is a healthy strong diet, and . . . I prefer it to lean venison or elk, and is far superior to horse in any state."

Why did the Indians keep dogs? According to Lewis and Clark: "The natives do not eat them nor appear to make any use of them but in hunting the Elk" (February 16, 1806). That may have been reason enough. "None of the Oregon Indians eat their dogs; they use them for driving elk and deer" (Suckley and Cooper 1860:112).

The practice of caniphagy, adopted initially by the Corps of Discovery followed by the fur traders (Coues 1897; Cox [1831]1957:127, 206; Davies and Johnson 1961), reflects the scarcity of wild game along much of the Columbia River. Scarcity could result from either seasonal movements of game, poor habitat, or heavy hunting by natives. While sea-

sonal change in the movements of game may account for scarcity in the Bitterroots when Lewis and Clark traveled west, it would not account for scarcity near Kamiah on their return east, when large animals, the explorers, and the Nez Perce alike were barricaded at the foot of the Bitterroots by the mountain snow pack. In this case, Lewis and Clark's journal entries do not support the poor habitat argument. That leaves hunting pressure as the explanation for the game sink west of the Bitterroots.

A sink is a region where the mortality of a metapopulation exceeds natality, but the species persists thanks to immigration from other sources (Pulliam 1988). While contact diseases would soon reduce Native American populations throughout the region (Boyd 1999), Lewis and Clark found many more Native Americans along the interior Columbia River (a game sink) than along the Missouri River in Montana (a game source). In our view, the differences in population size account for differences in the abundance of game.

Horse Beef

Only one large herbivore was vastly more numerous along the Columbia than along the upper Missouri River. This was the horse (*Equus caballus*). Along with dogs, horses became a major source of meat for the fur traders. Horses reached the Columbia Plateau region roughly a century before Lewis and Clark (Moulton, vol. 7:260). After more than 50 million years of New World horse evolution, followed by extinction of all New World species some 13,000 years ago, the historic return of the horse restarted horse evolution in the Americas where the family Equidae had evolved.

According to Sergeant Patrick Gass of the Corps of Discovery, "Between the Great Falls of the Columbia and this place [the Canoe Camp on the Clearwater] we saw more horses, than I ever saw in the same space of country" (Gass 1958:255). "These people have immense numbers of [horses]; one individual might own 50 to 500 head" (Lewis, May 13, 1806). Large herds in such places as the Horse Heaven Hills along the Columbia (Moulton, vol. 7:6) indicate a substantial carrying capacity for horses. Martin and Szuter (1999b) estimate 50,000 to 500,000 horses in the Columbia Plateau early in the 19th century. If 1 individual out of 20 in a population of 80,000 (Lewis's estimate) owned 50 horses (it could be 50 to 500 in Lewis's estimate), the region would have supported 200,000 animals.

Indians rode their horses to hunt deer and bear. "It is astonishing to see these people ride down those hills which they do at full speed" (Lewis, May 22, 1806). On horseback, the Kootenae managed to capture wild horses by running them into deep snow (Thompson in Coues 1897:708). The Nez Perce were expert at roping and more skillful than the Americans at gelding stallions (Lewis, June 2, 1806). Horses contributed to the grave goods. "They sacrifice horses . . . the bones of many horses are seen laying about those sepulchers" (Lewis, May 7, 1806).

The Indians ate horses "when necessity compells them" (Lewis, April 30, 1806). Leading the Astorians down the Snake River in Idaho, in November 1811, Wilson Price Hunt obtained horsemeat from the Shoshone. He thought horsemeat and wild plant seeds were the only food of the Shoshone (Rollins 1995:296). Anticipating scarcity of game in their return across the Bitterroots, Lewis (April 2, 1806) commented, "By thus acquiring a large stock of horses we shall not only secure our baggage over the mountains but that we will also have provided the means of subsisting; for we now view the horses as our only certain resources for food."

Environmental Assessment of the Inland Empire

Despite the absence of big game, Lewis and Clark appreciated the potential agricultural productivity of what became known as the Inland Empire. The vegetation gradient from the western edge of the Walla Walla country (near the junction of the Snake River with the Columbia) eastward into the Bitterroots consists of a Great Basin shrub steppe of sagebrush (wormwood); prairie bunch grasses, including *Agropyron* and *Festuca*; foothills parklands of ponderosa pine, grass, and shrubs; and, finally, in the headwaters, a diverse conifer forest punctuated by grassy meadows. In the shrub steppe, "great numbers of the natives [*sic*] pass us on horseback" (Clark, April 24, 1806). The next day Lewis wrote,

The soil is not as fertile as about the falls [Great Falls of the Columbia], tho' it produces a low grass on which the horses feed very conveniently; it astonished me to see the order [good condition] of their [Indian] horses at this season of the year when I knew that they had wintered on the dry grass of the plains and at the same time [were ridden] with greater severity than is common among ourselves. I did not see a single horse which could be deemed poor and many of them were as fat as seals.

With all the members of the Corps of Discovery riding horses along the Touchet River in Walla Walla County, Lewis (May 1, 1806) saw "very little difference between the apparent face of the country here and that of the plains of the Missouri only that these are not enlivened by the vast herds of buffalo, Elk, etc. which ornament the other" (emphasis added). Six days later they camped in what is now Nez Perce County, Idaho, "in a beautiful fertile and picturesque country" where "the face of the country when you have once ascended the river hills is perfectly level and partially covered with the long-leaved [ponderosa] pine. The soil is a dark rich loam thickly covered with grass and herbaceous plants which afford a delightful pasture for horses" (Lewis, May 7, 1806).

