

HISTORIC DISTRIBUTION AND ABUNDANCE OF BISON IN THE ROCKY MOUNTAINS OF THE UNITED STATES

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ABSTRACT

Scant public awareness of the early distribution and abundance of bison (*Bison bison*) in the Rocky Mountains of the United States inhibits discussion of possible restoration of wild bison. A review of written evidence, largely from 1805-1845, indicates bison were widely distributed in intermountain valleys, with a major regional concentration spanning parts of Idaho, Montana and Wyoming. However, several interacting factors caused large spatial and temporal variation in bison abundance. Native American predation was likely a major influence on bison distribution and abundance during and shortly before 1805-1845. The area where bison were observed by early explorers underestimates the area where restoring productive herds of wild bison is possible.

Key words: Bison, *Bison bison*, Rocky Mountains, Historic Distribution

INTRODUCTION

Although bison (*Bison bison*) are abundantly widespread as private livestock, there are proposals to reestablish wild herds that will be influenced by a preponderance of natural selection in diverse habitats (Gates et al. 2010, Bailey 2013). Developing a constituency for restoring wild bison requires broader awareness of former bison distribution, particularly in the Rocky Mountains.

Previous summaries of early bison distribution in the Rocky Mountains are from Allen (1877), Hornaday (1889) and Roe (1951). Meaney and Van Vuren (1993) compiled a list of early bison observations and of collected bison specimens for the Rocky Mountains of Colorado. For the northwest United States, reviews of bison in late-prehistoric to early historic time are in Kingston (1932), Butler (1978), Daubenmire (1985), Van Vuren and Bray (1985), Van Vuren (1987), Van Vuren and Dietz (1993), Lyman (2004), Williams (2005) and Grayson (2006). However, most of these references focus on bison west of the Rocky Mountains in southwest Idaho, eastern Washington and Oregon and the Great Basin.

Early literature based largely on 2nd hand descriptions, suggested that a unique strain of mountain bison once occupied the Rocky Mountains (Allen, 1877:447-448;

Hornaday, 1889:407-412; Roe, 1951:33-56; Meagher, 1973:14-17). Described characteristics of "mountain bison" may have been phenotypic with little or no genetics distinct from sympatric bison on the Great Plains. However, unique bison characteristics elicited by distinct environmental conditions in the Rocky Mountains constitute an ecotype, a portion of biodiversity without which the full expression of the *Bison bison* genotype would not occur.

LITERATURE REVIEW

For the "Rocky Mountains" I included parts of Idaho, Montana, Wyoming, Colorado and northeast Utah. To emphasize continuous mountain habitat, I excluded island mountains in the plains of eastern Montana and the Bighorn Mountains of Wyoming. I did not include the Colorado Plateau of southwest Colorado and Utah.

I searched reports of fur trappers, trapping brigade leaders, missionaries, military expeditions and other explorers, largely from 1805-1845. Sources are the most accessible literature and are mostly edited versions of original writings. I noted the year, month and general location (usually a major river drainage) of bison observations (Tables 1-5). I omitted sightings with unclear locations. However, a few locations

were inferred from clearly described travel routes. Nothing can be inferred from diary entries lacking references to bison. Clearly, where bison were everyday abundant, writers often failed to record them. Records are organized by state and county to be most useful for today's readers.

Meaney and Van Vuren (1993) plotted locations of about 89 specimens (mostly skulls) and about 36 early recorded observations of bison in the Rocky Mountains of Colorado. Almost all these records are in northwest, north-central and central Colorado. I report additional records for Colorado and repeat observations, not specimens, from Meaney and Van Vuren.

FINDINGS

Bison were found throughout the Rocky Mountains, except in the northern, more forested, mountains of Idaho and northwest Montana (Fig. 1, Tables 1-5). It is widely known, but misleading, that Meriwether Lewis and William Clark saw no bison in the mountains in 1805-06. In contrast, they noted old bison sign on the Jefferson River, in the Big Hole and Gallatin Valleys and on Bozeman pass, all in Montana. In 1806, Sacajawea said to Clark that her nation, the Shoshones, had "gathered cows" in the Big Hole Valley not many years before and that bison had recently been numerous in the Jefferson and Gallatin Valleys (Table 2).

There was a major abundance of bison in the central Rocky Mountains of the United States (Fig. 1). This area - broadly straddling the continental divide - encompasses parts of southwest Montana, east-central and southeast Idaho and southwest Wyoming, including the upper valleys of the Jefferson-Beaverhead, Salmon, Snake, Bear and Green rivers and their numerous tributaries. Fremont (1845:144) reported "mountain man" Tom Fitzpatrick's description of "immense numbers" of bison over this country "in about 1824". Numerous, mostly later, reports confirm Fitzpatrick's description (Tables 1-3).

Bison were observed in the Rocky Mountains during every month. A

preponderance of summer observations, especially in Wyoming and Idaho, reflects observations of seasonal cross-country travelers on the Oregon and Overland Trails. Most winter observations were in Idaho and Montana, also reflecting the distribution of observers. Mountain men favored wintering not far north of Fort Hall, Idaho where trapping brigades and Native Americans, often wintered on both sides of the Idaho/Montana border in part because bison were abundant in this area (Lewis and Phillips, 1923:114-119, 123, 130; Haines, 1965:108-109; Ferris, Ch. XXII, XXIII). These records provide very little information on habitat selection by bison in the mountains, or about elevational migrations.

