24 Reintroduction of bison into the Rocky Mountain parks of Canada: historical and archaeological evidence

CHARLES E. KAY, Department of Political Science, Utah State University, Logan, Utah 84322
CLIFFORD A. WHITE, Parks Canada, Banff National Park, P.O. Box 900, Banff, Alberta T0L 0C0, Canada

Introduction and Methods

Parks Canada is required by legislative statute to maintain the ecological integrity of Canada's national parks, which includes restoring extirpated species (Parks Canada 2000a-b). To determine if bison *(Bison bison)* were indigenous to the southern Canadian Rockies, we conducted a detailed analysis of first-person historical journals and reviewed existing archaeological data (Kay and White 1995; Kay et al. 1999; Kay, Patton, and White 2000). For, as Aldo Leopold noted over 40 years ago, "if we are serious about restoring [or maintaining] ecosystem health and ecological integrity, then we must know what the land was like to begin with" (Covington and Moore 1994, 45). Five Canadian national parks are found in the Rocky Mountain Cordillera: Banff (Canada's oldest, established in 1885), Yoho (1886), Waterton Lakes (1895), Kootenay (1920), and Jasper (1907). Yoho and Kootenay are located west of the Continental Divide in British Columbia, while Banff, Jasper, and Waterton Lakes are situated east of the divide in Alberta (Figure 24.1).

Some people have used selected quotes from historical journals as evidence that certain animals were or were not abundant during the late 1700s and early 1800s (Byrne 1968; Nelson 1969a; Nelson 1969b; Nelson 1970). With selective quotations, however, there is always a question of whether or not the author included only those passages that support some preconceived hypothesis (Kay 1990; Kay 1995c; Kay and White 1995). To overcome any problems of bias, we systematically recorded all observations of ungulates and other large mammals found in first-person historical accounts of exploration in the southern Canadian Rockies from 1792 to 1872. We then tabulated those data in three ways (Kay et al. 1999; Kay, Patton, and White 2000). First, animals seen; second, game sign encountered or referenced; and third, animals shot or killed. For this analysis, we divided the southern Canadian Rockies into three contiguous geographic regions—the Alberta Foothills, the Rocky Mountains, and the Columbia Valley in British Columbia (Kay et al. 1999; Kay, Patton, and White 2000).

We used only first-person journals penned at the time of the event or edited versions written soon thereafter because later narrative accounts are less accurate (MacLaren 1984; MacLaren 1985; White 1991, 613-632; MacLaren 1994a-c; Shaw and Lee 1997). Even "the humblest narrative is always more than a chronological series of events" (McCullagh 1987, 30). The ideological implications of most narrative historical accounts are "no different from those of the narrative form in fiction" because narratives are always influenced by prevailing cultural myths (Galloway 1991, 454; Pratt 1991; Cronon 1992; Demeritt 1994; Wishart 1997; Kearns 1998). In addition, we used standard techniques developed by historians to gauge the accuracy of all historical journals analyzed during this study (Forman and Russell 1983).