Such a habitat should have provided a delightful pasture not only for horses but also for buffalo and elk. When traveling in buffalo country, British-Canadian fur brigade leaders Alexander Henry (Coues 1897:193), Peter Skene Ogden (Rich and Johnson 1950:86, 225), and John Work (Haines 1971:75) complained that heavy grazing by buffalo deprived their starving horses of pasture. Conversely, if free-ranging horses could find good pasture and thrive in the Columbia Plateau along the Columbia River, as they did, one might expect the habitat to favor bison as well.

On the return journey, having adapted to the local diet, Lewis lauded the Inland Empire (northern Idaho and eastern Washington). "The country along the rocky mountains for several hundred miles in length and about 50 in width is level extremely fertile and in many parts covered with a tall and open growth of the longleaved pine." Overlooking the existing settlements of the Nez Perce and unknowingly anticipating Lewiston, Idaho, and Clarkston, Washington, he added: "This country would form an extensive settlement; the climate appears quite as mild as that of similar latitude on the Atlantic coast if not more so and it cannot be otherwise than healthy; it possesses a fine dry pure air. The grass and many plants are now upwards of knee high." "[Nature has] distributed a great variety of esculent plants over the face of the country, . . . a plentiful store of provision [for the natives, a nutritious food] . . . acquired with little toil" (Lewis, May 9, 1806). The Corps of Discovery soon arrived at a camp they would occupy for a month. Located near Kamiah, Idaho, the site was "in the vicinity of the best hunting grounds from Indian information . . . convenient to the salmon which we expect daily and have an excellent pasture for our horses" (Lewis, May 14, 1806). That morning one

of their hunters killed two grizzly bears and that evening another killed a female with two cubs. Besides grizzly bears, they shot deer and elk.

However, the good hunting did not last. At Weippe Prairie, "the indians pursue the game so much on horseback in this neighborhood that it is very shy" (Lewis, 23 June 1806). The salmon were late. To provision themselves for the crossing of the Bitterroots, the party resorted to bartering medical services with the Nez Perce, smithing ironware, and trading what little they had left to trade, ultimately the buttons off their tunics. With one exception, which we discuss in the next section, the captains did not probe more deeply into the question of why bison did not occupy attractive country in eastern Washington and panhandle Idaho, or why game in general, so abundant and tame in similar country in Montana, was scarce and wary west of the Rockies. They simply reported what they found. We argue that the lack of game along the interior Columbia River drainage into the Bitterroots resulted from the hunting pressure of a sizable and relatively peaceful human population supported by an abundance of edible plants and salmon.

To show that unfavorable habitat does not account for the lack of game along the shrub steppe of the Columbia River, we cite the case of elk at Hanford, Washington, at Hanford and at the National Engineering Laboratory in Idaho. In open country along the lower part of the Columbia River, until they reached the forested country in the Cascades or in the Blue Mountains, no early explorers expected to find elk. Although not abundant, elk had been hunted along the lower Columbia River in prehistoric times (Dixon and Lyman 1996; McCorquodale 1985). Elk thrive there now in sagebrush steppe in the Hanford Reserve and in the Idaho National Engineering and Environmental Laboratory (INEEL) reserve. For the Hanford elk, "nearly twenty years of trend data on the population yielded an overall rate of increase of 20% per year" (Eberhardt et al. 1996). The eruption of elk (wapiti) at both Hanford and the INEEL (Strohmeyer et al. 1999) suggests it was possible for large herds of elk to occupy treeless sagebrush steppe interspersed with agricultural land. It discounts allegedly unfavorable habitat (especially the absence of tree cover) as the only explanation for a scarcity of elk along the Columbia in early times. If elk thrived in grassland along the Missouri and Yellowstone Rivers in the time of Lewis and Clark, what ac-

counts for the absence of elk in grassland along the Columbia and its tributaries east of the Cascades?

Wolves and Grizzlies West of the Rockies

Given the marked difference in numbers of large herbivores on both sides of the Continental Divide, it is not surprising that scavengers followed suit. "Wolves are not abundant in the plains of the Columbia because there is but little game on which for them to subsist" (Lewis, February 20, 1806). Natives dressed in wolf skins may have got them in trade. According to Lewis (January 13, 1806), his hunters found that carcasses of elk left out overnight at Camp Clatsop were "untouched by wolves, of which indeed there are but few in this country." Coyotes also were scarce. In game-poor central Oregon, hungry trappers found little to eat beyond the carcasses of the beaver they caught. Wherever hunger was a problem, journals of brigade leaders rarely mentioned wolves.

On the other hand, in the 1820s when buffalo moved through western Montana and into southeastern Idaho, wolves went with them. Fur brigade leaders Donald McKenzie, Alexander Ross, and Peter Skene Ogden of the Hudson's Bay Company regularly reported wolves with the buffalo. "Wolves find it in their interest to follow us and no doubt fatten [on our buffalo kills]" (Ogden in Rich and Johnson 1950:24). Occasionally wolves stole beaver caught in traps (Ogden in Davies and Johnson 1961:107).