Rocky Mountain bison were quite mobile and could be absent from large portions of the area at any time. Roe (1951:261-266) discussed locally inconsistent observations of bison abundance. For example, bison were reported as abundant in the Jefferson-Beaverhead Valleys, Montana, in the 1830s, where Lewis and Clark saw no bison in 1805-06, although Sacajawea said bison were once numerous there (Table 2). In 1812, Stuart found no bison in southeast Idaho where bison were plentiful in the 1820s and 1830s (Table 1). Stuart (Spaulding 1953) found few bison in the upper Green River valley of Wyoming where Hunt (Irving 1836) had observed many herds during the same season of the previous year (1811). In the 1830s, even more bison were recorded in this area (Table 3). Stuart had observed large, recently used Native American camps and trails and bones from recent abundant bison kills. At least three nations had recently hunted in the Wyoming area.

Mass movements of bison, sometimes over long distances, were reported by several diarists as responses to attacks by hunters. Many records of Euro-American brigades and accounts of Native American hunting parties describe cautions taken not to disturb bison, lest they leave an area, before an entire hunting party was brought up and prepared to kill a sufficient number of animals.

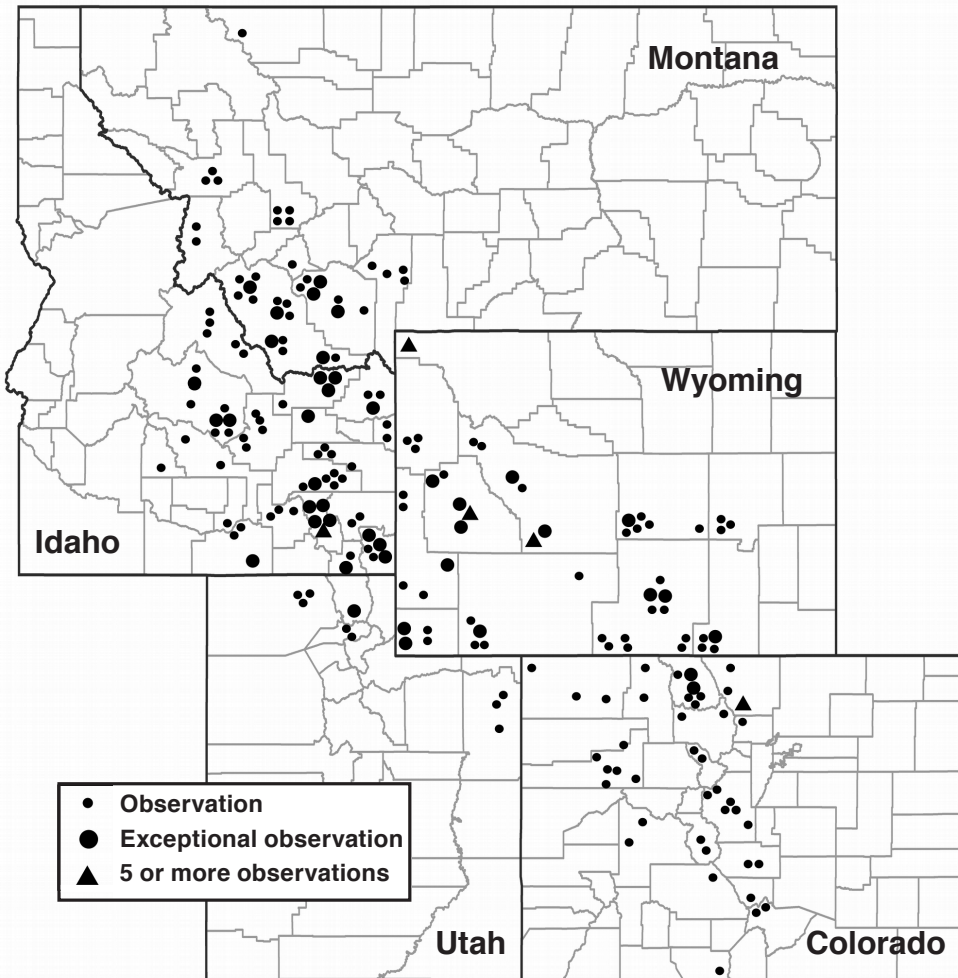


Figure 1. Early historic observations (Tables 1-5) of bison in the Rocky Mountains, USA. Exceptional observations are observer estimates of 1000 or more bison, or descriptions such as "vast herds".

Even before obtaining horses (about 1730) and more so thereafter, Native Americans had effective methods for killing bison (Point nd:121-125; Hornaday 1889:465-484). When large numbers of bison were accessible, both Native- and Euro-Americans often preferred the flesh and hides of cows (Hornaday 1889:465). This selective harvesting would have negatively influenced regeneration of bison numbers.

Native Americans often killed very large numbers of bison. Stuart (Spaulding 1953:116-117) found immense numbers of bison bones in every direction of the upper

Green River Valley, Wyoming, in 1812 and Bonneville observed similar conditions in the same place in 1833 (Irving 1837:95). Clyman (1984:25) observed Crows killing "upwards of a thousand" bison in a day of 1824. Russell (Haines 1965:36) describes one village of Shoshones killing, without guns, "upwards of a thousand cows" in one day of 1835. On the Great Plains, 500 or more Sioux killed 1400 bison in less than a day of 1832 (Catlin in Roe 1951:631) and 100 or more Minatarees and Mandans killed several hundred bison in 15 minutes (Catlin in Hornaday 1889:482). Native Americans often attempted to kill whole herds of bison.