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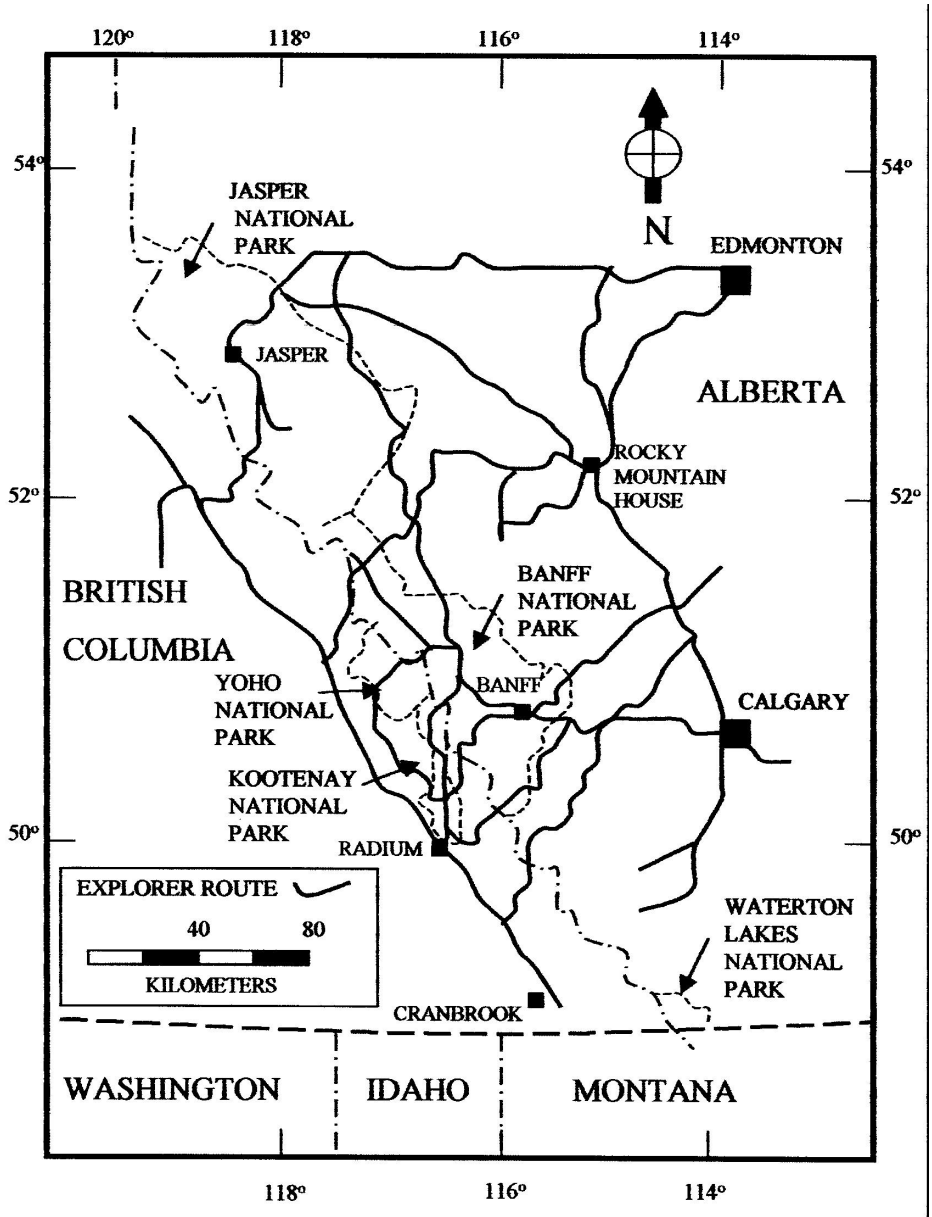

Figure 24.1. Routes of early explorers to the southern Canadian Rockies. Some routes were traveled by more than one expedition. Also shown are Banff, Jasper, Kootenay, Waterton Lakes, and Yoho national parks, as well as present cities and towns.

To determine the relative abundance of ungulate species in pre-Columbian times, we reviewed all available reports for archaeological sites in the southern Canadian Rockies (Kay et al. 1999). This included the Alberta Foothills from the U.S. border

north to the Smoky River, the Rocky Mountains from Montana to Jasper National Park, and the entire Rocky Mountain Trench including the middle Kootenay, upper Columbia, and Canoe River valleys. In all, we consulted more than 200 studies. We also conducted an extensive review of the archaeological literature on site formation processes so that we could make informed interpretations from the archaeological record. Taphonomic and transportation questions were given major consideration. Moreover, we reviewed ethnographic material for peoples who inhabited the Canadian Rockies and adjoining prairies at historical contact.