Although wolves had little in the way of wild prey on the Columbia Plateau (Dalquest 1948:233), they found wild and free-ranging domestic horses in sizeable numbers. Six years after Lewis and Clark, the Pacific Fur Company of John Jacob Astor established the first trading posts near the horse herds of Native Americans at Okanogan and Spokane, where traders reported seeing wolves attacked by horses in winter (Cox [1831]1957:239-241; Ross 1956:52; Suckley and Cooper 1860). Wolves also stole the supplies from the backs of snowbound pack animals (Ross 1904:204). Cox witnessed 200-300 wolves attacking a horse herd with two or three of the weaker horses overtaken before the traders drove off the wolves, shooting some. Cox ([1831]1957:240) claimed to have seen six to eight dead wolves with their limbs broken and their brains scattered about, kicked to death by their would-be prey. In the vicinity of the Cascade and Blue Mountains, wolves destroyed even the largest horses by

hamstringing them while they were running (Suckley and Cooper 1860:90).

Wolves may have benefited temporarily at the start of the livestock industry. By the 1840s near the mouth of the Columbia, "cattle, hogs, and horses were allowed to range freely on the tidelands (Clatsop Plains), but their numbers were constantly reduced by wolves" (Hafen 1968:406). To protect the livestock around Fort Vancouver, Chief Factor John McLoughlin stocked strychnine to poison wolves (Rich 1943:164) which proved effective (Suckley and Cooper 1860:111). Especially east of the Cascades shepherds had to guard their flocks of sheep from attacks by wolves (Suckley and Cooper 1860:139). Wolves pestered livestock at Marcus Whitman's mission, Waiilatpu, near Walla Walla. Whitman set out meat laced with arsenic and in the process inadvertently poisoned three Cayuse Indians. After the Whitman massacre in 1847, wolves pillaged the shallow graves of Whitman and other victims (Drury 1937:307). These accounts do not alter the fact that Lewis and Clark saw many more wolves (around bison) in Montana than west of the Continental Divide in Idaho, Washington, and Oregon. After the time of Lewis and Clark, wolves may have increased temporarily in the years of the fur trade and early settlement.

Grizzly (brown) bears, too, were less abundant west of the Rockies than to the east. Neither Lewis and Clark, David Thompson, Robert Stuart, Wilson Price Hunt, Alexander Ross, Ross Cox, nor Alexander Henry mentioned grizzly bears below the headwaters of the Columbia River proper. According to Suckley and Cooper (1860:118-120), bears were rare north of the Columbia and east of the Cascades, and absent west of the Willamette.

It could not have been a matter of food supply. If the Columbia River lacked abundant floating carcasses of drowned buffalo, so attractive to grizzly bears along the upper Missouri, it featured abundant salmon, including floating carcasses of spent or dead fish, highly attractive to bears elsewhere, such as along rivers in Alaska. Grizzlies occurred in the headwaters of the Columbia, as in the case of Lewis and Clark at Camp Chopunish near Kamiah, Idaho, and in the northern Cascades and northeastern Washington (Dalquest 1948).

Lewis considered grizzly bears to be less fierce west of the Rockies than in the upper Missouri (May 15, 1806), "perhaps from the circumstance of their being compelled from

the scarcity of game in this quarter to live more on roots . . . than on live animals." The Thompson Indians of British Columbia "claim that the grislies were much less fierce in some parts of the country than others" (Teit 1900:249). Teit adds that "to kill black bear or cougar was considered no great feat; but the hunter who had killed, single-handed, grisly . . . was highly respected for his courage; and for this reason many young men hunted the grisly." In Ogden's experience, grizzly bears in southwestern Oregon (absent along the game sink along the Columbia River) were decidedly aggressive (Davies and Johnson 1961:99-105).

Among the Okanogans "hunting the grizzly bear was considered the most dangerous activity and the leader of the party had to have considerable power" (Baker 1990). How could Indians eliminate grizzlies? The answer may have been baited deadfalls set in the early spring when the grizzlies were ravenous (Teit 1900:248; Post 1938), an easier way to kill them than in a direct confrontation. In British Columbia the Shuswap set deadfalls in places where grizzlies came for salmon (Teit 1909:524).

In an Alaskan park, Ted Birkedal (1993) found grizzly bears catching salmon in drainages only recently depopulated by Eskimo, presumably as a consequence of historic disease. The reverse may have happened on the Columbia. At contact, the Native Americans' catch of salmon and steelhead was an estimated 18 million pounds annually (Hunn 1990:149). Historically, along the Columbia Native Americans controlled the best fishing sites; numerous fish bones in archaeological middens suggest they may have done so for over 7,000 years (Hunn 1990). In all of eastern Washington, Lyman (1986) reported only six archaeological records for grizzly bears (Lyman 1986). In addition to bison, elk, and deer, the Columbia corridor would appear to have been a sink for grizzly bears. We believe human hunting and trapping is the best explanation for the scarcity of bears in a land rich in resources for them, namely, salmon and geophytes.

Would Fishermen Hunt?

Lewis and Clark were by no means the only ones to resort to horsemeat west of the Rockies. Although the season should have been especially favorable for deer, according to Bibaud the traders wintering at Spokane House in 1812-1813 had to live on horseflesh; they ate 90 horses (Franchère 1967:76). Two years later the traders "chiefly subsisted on

horses" (Cox [1831]1957:209). In his 1825 tour of inspection, Hudson's Bay Company governor George Simpson discovered that to provision Fort Nez Perce near the mouth of the Snake, over 200 kilometers southwest of Spokane, the traders had slaughtered some 700 horses in the preceding three years (Merk 1968:128).

