

An Analysis of Attacks by Grizzly Bears (*Ursus arctos horribilis*) in Glacier National Park, Montana

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ABSTRACT

Grizzly bears inhabit several popular recreation areas in the American West, including Glacier National Park, Montana. The likelihood of a grizzly bear-human confrontation increases as annual visitation continues to increase. This study investigates grizzly bear-human confrontations for each type of attack, in Glacier National Park from 1910 to the present. The types of confrontations, and the spatial and temporal distributions of each type of attack are examined. Maulings are the most frequent type of confrontation, followed by charges and then fatalities, respectively. Spatially, most attacks occur in the central portion of the Park, and east of the Continental Divide. Attacks also coincide with the seasonal migration patterns and seasonal food availability of grizzly bears in the Park.

KEY WORDS: grizzly bears, Glacier National Park, human-bear confrontations

INTRODUCTION

Grizzly bears (*Ursus arctos horribilis*) are large, powerful omnivores that inhabit several popular tourist destinations in the American West, including Yellowstone and Glacier National Parks. As tourism and regional growth bring more people into and around these park areas, it is inevitable that grizzly bear-human confrontations arise (Mattson *et al.*, 1996). In the last century, 14 fatalities and at least 100 injuries have occurred in the lower 48 states as a result of grizzly bear attacks in the American West (Chadwick, 1986).

This paper investigates grizzly bear-human confrontations in Glacier National Park. The study examines the types of confrontations, the spatial distribution of each incident, and the temporal aspect of each confrontation in the Park.

BACKGROUND

Grizzly bears once occupied a large part of North America in great numbers. An estimated 50,000 to 100,000 grizzlies roamed the landscape prior to European contact (Craighead *et al.*, 1982). Today, fewer than 1,000 grizzlies remain in the

United States exclusive of Alaska, occupying only two percent of their former range. These remaining habitats span four states (Montana, Wyoming, Idaho, and Washington) and six ecosystems, an energy interrelation of organisms and their surroundings (Dickinson and Murphy, 1998) (Fig. 1): 1) areas including and surrounding Yellowstone and Grand Teton National Park; 2) the Northern Continental Divide ecosystem, focused on Glacier National Park (GNP), Montana; 3) The Cabinet/Yaak ecosystem; 4) the Selkirk Mountains; 5) the northern Cascades; and 6) the Selway/Bitterroot area (IGBC, 1987; Maguire and Servheen, 1992; Clark *et al.*, 1996). The greatest number of grizzly bears exist in the Yellowstone and Northern Continental Divide ecosystems, containing approximately 350 and 600 bears, respectively (IGBC, 1987). Within the Northern Continental Divide ecosystem, grizzlies are most numerous in GNP, where approximately 200 bears live (respectively (Martinka, 1971, 1972, 1974a, 1974b, Martinka and Kendall, 1986; Keating, 1986, 1989; Butterfield and Key, 1986; Hayward, 1989).

Adult grizzly bears can weigh up to 160 kg or more, and stand about 2 meters tall when upright (Craighead *et al.* 1982). The most distinguishing characteristic of a grizzly bear is the massive hump of muscles over its shoulders. The presence of the hump is the easiest way to identify a grizzly bear in the field. Grizzlies also typically have a round head with a concave facial profile, and coloring that can range from blonde to nearly black.

Grizzlies require a large area of habitat for survival (Noss *et al.*, 1996). Within the overall forest mosaic of GNP, prime grizzly habitat includes stream banks, mountain parks, alpine meadows, fire-succession sites, snow-avalanche paths, and grass/forest ecotones (Martinka, 1972; Singer, 1978; Craighead *et al.*, 1982; Blanchard, 1983; Zager *et al.*, 1983; Butterfield and Key, 1986; Herrero *et al.*, 1986; Martinka and Kendall, 1986; Hamer and Herrero, 1987; IGBC, 1987; Butler, 1992). These favored habitats may span 500 vertical meters or more, providing a variety of basic foods to the typical grizzly diet. Griz-

zly bears utilize these habitats on a seasonal basis, as they search out seasonal food supplies. In the spring, grizzlies in GNP typically frequent lower-elevation patches and corridors such as riparian edges and bottomlands, meadows, and snow-avalanche paths (Martinka, 1972; Singer, 1978; Butler, 1992) foraging for green vegetation, bulbs and tubers, fish, and carcasses of animals killed during the previous winter. Grizzlies migrate to upper treeline and alpine tundra sites in the summer months in search of rodents, insects, ungulates, and a variety of bulbs and tubers. Autumn induces a reverse migration back to lower elevations to forage for ripening berries, followed, in turn, by a retreat to higher elevations for winter denning (Martinka, 1972; Kendall, 1983; Mace and Jonkel, 1986; Butler, 1992).