Results

Early explorers visited most parts of the Canadian Rockies, although their travels were generally confined to major river drainages and established mountain passes (Figure 24.1). David Thompson first crossed the Canadian Rockies in 1807 by way of the North Saskatchewan River, Howse Pass, and the Blaeberry River. The Peigan people, however, objected to Thompson trading with their enemies west of the divide and by 1810, the Peigan had closed the North Saskatchewan to Europeans. This forced David Thompson and the North West Company to find an alternative route farther north using the Athabasca River, Whirlpool River, Athabasca Pass, and Wood River to reach the Columbia. The North Saskatchewan route passed through what is now the northern portion of Banff National Park, while the Athabasca Trail traversed today's Jasper National Park (Kay et al. 1999; Kay, Patton, and White 2000).

Only after the Peigan shifted their trade to American posts on the Missouri River, and then lost their warriors to repeated European-introduced epidemics and other colonial processes, did explorers gain access to the southernmost Canadian Rockies (Smith 1984; Kidd 1986). As a result, the first Europeans known to have traveled Banff's Bow Valley did so only in 1841, and the area comprising Banff, Kootenay, and Yoho national parks was not fully explored until Dr. James Hector of the Palliser Expedition arrived in 1858. By then, the fur trade was declining, and the region's mineral-poor rocks failed to attract the onrush of prospectors that occurred further west in British Columbia.

Historically, ungulates were not common in the southern Canadian Rockies or elsewhere in the Intermountain West (Kay 1990; Kay 1994; Kay 1995a-c; Kay 1997a-c; Kay 1998; White et al. 1998). Nevertheless, bison were the second most frequently observed ungulate species in the Canadian Cordillera (Table 24.1). Bison were also the most commonly encountered ungulate in the Alberta Foothills, but early explorers failed to report seeing bison or those animal's sign in the Rocky Mountain Trench (Table 24.1). Between 1807 and 1810, David Thompson reported killing 22 bison on six separate trips up the North Saskatchewan River, primarily on the Kootenay Plains (Kay et al. 2000). Thompson also reported a bison pound (trap) near Howse Pass, as well as chasing a small herd of bison up and over Howse Pass into British Columbia (Kay et al. 1999). Alexander Henry reported bison on the Kootenay Plains and bison sign further west in today's Banff National Park during a winter expedition in 1811. Similarly, David Thompson reported killing bison in the Athabasca Valley just east of the present Jasper National Park, as well as bison sign further west in the park (Kay et al. 1999). Later explorers to the Canadian Rockies, however, seldom saw or killed any bison, though they did report old bison sign, including bison skulls (Kay et al. 1999).

Archaeological evidence indicates that bison and other ungulates were also rare throughout the mountain cordillera in pre-Columbian times (Kay 1990; Kay 1994; Kay 1998; Kay and White 1995; Kay et al. 1999). In fact, for the last 10,000 years, Intermountain aboriginal diets generally contained only a small amount of ungulate foods, often 10% or less (Kay 1994; Kay 1998). Nonetheless, of the ungulate faunal remains recovered from archaeological sites in the southern Canadian Rockies, bison was the most common species in the Alberta Foothills and on the east slope of the Rocky Mountains (Kay et al. 1999; Langemann 2000b). Bison were the most com-

monly unearthed ungulate in Waterton Lakes National Park, in Crowsnest Pass, and on the lower Bow and Red Deer Rivers. Even in Banff National Park, where human occupation has been dated to 10,300 BP (years before present; Fedje et al. 1995), bison outnumbered other ungulates in archaeological sites. Bison have even been unearthed from archaeological sites in the Rocky Mountain Trench (Langemann 2000b, 7), but it is thought that those bones were deposited by aboriginal people who killed the animals on the east side of the Continental Divide, as there is no evidence that modern bison ever inhabited southern British Columbia (Kay et al. 1999). [Ed. note: an additional table describing these faunal remains could not be included here because of size constraints. See Kay et al. 1999 for details.]