To save the expense of buying and butchering horses from the Indians, Simpson proposed that the traders grow their own potatoes, and he brought them 10 bushels for seed. Impressed with the sizable Indian population on the banks of the Columbia, which appeared to be lined with lodges, he imagined that the natives lived on fish and roots alone, not bothering to hunt (Merk 1968:94). Simpson was mistaken. When Alexander Ross had lived with the Salishan tribes, he found "hunting . . . a favorite exercise with all Indians, and the Oakinackens . . . very fond of displaying their dexterity in riding and decoying animals of the chase. I have seen a fellow get into a deerskin, stripped for the purpose, with the skin of the head and horns complete, walk off on all fours, and get actually among a herd of deer without their taking notice of the deception" (Ross 1904:282, 283). Indians of the Willamette Valley (Henry in Gough 1988, January 24, 1814), the Nez Perce (Lewis, May 15, 1806), and Shuswap (Teit 1909:524), among many others, made effective use of a deer's head and horns to imitate and decoy wild animals. The Shuswap used a number of different calls for game. Does were readily called with a leaf held between the lips, to imitate the bleat of the fawn (Teit 1909:520). Lewis and Clark's hunters used the same technique in hunting does with fawns (Lewis, June 23, 1806).

Between Okanogan and Spokane House, Indians employed a fire drive to hunt herds of deer and felled "great numbers" with their arrows (Cox [1831]1957:214). The Okanogans, Thompson, and other Indians in the region constructed nets or drift fences of brush for their deer drives. The fences might extend 2 to 3 kilometers along a mountain slope to intercept game trails (Baker 1990; Post 1938; Teit 1900). Dogs were used to bring game to bay (Post 1938; Stuart in Rollins 1995:253; Teit 1909:520). Hunters on horseback armed with guns increased the game bag. "The possession of fire-arms has been, in many respects, an injury to the savages, leading them to the wanton slaughter and destruction of the deer during heavy snows" (George Gibbs in Suckley and Cooper 1860:135). It was not a lack of interest in hunting by the natives that forced the resident traders at Fort Nez

Perce to supply their own table by purchasing, slaughtering, and eating hundreds of horses. The most reliable foodstuff for the traders at Fort Nez Perce was horsemeat. Sustained by other resources (fish, nutritious wild plants), Indians along the Columbia River hunted in season. The result was a chronic game sink.

Game Sinks, Game Parks, and No-Man's-Lands

In the earliest journals and narratives of the Columbia River nearly two centuries ago, Cox, Gabriel Franchère, Lewis, Clark, Ogden, Ross, Stuart, and Thompson reported little wild game besides deer and, in the forest near the mouth, elk. Although poor in game, the sagebrush steppe supported horses, which attracted wolves. In open country such as the Horse Heaven Hills of south-central Washington, local groups of Native Americans ran large numbers of horses. Not a geographic designation used by Lewis and Clark, the "Horse Heaven Hills" are shown on the expedition's route map for March 23–June 9, 1806, in Moulton's edition of the journals, volume 7. On the north side of the Columbia River, the Hills extended over 128 kilometers west from Kennewick to the Klickitat River. "They [horses] even keep fat if not much used on the dry grass of the plains [along the Columbia] in the winter" (Lewis, February 15, 1806). The proliferation of horses, as an indication of the carrying capacity of Great Basin sagebrush steppe east of the Cascades, supports our inference that the Columbia Plateau was a predatory, not an environmental sink for big game (for modern examples, see Dias 1996; Pulliam 1988).

The historic absence of bison and scarcity of elk along the Columbia River and in adjacent parts of the Columbia Plateau have been explained in a variety of ways. Some ecologists conclude that low overall forage production will account for the absence of bison west of the Rockies (Van Vuren 1987). Historical accounts suggest otherwise.

On June 8, 1826, Peter Skene Ogden wondered why buffalo were missing in southwestern Idaho: since the "Banks of this River [Owyhee drainage] composed of good rich soil in a Country similar to [one in which last year in eastern Idaho] I saw Buffalo by hundreds . . . it seems to me unaccountable why Buffalo should be confined to certain tracts of Country" (Rich and Johnson 1950:180). Near Twin Falls, Idaho, on June 23, 1828, he added: "Strange as it may appear,

on this side of the South Branch beyond this stream, buffalo seldom or never are seen; to account for this I am at a loss, as the country is level and water abundant" (Williams et al. 1971). Ogden's remarks are reminiscent of what Lewis wrote earlier (May 1, 1806) about very little difference between the face of the country here (Walla Walla, Washington) and on the plains of the Missouri, except for the absence of buffalo. In 1833, the absence of bison in southwestern Idaho puzzled another trapper: "We were told by the natives that the animals [bison] were never known further west, which is something singular, as the country is just the same, if not better as to grass" (Leonard 1959:48).

One hundred and fifty years later, ecologist Rexford Daubenmire (1985) agreed that forage west of their range would have been adequate for bison. While the Bitterroots were a greater barrier to the westward spread of buffalo than the Rockies, they could be circumvented. "*Had there been no human enemies*, the buffalo would probably have found their way down the Clark Fork and around Lake Pend d'Orielle into the open country beyond" (Kingston 1932:169, emphasis added). At times bison ranged further west, leaving their bones at Malheur Lake, southeastern Oregon (McDonald 1981) and in archaeological sites in the southern Plateau (Osborne 1953). A nominee for the westernmost bison kill, a minimum number of seven animals procured in an uphill drive between late November and January in a dune field at the Hanford site in south-central Washington, yielded a radiocarbon date of approximately 2,100 years *a.p.* (Chatters et al. 1995).