Table 1. Early historic observations of bison in the mountains of Idaho.

County	Area	Year	Month	Comments	Citation		
Bannock	Portneuf Valley	1825	May	Kittson: "bulls killed"	Miller (1954:142)		
				Ogden: "buffalo in abundance"	Miller (1952:186)		
		1826	April	Ogden: "large herd of buffalo"	Elliott (1909:358)		
		1827	Dec.	Ogden: "Never seen buffalo so numerous, killed 12"	Elliott (1910a:367)		
		1831	Apr.	"buffalo numerous", killed "upwards of 50"	Ferris (1983:Ch. XIV)		
		1833		Bonneville: "the buffalo range"	Irving (1837:77)		
		1833	Nov.	Bonneville: "several large herds"	Irving (1837:135)		
		1834	June	Bonneville: Killed 2 bulls.	Irving (1837:177)		
		1834	July	With Nez Perce, killed "many buffalo"	Townsend (1978:100)		
		1834	autumn	Bonneville: "immense herds" of buffalo	Irving (1837:220)		
		1836		Russell: "large bands could be seen"	Haines (1965:123)		
		1840	Nov.	Russell: "only traces were scattered bones"	Haines (1965:123)		
		Bear Lake	Bear River Valley	1824		Fitzpatrick: "immense numbers"	Fremont (1845:144)
				1830	Sept.	Valley "covered with buffalo"	Ferris (1983:Ch. X)
1832	April			"killed several from a large herd"	Ferris (1983:Ch. XXIV)		
1834	June			Bonneville: "country covered with buffalo"	Irving (1837:180)		
1834	July			Bonneville: Killed "some buffalo"	Irving (1837:192)		
1834	July			Killed "only a few buffalo"	Townsend (1978:90)		
1834-35	winter			Bonneville: "vast herds"	Irving (1837:222)		
1832	May			"buffalo continuously in sight"	Ferris (1983:Ch. XXV)		
1833				Bonneville: "the buffalo range"	Irving (1837:77)		
1834	July			Bonneville killed buffalo.	Irving (1837) p. 206		
Bingham	Blackfoot Valley	1811		Hunt: "old bison traces"	Rollins (1995:291)		
		1832		Saw "buffalo running"	Ferris (1983:Ch. XXXIV)		
		1835	Dec.	Russell: "thousands; killed a great number"	Haines (1965:13)		
		1827	Nov.	Ogden: Killed 10 cows.	Elliott (1910a:364)		
Blaine	Big Wood R. Valley Little Wood Valley	1832	May	Work: "a good many" buffalo	Lewis, Phillips (1923:153)		

Table 1. continued.

County	Area	Year	Month	Comments	Citation
Bonneville	Snake River Valley	1831	May	"killed numbers of buffalo" Saw "hundreds of carcasses" in Snake River	Ferris (1983:Ch. XV)
		1833	Jan.	Bonneville: "buffalo in herds"	Irving (1837:76)
		1839	Jan.	Russell: "a few bulls"	Haines (1965:94)
	Gray's Lake Outlet	1833	Apr.	"a herd; killed several"	Ferris (1983:Ch. XXXVI)
Butte	Little Lost R. Valley	1827	Nov.	Ogden: Killed 5 cows along Day's Defile.	Elliott (1910a:364)
		1830	Oct.-Nov.	Work: "large herds are about" Killed 4	Elliott (1912:369)
		1832	Dec.	Bonneville killed 2 bulls.	Irving (1837:73-74)
		1831	Dec.	"several herds; shot 1"	Ferris (1983:Ch. XXXIV)
	Big Lost R. Valley near Three Buttes	1832	Dec.	Bonneville killed a bull.	Irving (1837:73-74)
Camas	Camas Creek	1832	May	Work: "started 8 buffalo"	Lewis, Phillips (1923:153)
Caribou	Bear River Valley	1812	Sept.	Stuart: "considerable fresh sign of buffalo"	Spaulding (1953:95)
		1824		Fitzpatrick: "immense numbers"	Fremont (1845:144)
		1825	May	Kittson: "plenty buffalo, many killed"	Miller (1954:142)
	Portneuf Valley	1839	July	"killed 5 buffalo" west of Beer Spring	Wisizenus (2005:104)
Cassia	Raft River Valley	1831	May	Work: "large herds" Killed many	Elliott (1913a:287-288)
	Snake River Valley	1826	Mar.	Ogden: "buffalo are near" Killed 2	Elliott (1909:355)
		1824		Fitzpatrick: "buffalo west to Fishing (Twin) Falls	Fremont (1845:144)
		1830?		Kit Carson: 3 or 4 bulls	Fremont (1845:166)
Clark	Camas Creek	1831	May	"large herds, killed many"	Ferris (1983:Ch. XV)
		1834	May	"immense herds in every direction"	Ferris (1983:Ch. L)
		1835	Sept.	Russell: "traveled amid thousands; immense bands as far as eye could reach"	Haines (1965:34)
				Bannock killed "upwards of 1000 cows"	
	Birch Creek	1832	May	"numerous in all directions; killed numbers"	Ferris (1983:Ch. XXV)

Table 1. continued.