Ecoregion	*Elk*	*Bison*	*Deer*	*Bighorn*	*Moose*	*Mtn. goat*
Alberta Foothills						
Animal sign	1	4	0	0	4	0
Animals seen	19	35	32	4	8	0
Animals killed	19	43	24	5	9	0
Total	39	82	56	9	21	0
Percent	19	40	27	4	10	0
Rank	3	1	2	5	4	6
Rocky Mountains						
Animal sign	11	19	6	12	10	7
Animals seen	12	39	7	69	27	23
Animals killed	9	34	6	113	26	17
Total	32	92	19	194	63	47
Percent	7	21	4	43	14	11
Rank	5	2	6	1	3	4
Rocky Mountain Trench						
Animal sign	5	0	6	0	4	0
Animals seen	7	0	14	2	2	1
Animals killed	7	0	13	3	1	2
Total	19	0	33	5	7	3
Percent	28	0	49	7	10	4
Rank	2	6	1	4	3	5

Alberta Foothills (1792-1863): 29 expeditions, 212 party-days.
Rocky Mountains (1792-1872): 26 expeditions, 369 party-days.
Rocky Mountain Trench (1807-1859): 11 expeditions, 161 party-days.

Table 24.1. Historical evidence relating to the distribution and abundance of ungulates in the southern Canadian Rockies, 1792 to 1872. Animal sign is the number of times animal sign was observed; animals seen is the number of occasions on which various species were seen; animals killed is the number of animals early explorers reported as having killed. Party-days is the total length of time the early exploring parties spent in each ecoregion; expeditions is the number of groups that visited each ecoregion. Species: elk *(Cervus elephus)*, bison *(Bison bison)*, mule deer *(Odocoileus hemionus)* and white-tailed deer *(O. virginianus)*

combined, bighorn sheep *(Ovis canadensis),* moose *(Alces alces),* and mountain goat *(Oreamnos americanus).* After Kay et al. 1999; Kay, Patton, and White 2000.

Bison bone has not been recovered from archaeological sites in Jasper National Park because few sites have been excavated in that area and bone does not preserve well in those acidic soils (Kay et al. 1999; Langemann 2000b). Surprisingly, few bison bones have been recovered from Kootenay Plains on the North Saskatchewan River, but there all the larger known archaeological sites were flooded when Bighorn Dam was constructed (Kay et al. 1999).

Discussion

Although free-ranging bison have been absent from Canada's Rocky Mountains for more than 100 years (Kopjar 1987), historical sources confirm that bison were present in Banff and Jasper national parks during the early 1800s, while archaeological evidence indicates that bison were present for at least 9,000 years. It has been suggested that these were mountain or wood bison *(Bison bison athabascae),* which maintained populations separated from bison *(B. b. bison)* found on the plains (Meagher 1973; Kopjar 1987). The available data, however, does not support this interpretation. First, there is no morphometric evidence that mountain or wood bison is a valid subspecies (McDonald 1981). Geist (1991) reported that wood bison was an ecotype, not a subspecies, a conclusion supported by genetic analyses (Bork et al. 1991). This suggests that whatever bison were in the mountains during pre-Columbian times or historically were not isolated from bison on the Canadian prairies.

Second, unless constantly replenished with animals from the plains, it is unlikely that bison could have maintained viable populations in the mountains (Kay et al. 1999). Long-term studies in Wood Buffalo National Park indicate that wolf *(Canis lupus)* predation alone can have a dramatic impact on bison numbers, keeping the population well below the level the range could otherwise support (Carbyn, Oosenbrug, and Anions 1993; Carbyn, Lynn, and Timoney 1998; Joly and Messier 2000), while studies of hunter–gatherers indicate that native hunters were the ultimate keystone predator that limited the numbers and distribution of all ungulate species, including bison (Kay 1994; Kay 1997c; Kay 1998). This interpretation complements the view that bison once summered on the Canadian prairies but then moved into the foothills and aspen parklands, and we would add montane valleys, to avoid harsh winters on the open plains (Moodie and Ray 1976; Morgan 1980; Hanson 1984; Chisholm et al. 1986; Bamforth 1987; Epp 1988). Some bison may have summered in the mountains, but non-migratory animals would have been under intense predation by Native Americans, wolves, and bears *(Ursus arctos* and *U. americanus).*