The astonishing growth of the cattle industry in the Northwest from 1855 to 1885 under year-round grazing without supplementation "is proof that the quality of forage in the Columbia Plateau was more than adequate [for bison] at all seasons" (Urness 1989). The rapid increase in cattle in the 19th century and the success of free-ranging bison on Antelope Island in Great Salt Lake, in the Henry Mountains of southern Utah, and elsewhere west of their historic range, led Phillip Urness to conclude that "bison could do very well in the grasslands and sagebrush grass steppe throughout the Far West."

Along the Snake River in the time of the Northwest and Hudson's Bay Companies the western limit of bison coincided with the upstream limit of salmon, blocked by falls near present-day Twin Falls, Idaho (Sappington 1981). In western Idaho, fishing was the principal subsistence for the

Snakes or "War-are-ree-kae" (Ross 1956:166) who thronged the banks of the Snake River. After the salmon run ended, small game was all that was available, including every reptile and insect that the country afforded. Outside the salmon season, southwestern Idaho was a hard country for Euroamerican travelers (see Fremont in Jackson and Spence 1970; Sappington 1981:34-35; Townsend 1839). Through fishing and intense foraging the Snakes maintained a population that we propose was large enough to constrain bison from ranging further west. Horses may have helped. "Increased hunting efficiency of mounted Indians remains a valid explanation of extinction of bison in the Pacific Northwest" (Van Vuren 1987). Mounted Indian hunters may also account for the historic absence of elk along the Columbia corridor (Dixon and Lyman 1996).

At least parts of eastern Washington and Idaho now support considerably more game than found by Lewis and Clark and other early explorers. Under state game management, deer and elk are plentiful and elk have established a sizable and robust wild herd in the open shrub steppe within and on cropland beyond the fence of the un hunted Hanford Reserve near Yakima, Washington. Elk also thrive on treeless shrub steppe within the reserve of the Idaho National Engineering and Environmental Laboratory outside Idaho Falls on the Snake River Plain (Miller pers. corresp., September 1996; Strohmeier et al. 1999). While seemingly too arid for elk, Great Basin sagebrush habitat evidently is as productive in elk forage as the pine and cedar-hemlock forest (McCorquodale 1991) often viewed as the natural domain of elk. Thanks to the research at Hanford, it appears that the historic absence of elk in the sagebrush steppe of eastern Washington and elsewhere is not a matter of unsuitable habitat. Elk may also benefit from irrigated croplands in former sagebrush (Strohmeier et al. 1999).

As mentioned previously, we attribute the wealth of wildlife east of the Rockies in the upper Missouri and Yellowstone River to Blackfeet and Assiniboin suzerainty. What was the role of the Blackfeet and how might their activity favor game and game sources? In the 18th century trade goods from fur trading companies, including guns, knives, and ammunition, began to spread southwest from posts on Hudson's Bay and on the Great Lakes. The trade armed the Chipewyan, Cree, Assiniboin, and, eventually, more distant groups, including the Atsina (Gros Ventre) and the Blackfeet.

Finding themselves supplied with more and better weapons than their neighbors to the west, "three Blackfeet tribes (Piegan, Blood, and North Blackfeet) and their culturally related allies, Gros Ventre and Sarsi, laid claim to a vast area of grassland immediately east of the Rocky Mountains extending from the North Saskatchewan River in present Alberta southward to present Yellowstone Park and eastward to the mouth of the Milk River on the Missouri" (Ewers 1968:157; also, Clark, May 12, 1806). In savage nomadic raids, the Blackfeet and their allies drove out Kootenais, Flat Heads, Nez Perce, Shoshones, and others hunting the western edge of the buffalo range (Joseph 1965:31).

From his lengthy experience with the Blackfeet, Henry (in Coues 1897:726) concluded: "War seems to be the Piegan's sole delight; their discourse always turns upon the subject; one war-party no sooner arrives than another sets off . . . horses are their principal plunder . . . they are always the aggressors." Over 100 years later anthropologist John Ewers concluded, "It is doubtful that any other western tribes were so genuinely feared by so many other tribes as were the Blackfeet in the middle of the nineteenth century. The Assiniboines, the western bands of Crees, the Crows, Shoshones, Flat Heads, Pend d'Oreilles and Kutenais all looked upon them as their greatest enemies" (Ewers 1958:125-126).

Evidently, Blackfeet raids into southwestern Montana and southeastern Idaho in the early 1800s displaced the Shoshone and their neighbors. Bison found a refuge in the shifting war zone. In western Montana, west of Three Forks, Sacagawea interpreted changes in the buffalo range for Clark. On their return at Travelers Rest in western Montana, Lewis and Clark divided forces. Lewis headed northeast for the Marias River. Clark proceeded southward and then east from Three Forks toward the Yellowstone River. Aside from traces at Gibbons Pass on the Continental Divide, his party saw no signs of buffalo until they reached present-day Bozeman. There Sacagawea commented on an old sign, presumably buffalo dung or bones, or both.

The Indian woman informs me that a few years ago Buffalow was very plenty in these plains and vallies quit as high as the head of Jeffersons river [where the Corps found only dung and bones] but . . . few of them ever come into those valleys of later years owing to [hunting by] the Shoshones who are fearful of passing [further east] into the plains. . . . Small parties of the Shoshones do pass over to the plains for a few days at a time and kill buffalow

for their skins and dried meat, and return immediately into the mountains. (Clark, July 14, 1806)

As we have mentioned, Nez Perce, Flat Head, and Shoshone buffalo hunters usually lacked sufficient guns and ammunition to defend themselves from large parties of the aggressive Blackfeet. Sacagawea's observation suggests that hunting by the Shoshones and other tribes, hovering on the western edge of buffalo range, just as Lewis and Clark found them the year before, had been heavy enough to eliminate buffalo from a productive range around Three Forks.