County	Area	Year	Month	Comments	Citation
Custer	Salmon River Valley	1824		Ross: "over 10,000 in 1 herd" Killed 60	Roe (1951: 267)
		1832	Apr.	Work: Killed 21.	Lewis, Phillips (1923:144)
		1835	Sept.	"large band" Killed 50-60	Parker (1842:107)
		1827	Nov.	Ogden: Killed 10 buffalo	Elliott (1910a:364)
		1831	July	"valley covered with buffalo; killed many"	Ferris (1983:Ch. XVII)
		1832	Feb.	"large herds, killed several"	Ferris (1983:Ch. XXIII)
		1832	Apr.	Work: "a band; plenty ahead" Killed 17	Lewis, Phillips (1923:146)
		1833	Apr.	Bonneville: "buffalo recently driven from area"	Irving (1837) p. 84
		1834	Aug.	Killed a bull, calf and 3 others	Townsend (1978:125)
		1825	May	Ogden: "plains covered with buffalo, killed many"	Miller (1952:169-172)
Franklin	Bear River Valley			Miller (1954:132)	
Fremont	Henry's Fork Valley	1811	June	Hunt: "numerous tracks of buffalo in all directions"	Rollins (1995:290)
		1832	June	"killed hundreds daily"	Ferris (1983:Ch. XXVI)
Jefferson	Camas Creek	1835	Sept.	"plains covered with buffalo in all directions"	Haines (1965:34)
		1824	Sept.	See Clark County comments for 1835	Fremont (1845:144)
Jerome	Snake River Valley	1831-32	Dec.-Jan.	Fitzpatrick: "buffalo west to Fishing (Twin) Falls	Lewis, Phillips (1923:118-119)
		1832	Mar.	Work: "a few - large herds far off"	Lewis, Phillips (1923:136-137)
Lemhi	Lemhi River Valley	1832		Work: "buffalo road, some herds"	Ferris (1983:Ch. XXIII)
		1831		"a favorite resort of buffalo"	Elliott (1910a:375)
Minidoka	Snake River Valley	1827	Dec.	McKay to Ogden: "buffalo numerous"	Ferris (1983:Ch. XXII)
		1831		"buffalo numerous" Killed "upwards of 100"	Fremont (1845:144)
Power	Bannock R. Valley	1824	Apr.	"buffalo on both sides of river west of Fort Hall"	Elliott (1913a:282-283)
		1831	Apr.	Work: "few", but "numerous recently" Killed >16.	Fremont (1845:144)
Teton	Teton River Valley	1824		Fitzpatrick: "buffalo west to Fishing (Twin) Falls"	Elliott (1909:360)
		1826	Apr.	Ogden: Killed 12 buffalo.	Elliott (1913a:284)
		1831	Apr.	Work: "some buffalo seen, killed 2 or 3"	Ferris (1983:Ch. XLI)
		1833	July	"killed a bull"	Ferris (1983:Ch. LI)
		1834	May	"killed several bulls"	Ferris (1983:Ch. LI)

Table 2. Early historic observations of bison in the mountains of Montana.

County	Area	Year	Month	Comments	Citation
Beaverhead	Beaverhead Valley	1806		Sacajawea: bison once numerous to sources.	Biddle (1962:510)
		1824	April	Ross: "large herd, took 22"	Elliott (1913b:379)
		1831	Nov.	Work: "large herds" Killed 45.	Lewis, Phillips (1923:105-108)
		1832	Jan.-Feb.	Work: "buffalo numerous" Killed >100.	Lewis, Phillips (1923:123-131)
		1853?		Suckley: "bison still existed, immense numbers"	Allen (1877:516)
		1806		Clark: "old buffalo paths" and skulls.	Biddle (1962:506)
				Sacajewea recalled "gathering cows" here.	
		1824	Apr.	Ross: "herds of buffalo"	Elliott (1913b:379)
		1831	Nov.	Work: "herds seen" Killed 8-10.	Lewis, Phillips (1923:101-102)
		1832	Aug.	"herd of buffalo" Killed 1.	Ferris (1983:Ch. XXIX)
1834	May	Killed a cow and a bull.	Ferris (1983 Ch. XLIX)		
1834	May	"large herds, killed several"	Ferris (1983:Ch. XLIX)		
1853	Dec.	bison "in great numbers"	Allen (1877:539)		
1831	Dec.	Work: "large herds all around" Killed >22.	Lewis, Phillips (1923:109-111)		
1832	Feb.-Mar.	Work: "large herds, immense number" Killed 56.	Lewis, Phillips (1923:132-135)		
1832	Oct.-Nov.	Bonneville: "killed buffalo"	Irving (1837) p. 53		
1835	Sept.	Russell: "valley full of buffalo"	Haines (1965:34)		
ND		In 1895, noted old bison trails, wallows.	Brower (1896:Chart)		
1806	Bozeman Pass	Clark: "pursued the buffalo road"	Biddle (1962:511)		
1840		DeSmet followed a buffalo trail.	Carriker (1995:38-39)		
1806	Gallatin Valley	Clark: "buffalo roads in every direction"	Biddle (1962:510)		
		Sacajawea: bison "once numerous here"			
1840	Three Forks	DeSmet: Indians killed >500 bison	Carriker (1995:37)		
ND	Glacier Nat. Park	records of bison	Fryxell (1928)		

Table 2. Continued.