TYPES OF GRIZZLY BEAR ATTACKS DEFINED

Three types of grizzly bear attacks are investigated in this paper: charges, maulings, and fatalities. A charge occurs when a bear runs toward a person or persons, but does not make physical contact with the person(s). When a grizzly bear comes in contact with a person and the bear induces injuries such as lacerations and scratches, and the person survives the attack, the encounter is defined as a mauling. If a victim dies as a result of injuries incurred by a grizzly bear, a fatality has occurred.

PARK VISITATION PATTERNS

In spite of its somewhat isolated locality visitors to GNP have increased markedly over the decades. During 1911, the first full tourist season of Glacier National Park, a modest 4,000 people visited the Park (Table 1). Since then, GNP has experienced a steady increase in visitation every decade. During the 1920s, the number of visitors increased nearly 3.5 times from the 110,096 visitors recorded in the previous decade. Visitation surpassed one million visitors in the 1930s, partially due to the opening of Going-to-the-Sun Road, the only trans-Park road. Although GNP was essentially closed during World



FIGURE 1. Location of the six primary grizzly bear habitats in the United States.

TABLE 1
Visitor Total by Decade
for Glacier National Park,
Montana

Decade*	Visitor Total
1910-19	110,096
1920-29	376,806
1930-39	1,255,590
1940-49	1,840,263
1950-59	6,551,379
1960-69	8,267,600
1970-79	14,649,817
1980-89	17,559,920
1990-99	17,678,286

Source: National Park Service, 1999.

War II, visitation increased to nearly 1.85 million people during the 1940s. An increase of 4 million more visitors occurred in the 1950s than the 1940s. The first single year to record one million visitors occurred during the 1960s. The number of visitors during the 1970s was nearly an eight-fold increase from the 1950s. Three million more people visited GNP in the 1980s than during the 1970s, and the number of visitors from 1990-1998 had topped the number from the previous decade by 100,000 visitors. Clearly the Park has become a popular attraction particularly since the 1940s.

METHODS EMPLOYED

To determine grizzly bear attacks, the local newspaper, the *Hungry Horse News*

(HHN), was a prime source of data. Because of the geographic proximity of the newspaper offices to Glacier National Park, the paper provides thorough coverage of news stories emerging from the Park. Every issue of the newspaper from 1946 (the year the newspaper was founded) through 1998 was read cover-to-cover. All news articles related to bear-human confrontations in GNP were recorded and Park records corroborated the incidents that caused injury. In some cases where charges occurred that did not result in injuries, we relied on eyewitness accounts as told to us by long-time National Park Service employees. The variables noted included date of the event, location in GNP, the type of attack (charging, mauling, or fatality), and the number of people involved. Dates were tabulated by month and year to facilitate comparison with the timing of seasonal migration patterns of grizzly bears in the Park.

RESULTS

CHARGES

We noted 13 recorded charging incidents, involving 25 people (Table 2; Figure 2). Personal experience indicates that these numbers are conservative and many more charges occur than are reported by the newspaper. For example, in

June 1974 the second author and a hiking companion were bluff-charged by a sow grizzly protecting her cubs, but this incident was not reported to the HHN. The greatest number of charges in any given year was five, occurring in 1981. June, July, and September topped the monthly frequency with four charges each month. Interestingly, no charging incidents were recorded during the month of August. The majority of these attacks were at middle elevations (1,680–2,290 m), at locations that may intersect with the migration patterns of grizzly bears moving up- or downslope in search of certain foods, especially huckleberries in late summer and early autumn. Four recorded charges, two in July and two in September (one at the beginning and end of each month), involved a sow with cubs.

Spatially, over half of the charging events took place west of the Continental Divide, which stands in stark contrast to maulings and fatalities. Three-fourths of all the charges occurred in the central and northeast portions of the Park (Fig. 2).

An investigation of the type of victim reveals that three attacks involved Park rangers, whereas the rest were charges on GNP visitors. These accounts illustrate that no one is exempt from a bear attack, not even experienced backcountry rangers.