Frank Roe (1970) has argued effectively that the movements of buffalo are erratic, not migratory. Perhaps his explanation serves in this case. Nevertheless, some movement may result from a change in hunting pressure. For example, the invasion of eastern Idaho by buffalo between 1811 and 1819 occurred during the expansion of a war zone involving the Blackfeet. The historical record reveals the following sequence: (1) no buffalo and no dung or bones on Lemhi Pass or in eastern Idaho in the time of Lewis and Clark; (2) traces (dung) of buffalo but no animals seen in Idaho by Hunt and Stuart in 1811 and 1812; (3) bison well established on both sides of the passes between the Columbia and the Missouri drainages in the time of the fur brigades in 1819–1826; and (4) bison in decline by 1836 and after two to three decades are gone from Idaho by the 1840s. The record suggests a pulse into and out of Idaho comparable to bison expansion at an earlier time into southeastern United States (Martin and Szuter 2002; Rostlund 1960). If not conclusive, the circumstance of a bison invasion behind an expanding war zone is intriguing and merits further investigation.

Within the region of abundant game one expects patches of scarcity near settlements, whether of native or nonnative Americans. In the upper Kootenay River country, David Thompson noted the effect of hunting pressure: "Saw no Animals, but had not so many Indians been lately passing & tenting this way, we should probably have seen plenty of Chevreuil or the Virginian Deer, wild Sheep and a few Red Deer" (Belyea 1994:72). In 1814, the Indians on the game-rich upper Willamette River apparently recognized the danger of overhunting by Northwest Company trappers and traders. "An old man who seemed to be a chief among them, dismounted and gave him [an Iroquois, one of the imported company trappers] to understand that they did not wish

white people to come up this river; that our guns had driven away the deer or made them so wild that they could no longer be killed with bows and arrows; and finally, that if we did not abandon the river they would drive us away" (Henry in Coues 1897:818).

With rare exceptions, early observers west of the Rockies and east of the Cascades found scant wildlife, at least along the heavily traveled trade routes and heavily settled river corridors where most early observations were made. From the mouth of the Snake westward down the Columbia River to the coast, Lewis and Clark, followed by the fur brigades, reported large numbers of Indians. Human activities offer a ready explanation for the scarcity of wild game in the region. The recent eruption of unhunted elk at Hanford in Washington, at INELL in Idaho, and at Red Lake in Wyoming reveals the potential of sagebrush steppe to shift from a sink to a source of megafauna whenever hunting pressures relax.

East of the Rockies, disputed intertribal war zones and abundant wildlife went hand in hand. On August 29, 1806, after witnessing an estimated 20,000 buffalo near the White River, South Dakota, William Clark viewed "a greater number of buffalo than I have ever seen before at one time." Here two years earlier Lewis had reported vast herds of buffalo, deer, elk, and antelope as far as the eye could reach (September 16, 1804). We believe Clark's next words (written August 29, 1806, when Lewis was recovering from an accidental gunshot wound and not writing in his journal) have not attracted sufficient attention. It is the only interpretative effort of the Corps of Discovery to explain abundance of game: "*I have observed that in the country between nations which are at war with each other the greatest number of wild animals are to be found*" (emphasis added). Apart from Teton Sioux, the nations in this case are not clear; they may have included Yankton Sioux, Arikara, and Pawnee (Figure 3.2, war zone "B").

Similarly, over 60 years later, Colonel Dodge (1959:130) reported that the Sioux displaced west of the Missouri found themselves between their traditional foes the Crow and the Pawnee (Table 3.4). An immense area drained by the Niobrara and White Rivers "became a debatable ground into which none but war parties ever penetrated. Hunted more or less by the surrounding tribes, immense numbers of buffalo took refuge . . . where they were comparatively unmolested remaining there summer and winter in security."