County	Area	Year	Month	Comments	Citation
Madison	Jefferson Valley	1805, 06		Clark: "old signs, bones, excrement of buffalo"	Biddle (1962:206, 509)
		1831	Sept.	Sacajawea: bison once numerous to river sources.	Biddle (1962:510)
		1832	Sept.	"plains alive with buffalo" Killed "great numbers"	Ferris (1983:Ch. XX)
					"plains covered with buffalo at the Beaverhead" "several fine herds" "buffalo in abundance"
Missoula	Madison Valley Ruby Valley	1832	Oct.	"discovered 2 herds" Killed 6.	Ferris (1983:Ch. XXXI)
		1831	Sept.	"buffalo numerous in all directions" Killed many.	Ferris (1983:Ch. XXI)
		1832	Oct.	"hills covered with vast herds"	Ferris (1983:Ch. XXXII)
		1835	Sept.	Russell: "large numbers of buffalo"	Haines (1965:33)
	Hellgate vicinity	1832		Wyeth: Buffalo coming here are "killed at once."	Kingston (1932:168)
		1853	Nov.	A "lost bull" killed.	Pacific R. R. Report (1860:138)
		1860		Bison skulls seen "daily"	Allen (1877:539)
		1831	Nov.	Work: "some bulls" Killed 2.	Lewis, Phillips (1923:98)
		1831	Nov.	Work: "bulls only" Killed a few.	Lewis, Phillips (1923:99-100)
		1831		"buffalo now rare"	Ferris (1983:Ch. XIX)
Powell	Little Blackfoot V. Upper Clark Fork V.	1832	Sept.	"buffalo seldom seen" Killed 2.	Ferris (1983:Ch. XXX)
		1824	Feb.	Ross mentions game, but no buffalo.	Elliott (1913b:373-374)
		1831	Oct.	"a few buffaloes"	Roe (1951:268)
		1833		"buffalo never found" this far west.	Ferris (1983:Ch. XLI)
Ravalli	Bitterroot Valley	1841		DeSmet: Bison "abundant in Bitterroot Mountains".	Roe (1951:270)
		1853		"great numbers" of skulls observed.	Allen (1877:516)
		1831	Nov.	Work: "bulls, some cows" Killed several.	Lewis, Phillips (1923:101-102)
Silverbow	Lower Big Hole Valley	1831	Nov.		

Table 3. Early historic observations of bison in the mountains of Wyoming..

County	Area	Year	Month	Comments	Citation
Albany	Laramie River Plains	ND		Bison bones found	Fryxell (1928)
		1825	Mar.	Ashley: "innumerable herds of buffalo"	Dale (1918:131)
		1831		"buffalo and other game"	Leonard (1978:18)
		1839	Sept.	Smith: "a great many buffalo"	Hafen (1950:13)
		1843	Aug.	"a buffalo bull"	Fremont (1845:123)
		1844-45	winter	Dodge: "snow crusts and winter kill"	Allen (1877:544)
		1868		Observed numerous bison skulls.	Allen (1877:544)
		ND		Bison bones found	Fryxell (1928)
		1840	Apr.	Smith: "saw a great many buffalo"	Hafen (1950:22)
		1843	Aug.	"ten or 12 buffalo bulls"	Fremont (1845:124)
Carbon	Medicine Bow Mtns.	1812	Oct.-Dec.	Stuart: "many buffalo in bottoms" Killed at least 48.	Spaulding (1953:127-134)
		1839	Sept.	Smith: "probably about 2000 buffalo"	Hafen (1950:13)
		1840	Feb.	Smith: "valley filled with herds, killed 3 fat bulls"	Hafen (1950:20)
		1843	Aug.	"bands; country well-stocked with buffalo"	Fremont (1845:125)
		1844	June	"buffalo frequent"	Fremont (1845:282)
		1839	Aug.	"small herds"	Wislizenus (2005:136)
		1844	June	Saw herds, killed 4 bison.	Fremont (1845:281)
		1839	Sept.	Smith: "saw only a few bulls"	Hafen (1950:14)
		1840	Feb.	Smith: "killed some buffalo"	Hafen (1950:19)
		Converse	North Platte Valley	1812	Dec.
1834	Aug.			Anderson: hunter killed buffalo in this area.	Morgan (1987:179, 187)
1844	Aug.			"saw quantities of buffalo"	Clyman (1984:101)
1829	summer			Meek: "plenty of buffalo" near rendezvous site.	Vestal (1963:36)
Fremont	Popo Agie Valley	1833	Sept.	Bonneville: "numerous droves" Killed 2	Irving (1837) p. 119
		1823-24	winter	"buffalo plenty" Killed "upwards of 1000 one day"	Clyman (1984:24-25)
		1835		"abundance of buffalo"	Leonard (1978:255)

Table 3. Continued.