Near the head of the Red Deer River in Banff National Park, for instance, there are house pits at the foot of Drummond Glacier that continue to puzzle archeologists (Magne 1994; Langemann 1995; Langemann 2000b). This is a 3,000-year-old stratified site "where the only faunal remains to date are from bison" (Langemann 2000b, 7). Pit houses were very labor-intensive structures to build and are usually associated with Interior Plateau cultures and winter village sites at low elevations in the central Columbia Basin, not the Rocky Mountains (Langemann 1987; Magne 1994; Langemann 1995). We propose that these pit houses were part of a sophisticated management system employed by native people to herd bison into the mountains. This system included extensive aboriginal burning (White 1985; Kay 1995a-b; Heathcott 1999; Kay 2000) to both attract bison and make it easier for people to drive bison to killing sites deep in the mountains (White et al. 2001). This would have lowered those people's transportation costs, as it would have required less energy to transport dried meat and other bison products from kill sites near the Centennial Divide than from areas 50-100 km to the east. In addition, this strategy would

have minimized risk associated with people from the interior of British Columbia hunting bison on the Canadian prairies that were claimed by plains tribes, as these two distinct cultural groups were often engaged in open warfare and other hostilities (Smith 1984; Kidd 1996).

To test this hypothesis, Parks Canada subjected archaeologically recovered bison bone to stable carbon analysis (Langemann 2000a-b). Cool-season, or C3, plants fix ^{12}C and ^{13}C isotopes in different proportions than warm-season, or C4, grasses, which, in turn, are incorporated into the bones of herbivores who consume those plants. Thus, by performing isotopic analyses, it is possible to determine the proportion of C3 and C4 plants consumed by bison that once frequented western ranges (Chisholm et al. 1986; Tieszen 1994; Gannes et al. 1997). Moreover, because C4 plants are exceedingly rare in the Alberta Foothills and mountains, if bison unearthed from sites in the Canadian Rockies had a high proportion of C4 plants in their diets, then those animals would necessarily have spent a considerable portion of their lives several hundred kms to the east and south on the Great Plains (Chisholm et al. 1986; Langemann 2000a-b).

Of the bison bones analyzed to date, samples from Waterton Lakes and Banff national parks indicate that those animals consumed a significant proportion of C4 plants. Bison from Waterton Lakes had up to 28% C4 plants in their diet (Langemann 2000a), which is similar to bison tested further east on the Canadian prairies (Chisholm et al. 1986, 201). Even bison from deep inside Banff National Park once consumed major quantities of C4 plants—up to 14% of their diets, which again is significant since there are virtually no C4 plants in the park. Thus, these data support the hypothesis that bison found in the Rocky Mountains commonly migrated to and from the xeric grasslands on the northern Great Plains, a distance of several hundred kms. These data also support the hypothesis that "mountain bison" is not a valid subspecies or ecological concept, and that bison from the plains were a source population for bison that were under intense human and carnivore predation in the more confined mountain and foothill valleys (Kay et al. 1999).

Conclusions

Historical and archaeological data indicate that plains bison once frequented the Alberta Foothills and Canadian Rockies. Archaeological and other evidence suggest that those bison were intensively hunted by native people and that these ecosystems were structured from the top-down by carnivore and human predation—a factor that must be taken into consideration if free-ranging plains bison are to be reintroduced to Banff and other Canadian national parks (see the next chapter in this volume by White et al.). Furthermore, we suggest that, as a condition of reintroduction, hunting by First Nations may be required to maintain appropriate herd sizes and ecological integrity. This conclusion is in keeping with the recommendations of Parks Canada's recent Ecological Integrity Panel (Parks Canada 2000a-b).

According to that panel, "humans have been present for thousands of years on the lands that now constitute Canada. Their association with the land and their traditional activities were part of the ecosystems and, to a certain extent, made the landscape what it was when Europeans first arrived.... [Moreover] the influence of Aboriginal peoples is fully consistent with ... [the] definition of ecological integrity. [In fact] ... this traditional human role is an important element of the ecological integrity of the ecosystems that Parks Canada is mandated to preserve or restore..." (Parks Canada 2000b, 7-2).

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