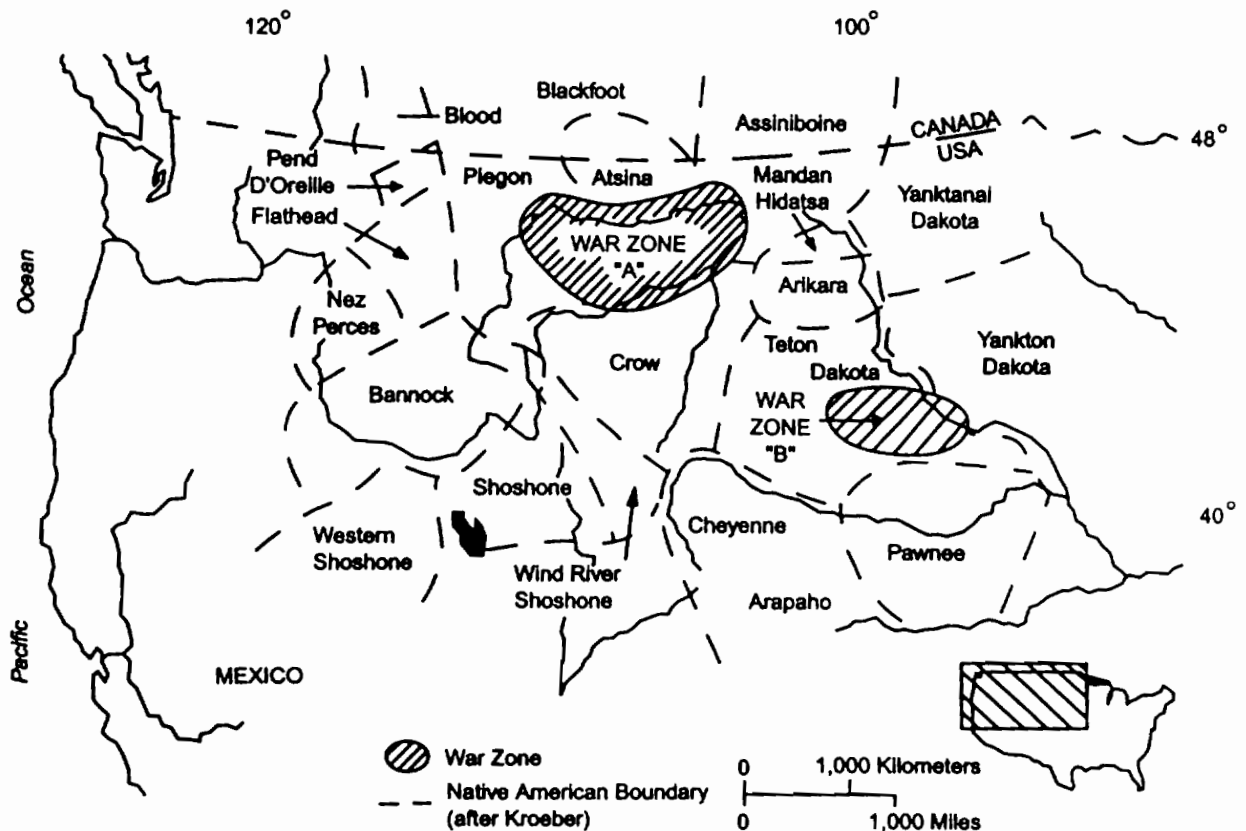


Figure 3.2. Distribution of Plains Indians and their neighbors around two war or buffer zones; map modified by Wishart (1979). With the permission of University of Nebraska Press.

Apparently, without knowing it, Dodge advanced the same explanation as Clark for the same phenomenon in the same general region.

In 1839 the Indians living by buffalo hunting claimed wide territories with rather vague boundaries: "In addition they recognize certain districts, where buffalo usually abound, as common hunting and war ground, where various tribes roam at will, subjecting their conflicting rights to the tests of strength. Between the tribes there is perpetual warfare" (Wislizenius 1969:150).

Returning from California in 1844 to the "first glad view" of buffalo near South Pass, Wyoming, John Fremont found the country richer in game than any part of the Rocky Mountains he had visited (Jackson and Spence 1970:710). The abundance of game, he wrote, "is owing to the excellent pasturage, and its dangerous character as a war ground" (*italics added*).

A valuable account of what it was like to enter, build a trapping post, and live in an uninhabited buffer or war zone

is found in Alexander Henry the Younger (Coues 1897; Gough 1988; we recommend the former). One of the British Canadian traders, Henry traveled south from the location of modern-day Winnipeg in 1800 and established the Park River Post on the Red River near what would become Grand Forks, North Dakota. His trading partners, the Salteur (Chippewa) Indians, were extremely nervous about being discovered and attacked by their traditional enemies, the Sioux (Coues 1897:90). Henry lost his "beau père" and "beau-mère" (his lover's father and mother) in a Sioux attack. Game was abundant. Henry's party loaded their stage with bear fat and choice meat (Coues 1897:95). River crossings were so heavily trampled by buffalo they looked like a barnyard. Elk twisted and tore up willow (Coues 1897:84). In addition, "bears made prodigious ravages in the brush and willows, the plum trees are torn to pieces" (Coues 1897:101). Near Devils Lake grizzly bears were numerous "and seldom molested by the hunters, it being the frontier of the Sioux, where none can hunt in safety; so there they

Table 3.4
Game-rich war zones, sparsely inhabited

Location	Animals	Disputants	Date	Source
Lake Champlain	Deer	Iroquois, Algonkians	1609–1628	Biggar 1925, Trigger 1987
Red River of the North Wisconsin, Minnesota	Bison, elk, bear Deer, elk	Chippewa, Dakota	1800–1808 1770–1850	Henry in Coues 1897 Hickerson 1965, 1970
White River, Niobrara, South Dakota	Bison, elk, deer	Teton Sioux, neighbors	1806, 1870	William Clark, Dodge 1959
Eastern Colorado	Bison	Arapaho, Crow, Cheyenne, Sioux	1820–1840	West 1995
Canoe River, British Columbia	Moose	(Kutenai)	1811–1817	Tyrrell 1916, Ross 1956
Upper Missouri, Yellowstone River	Bison, elk, deer, pronghorn, bear	Blackfeet, Crow, Atsina, Assiniboine, Shoshone, Flatheads, others	1800–1840	Martin and Szuter 1999a
Upper Amazon River, Brazil	Forest game	(various)	Prehistoric to 1700s	DeBoer 1981
Korean Demilitarized Zone (DMZ)	Cranes (<i>Grus vipio</i>)	North Korea, South Korea	1990s	Higuchi et al. 1996

[grizzly bears] breed and multiply in security" (Henry, October 17, 1800 in Coues 1897:72).

A map of the shift in bison range eastward out of Colorado between 1830 and 1840–1860 (West 1995) shows that bison herds endured in the neutral ground between Lakotas, Cheyennes, Arapahoes, Comanches, and Kiowas to the west and Pawnees, Otoes, and Osages to the east. In a sense, peace between Comanches and Kiowas and their Cheyenne and Arapaho rivals killed the bison in Colorado (Flores 1991; West 1995:62–63).