County	Area	Year	Month	Comments	Citation
	Sweetwater River ¹	1812	Oct.	Stuart: much "sign on pass, few seen, very wary"	Spaulding (1953:124)
		1824	Feb.	Killed a bull.	Clyman (1984:29)
		1832	July	Bonneville: "immense herds of buffalo"	Irving (1837) p. 26
		1834	Aug.	Anderson: records of many buffalo killed.	Morgan (1987:179)
		1839	June	"several buffalo, quantities of buffalo"	Wisizenus (2005:79, 81)
		1842	Aug.	"several bands of buffalo"	Fremont (1845:57)
		1843	Aug.	"saw buffalo again" Killed at least 1	Fremont (1845:71)
		1844	Aug.	"buffalo in great abundance"	Clyman (1984:106)
		1846	June	"several male buffalo"	Clyman (1984:258)
Lincoln	Salt River Valley	1833	May	"valley covered with buffalo"	Ferris (1983:Ch. XXXVII)
		1835	May	Russell: "thousands of buffalo"	Haines (1965:12)
	Green River Valley	1824	July	Fitzpatrick: "immense numbers"	Fremont (1845:144)
	Bear River Valley	1830	June	"herds of buffalo, killed a great many"	Ferris (1983:Ch. VIII)
Natrona	Platte River	1839	June	"a herd grazing on the shore, drove herds before us"	Wisizenus (2005:77-78)
	Sweetwater River	1812	Oct.	Stuart: "numerous herds" Killed 5.	Spaulding (1953:125-126)
		1834	June	Anderson: "immense numbers of buffalo"	Morgan (1987:117)
		1842	Aug.	"tolerably abundant" near Independence Rock	Fremont (1845:56)
		1844	Aug.	"buffalo in great abundance"	Clyman (1984:102)
		1846	June	"plenty of buffalo, several herds"	Clyman (1984:259)
Park	Yellowstone Park	ND		Bison bones found	Fryxell (1928)
	Yellowstone Park	1860-79		Eleven records of bison in the Park	Meagher (1973:116-118)
	Yellowstone Park	1877-1928		Annual Rpts. 600 bison in 1880; 25 in 1907	Skinner, Alcorn et al.
	Ham's Fork Valley	1834	June	Russell: "country abounds with buffalo"	Haines (1965:3)
Sublette	Upper Green River	1811	Sept.	Hunt: "numerous herds of bison graze the valleys"	Rollins (1995:287)
		1812	Oct.	Stuart: "a few bulls" Many fresh kills. Killed some.	Spaulding (1953:116-122)
		1832	Aug.	"plain covered with buffalo"	Ferris (1983:Ch. XXVII)
		1833	June	"plains covered with buffalo in all directions"	Ferris (1983:Ch. XL)

Table 3. Continued.

County	Area	Year	Month	Comments	Citation
		1833	July	Bonneville: "valley strewn with buffalo carcasses"	Irving (1837) p. 95
		1833	Sept.	Bonneville: "buffalo as far as he could see"	Irving (1837) p. 128
		1834	June	"large herds in every direction"	Townsend (1978:78)
		1834	May-June	"killed several buffalo along lake" "killed plenty of buffalos in plains"	Ferris (1983:Ch. LI)
		1838	July	Russell: "large band of buffalo"	Haines (1965:90)
	Hoback Valley	1832	Aug.	Valley "covered with herds of buffalo"	Ferris (1983:Ch. XXVII)
		1833	July	"killed a bull"	Ferris (1983:Ch. XLI)
		1834	May	"buffalo found here"	Ferris (1983:Ch. LI)
	Green River Valley	1824		Fitzpatrick: "immense numbers"	Fremont (1845:144)
		1824		Killed a buffalo.	Clyman (1984:30)
		1825	Feb.	Ashley: "got hides for boat; buffalo abundant"	Date (1918:138, 141)
		1834	Apr. -May	Anderson: "killed some buffalo"	Morgan (1987:130, 134)
	Great Divide Basin	1843	June	"a few straggling bulls"	Fremont (1845:127)
	Jackson Hole	ND	Aug.	Bison bones found	Fryxell (1928)
		1833	June	"large herd, killed several"	Ferris (1983:Ch. XXXIX)
		1835	Aug.	Buffalo ran through party"	Parker (1842:92)
		1877		Hayden: "a few bulls persist"	Allen (1877:516)
	Bear River Valley	1824		Fitzpatrick: "immense numbers"	Fremont (1845:144)
		1834-35	winter	Bonneville: "vast herds"	Irving (1837) p. 222
	Black's Fork Valley	1846	June	Valley "covered" with bison bones and campsites.	Clyman (1984:256)
		1849		Stansbury: "bison near Bridger's Fork of Muddy Creek"	Allen (1877:513)

¹ including South Pass

Table 4. Early historic observations of bison in the mountains of northeast Utah.

County	Area	Year	Month	Comments	Citation
Wasatch Front		1836		"many buffaloes".	Allen (1877:512)
		1837		"all destroyed with deep snow".	Allen (1877:512)
		1840		Russell: Buffalo "long since" gone.	Haines (1965:121)
Box Elder	Promontory Point	1832		Marsh: "Bison present until 1832."	Roe (1951:279)
	Salt Lake, northwest	1828	Dec.	Ogden: Killed 2 buffalo.	Elliott (1910b:390)
		1833	Sept.	Killed last buffalo, heading west.	Leonard (1978:106)
Cache	Ogden Valley	1825	May	Ogden: "plains covered with buffalo, killed some"	Miller (1952:175)
	Green River	1776	Sept.	Escalante expedition: Killed 1 bison.	Bolton (1950:168)
Uintah	White River	1825	May	Ashley: "a number of buffalo."	Dale (1918:146)
		ND		"few bison descend to mouth of White River"	Fremont (1845:144).

Table 5. Early historic observations of bison in the mountains of Colorado.¹

County	Area	Year	Month	Comments	Citation
Boulder	Wild Basin	ND			Meaney and Van Vuren (1993)
Chaffee	Arkansas Valley	1806	Dec.	Pike: Killed 8 buffalo.	Hart and Hulbert (2006:156)
Conejos	San Luis Valley	1694		"over 500 buffalo"	Meaney and Van Vuren (1993)
Custer	Grape Cr. Valley	1807	Jan.	Pike: Saw "2 gangs" of buffalo. Killed 2.	Hart and Hulbert (2006:164)
Fremont	Arkansas Valley	1806	Dec.	Pike: killed buffalo near 4-Mile Creek	Hart and Hulbert (2006:148)
		1844	June	Noted buffalo trails.	Fremont (1845:287)
Garfield	Flat Tops	ND		G. Schoonveld collected bison horn in 1980s.	Pers. Comm. ²
		ND		Prof. J. V. K. Waggar: "last bison in Colorado"	Pers. Comm. ³
	N of Glenwood Sprgs.	ND			Meaney and Van Vuren (1993)
Grand	Piceance/R	ND			Meaney and Van Vuren (1993)
	Rifle Creek	ND			Meaney and Van Vuren (1993)
	Grand Lake	ND			Meaney and Van Vuren (1993)
Gunnison	near Irwin	ND			Meaney and Van Vuren (1993)
	West Elk Mtns.	ND			Meaney and Van Vuren (1993)
Huerfano	Huerfano Valley	1807	Jan.	Pike: "discovered buffalo" Killed 4 at Muddy Creek	Hart and Hulbert (2006:166)
	East of sand dunes	1807		Pike	Meaney and Van Vuren (1993)
Jackson	North Park	ND		Bison bones.	Fryxell (1928)

Table 5. Continued.

County	Area	Year	Month	Comments	Citation
		1825	Mar.	Ashley: "valleys filled with numerous herds"	Dale (1918:129)
		1839	July	Guides: "Arapahos hunting bison"	Farnham (1843:43, 50)
		1839	Sept.	Smith: "probably about 2000 buffalo"	Hafen (1950:13)
		1844	June	"killed some buffalo"	Fremont (1845:283)
		ND		between Illinois and Grizzly Creeks	Meaney and Van Vuren (1993)
	Higo	ND			Meaney and Van Vuren (1993)
Larimer	Chambers Lake	ND			Meaney and Van Vuren (1993)
	North Fork, Poudre	1839			Meaney and Van Vuren (1993)
	Rocky Mtn. Nat. Pk.	ND			Hafen (1950:13)
		ND			Fryxell (1928)
		ND			Meaney and Van Vuren (1993)
Moffat	Little Snake Valley	1839	Sept.	Smith: "saw a great many buffalo" Killed 7.	Hafen (1950:15)
	Yampa River Valley	1849	Sept.	Bison bones.	Allen (1877:513)
	Brown's Hole	ND		bison noted at several sites in the Park.	Meaney and Van Vuren (1993)
Park	South Park	ND		Smith: "shot old buffalo", probably on Powder Wash	Meaney and Van Vuren (1993)
		ND		Stansbury: "bison on northern tributaries of Yampa."	Meaney and Van Vuren (1993)
		ND			Meaney and Van Vuren (1993)
		ND		Dodge: a bison hunt in mtns. near South Park	Homaday (1889:410)
		1806	Dec.	Pike: "killed a buffalo"	Hart and Hulbert (2006:151)
		1839	July	"herds, small bands" Killed 2.	Farnham (1843:43-46)
		1844	June	"buffalo charged through camp"	Fremont (1845:286)
	Mt. Lincoln	ND		"far above timberline"	Meaney and Van Vuren (1993)
	Mosquito Gulch	ND			Meaney and Van Vuren (1993)
	Tarryall Creek	ND			Meaney and Van Vuren (1993)
Rio Blanco	Mud Springs	ND			Meaney and Van Vuren (1993)
Routt	California Park	ND			Meaney and Van Vuren (1993)
	Yampa R. Valley	<1839		Guide: "buffalo plenty some years before"	Farnham (1843:51)
Saguache	San Luis Valley north	ND			Meaney and Van Vuren (1993)
Summit	Blue R. Valley	1839	July	"small bands, swells covered with buffalo" Killed 1.	Farnham (1843:47-48)
		1844	June	"country alive with buffalo"	Fremont (1845:284)

¹ Colorado records of subfossil specimens in Meaney and Van Vuren (1993) are not repeated here.² G. Schoonveld: Wildlife biologist, Colorado Division of Wildlife.³ J. V. K. Wagar: Retired professor, wildlife biology, Colorado State University.

In the cited Minataree/Mandan slaughter, every animal of the herd was killed. Using the same hunting technique, the “surround” or “running hunt”, Flatheads (Salish) “usually carried a hunt to the point of extermination.” (Point, nd:141). Literature cited here contains descriptions of pre-hunt ceremonies of Native Americans. Many appear to have believed that providence, more than prudence, determined the continued availability of bison.