According to Jerry McDonald (1981:262): "Unrestricted hunting by Indians often dislodged bison populations from an area, whereas contested hunting in intertribal buffer zones appears to have provided relative security and temporary refuges for some bison populations." Intertribal no-man's-lands date back to the time of Champlain in the early 1600s, even before the warring Algonkians and Iroquois had been armed with guns (Biggar 1925; Trigger 1987). An example of uninhabited buffer zones that have been traced to the prehistoric past are those of the 16th and 17th centuries in Brazil along the upper Amazon (DeBoer 1981).

An example of a modern equivalent is the 4-kilometer-wide demilitarized zone (DMZ) separating North and South Korea. All human activity is prohibited there, and between their wintering grounds in southern Japan and breeding

grounds in northeastern China, migrating white-naped cranes (*Grus vipio*) spend 87 percent of their time in the DMZ (Higuchi et al. 1996).

Conclusions: Controllers of the Game

We can never know what the West would have looked like had its native mammoths, camels, horses, and other large game (Table 3.1) survived the late Pleistocene. In the time of the mammoths, until 13,000 years ago, bison ranged coast to coast (Graham et al. 1994). Historically, "it is probable that had the buffalo remained unmolested by man and uninfluenced by him, [buffalo] would have crossed the Sierra Nevada and the Coast Range and taken up an abode in the fertile valleys of the Pacific Slope" (Hornaday 1889). If "unmolested by man," it is probable that throughout the West, from the Columbia Plateau and the intermontane region south into the Mexican Plateau, bison, elk, deer, pronghorn, mountain goats, bighorn, and javelina, along with their associated wolves, bears, and jaguar, would have ranged much more widely, and in far greater numbers prehistorically than they did historically. On a scale unimaginable in terms of historical observations, an un hunted fauna of bison, deer, elk, and so on would have proliferated, consuming resources formerly harvested by the extinct megafauna (Table 3.1).

Instead, in the culturally controlled landscape of the Holocene, the bison, elk, and other postextinction survivors could not and did not attain the numbers to be expected in the absence of human activity. A rough idea of biomass to be found in a hypothetical "wild America" released from heavy human predation can be derived from the disputed war zones (buffer zones or neutral zones) locally or regionally rich in game found in the postcontact period (Table 3.4). These include the upper Missouri and the Yellowstone Rivers in the time of Lewis and Clark (Figure 3.2) and the Red River of the North in the time of Alexander Henry. On the upper Missouri an abundance of locally tame animals enjoyed the unwitting protection afforded by the war parties of Blackfeet, Assiniboine, Atsina (Gros Ventre), and Crow. The Red River of the North was a buffer zone between Chippewa and Sioux.

Other game-rich war zones include the upper Amazon in the 1700s and, in the last 50 years, the DMZ in Korea. The example best known to anthropologists, the war zone in the Midwest between the Chippewa and Sioux, which harbored large numbers of deer and other game, took shape in the late 1700s as the disputants moved west (Hickerson 1970). Before epidemics and other impacts accompanying the turmoil of conquest, much of aboriginal America would have been a game sink with relatively small intertribal buffer zones to serve as sources of game, such as that found by Champlain in 1609. In this view the precontact populations of large animals would have been much less numerous than during the turbulent years of contact, when diseases swept away Native Americans to the benefit of their preferred prey.

If "wild" is taken to mean pristine or natural or totally bereft of human influence, such an environment vanished over 12,000 years ago when humans arrived and their influence began to be felt. The last "wild" West supported an un-hunted megafauna of at least 39 species, including mammoths, mastodons, camels, and ground sloths, exhibiting three times the diversity of megafauna found there historically (Table 3.1). Whether Clovis colonization triggered the extinctions (opinions on this vary, but a growing consensus is that it did [Flannery 2001; Kay and Simmons 2002; MacPhee 1999]), numerous historical accounts, including those reviewed here, suggest that the range and numbers of surviving large animals were profoundly influenced by the activities of Native Americans well before European settlement. European colonists had no patent on suppressing wildlife.

The implications for policy makers seeking to restore "wild America" to some imaginary "natural" condition are profound. If our conclusions are valid, not only did the majority of native megafauna vanish over 12,000 years ago, but subsequent human activity in America after extinction of native proboscideans, camelids, equids, and the like controlled the population sizes and limited the ranges of the surviving buffalo, elk, moose, caribou, deer, pronghorn, bighorn, mountain goats, mountain lions, grizzly bears, black bears, and wolves, as well as certain medium-sized species such as javelina, raccoons, and porcupines.

Near the end of the Lewis and Clark expedition, William Clark observed that "in the country between the nations which are at war with each other the greatest number of animals are to be found." The historic records we review support Clark's observation. Restoration of "wild America" to what Lewis and Clark found in 1805 and 1806 would be impoverished compared with what Clovis hunters found in 11,000 a.c. If poor in species, the bison, elk, deer, and other game seen by Lewis and Clark were abundant or scarce depending on cultural as well as environmental conditions. The view that prior to this century "Native Americans were the ultimate keystone species" (Kay 1994, 1998) is supported by our review of the historic record of big game. We conclude that those parts of the continent harboring large animals in large numbers historically were either buffer zones, war zones, or, as a result of the diseases of contact, sparsely inhabited areas. Human influence cannot be ignored in historic interpretations of the "wild" West (Lyman and Wolverton 2002; Martin and Szuter 1999a, 1999b, 2002).

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