These observations of bison slaughter occurred after Native Americans had been greatly and widely diminished by diseases, especially smallpox, which preceded Euro-Americans to the interior of North America. Pandemics eliminating entire local populations and more than half of regional populations have been inferred for smallpox epidemics that included the Rocky Mountain tribes in 1781, 1801 and 1837 (Russell in Haines 1965:86; Thompson in Hopwood 1971:93, 97, 198; Dobyns 1983:15). It is reasonable to assume that much larger populations of Native Americans routinely killed even larger numbers of bison over larger areas prior to arrival of European diseases, affecting where the earliest Euro-American travelers did not find bison.

Unusually deep and persistent snows sometimes greatly depleted local bison herds and may have caused local extirpations, especially in conjunction with continued human harvest. Colonel Dodge reported that thousands of bison starved on the Laramie Plains, Wyoming during an extraordinary winter with deep and crusted snow in 1844-45 (Allen 1877:544). The Plains were never repopulated. Allen (1877:512) noted reports that nearly all the bison in the Salt Lake area, Utah, were destroyed by unusually deep snow about 1837. In 1840, Russell (Haines 1965:121) noted that bison had “long since” been gone from this area.

Williams (2005) used local weather records to conclude that abundant, dense snow, combined with a greater frequency of droughts, had contributed to limiting bison distribution and abundance in the northwest United States during late pre-historic and early historic times. These weather effects

were most notable west of the Rocky Mountains in eastern Washington and Oregon.

Native Americans likely caused local, or even regional, extirpations of bison. In 1806, Sacajawea (Biddle 1962: 510) informed Clark that bison were once numerous in the Gallatin, Jefferson and Beaverhead valleys of Montana, but had disappeared in “but a few years” with concentrated Shoshone hunting. In 1833, near the mouth of the Bitterroot River and the “home base” of Salish, Wyeth noted: “Buffalo have come here and even further but they are killed at once and do not get wonted here.” (Kingston, 1932:168).

DISCUSSION

During the first half of the 19th century, bison were widely distributed in the intermountain valleys of the Rocky Mountains in the United States. A major regional concentration once occurred in the upper Snake and Salmon River drainages of southeast Idaho, in the upper Green River drainages of southwest Wyoming and over the continental divide along the uppermost tributaries of the Jefferson River in southwest Montana (Fig. 1, Tables 1-3).

Previous authors proposed multiple interacting factors to explain local or regional absence of bison in the northwest United States during early historic time (Van Vuren 1987; Laliberte and Ripple 2003; Lyman 2004; Williams 2005). Three of these references focus on areas west of the Rocky Mountains where bison were absent as Europeans arrived. For this area, authors had no access to recorded observations of Native American/bison interactions. Still, all recognized Native American predation as a factor explaining the early historic absence of bison, as did Meaney and Van Vuren (1993) for southwest Colorado. In contrast, early historic literature from the Rocky Mountains provides abundant descriptions of bison and of Native American predation. These observations provide compelling evidence that human predation was a major, perhaps preponderant, factor limiting bison distribution in the Rocky Mountains. While

other factors varied geographically and temporally, Native American predation was more persistent, mobile and widespread.

Native American ability to extirpate bison or to prevent reestablishment of bison would have been enhanced by:

(1) low bison abundance and productivity in areas with little and inconsistent forage production, due to aridness with frequent droughts and perhaps exacerbated by competitive foraging from wild and Native American horses;

(2) a large Native American population supported by alternative food resources, including salmon, other big game, small game and invertebrates;

(3) periodic major bison declines due to severe winters or prolonged droughts, accentuating the numerical ratio of human predators/prey;

(4a) patchily distributed bison habitat limiting bison mobility as an escape strategy, (4b) isolating source populations for reintroductions, (4c) limiting long term inter-population genetic support and (4d) allowing hunters to predictably locate their prey.

In the reviewed literature, I found no descriptions of epidemic disease in bison before there was contact with Euro-American domestic livestock.

In contrast, the ability of Native Americans to reduce bison numbers would have been limited by distance from permanent villages, especially in areas contested by dangerous enemy tribes (Martin and Szuter 1999; Laliberte and Ripple 2003; Kay 2007). The distance from permanent villages may have contributed to the above noted major abundance of bison in the central Rocky Mountains of the United States.

These interacting factors seem to have characterized much of the land in and especially west of, the Rocky Mountains. No doubt interacting factors varied in time and space. Interacting factors resulted, when Euro-Americans first arrived, in few or no bison west of the Rocky Mountains and, at least periodically, few or none in

some areas within the Rockies. But human predation must have been a preponderant factor in many areas (Urness 1989; Martin and Szuter 1999; Laliberte and Ripple 2003; Kay 2007). After 1824, continued harvesting by both Native- and Euro-Americans rapidly eliminated most bison from the Rocky Mountains. By the 1840's Salish from the Bitterroot Valley, Montana, had to march 24 winter days to find any trace of bison (Point nd:120). In summer, on a more direct route, they traveled 15 days before finding bison (p.166). Eventually, bison remained only as a relic herd in Yellowstone National Park (Skinner, Alcorn, et al. 1951; Meagher et. al 2002).

Early historic records indicate bison were once widespread in non-forested intermountain valleys of the Rocky Mountains. It is less clear if bison persistently used upper mountain elevations in large numbers. Some areas where bison were not recorded by Euro-American explorers likely were lands where bison had been extirpated – for short or long periods - largely by Native Americans. Early historic records provide few geographic limits for restoring the mountain ecotype of bison in the Rocky Mountains.

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