TABLE 2
Grizzly Bear Charges in Glacier National Park, Montana

	Date	Location	Number in Party
1	6/23/1961	3 miles from Many Glacier on Cataract Creek Trail	2
2	7/5/1973	Quartz Creek Campground	1
3	6/3/1977	Avalanche Lake	3
4	9/7/1979	Junction of Dry Fork Creek & Old Man Lake Trails	1
5	7/1/1981	1 mile up Loop Trail	4
6	9/24/1981	Ptarmigan Tunnel Trail	3
7	9/30/1981	Shore trail of Glenss Lake	3
8	10/7/1981	Coal Creek Drainage	2
9	6/27/1984	Two Medicine Lake	1
10	7/6/1988	Mount Brown Lookout Trail	1
11	6/28/1993	Cracker Lake Trail	1
12	9/29/1993	Ahern Pass Trail	2
13	7/25/1994	Red Rock Point	1

Source: Anonymous, 1979b, 1981b, 1984a, 1993c, 1993d, 1994a, 1998b; Kennedy, 1984b.

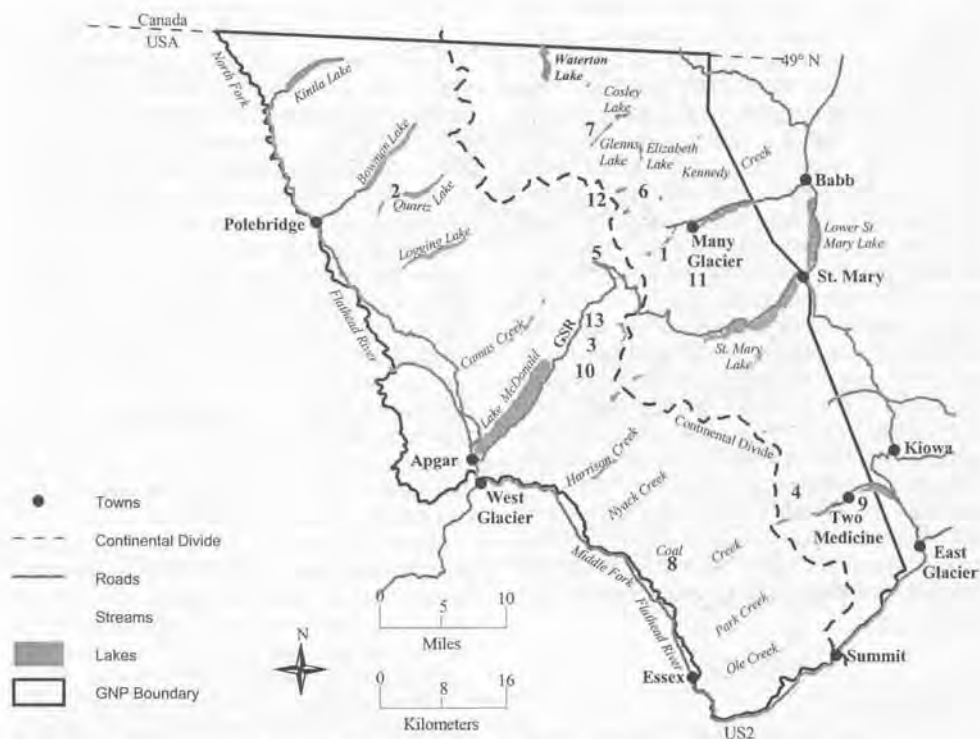


FIGURE 2. Location of grizzly bear charges in Glacier National Park, Montana.

MAULINGS

From 1946 through 1998 44 recorded incidents of mauling by grizzly bears, involving 65 people occurred (Table 3). Forty percent of these attacks befell solo hikers; the largest party enduring a mauling attack consisted of five people. The first attack recorded by the *Hungry Horse News* occurred in 1959 and the number of recorded maulings has increased every decade since this initial event. The number of grizzly maulings significantly increased ($t = 1.87$; sign. at 0.05 level) from 0.6/year in the 1960s to 1.4/year from 1990–August 1999. The greatest number of maulings occurring in any one year was in 1975 (6 incidents), followed by 1993 (5 incidents). July (15), September (10), and August (8) exhibit the highest number of maulings per month. Nearly one-third of all maulings involved a sow and her cubs. Thirteen mauling events oc-

curred around or after September 7, again possibly corresponding to human interference with the migration habits of the bears.

Spatially, the central and north-central portions of the Park experienced the majority of these attacks, with at least five events occurring on trails originating in the Swiftcurrent/Many Glacier Valley (Fig. 3).

FATALITIES

We recorded 10 human fatalities from nine incidents caused by grizzly bears in GNP (Table 4; Fig. 4). The most recent fatality occurred in May 1998. Four of the nine incidents transpired west of the Continental Divide. Two of these four incidents occurred at widely separated sites on the same night in August 1967, marking the first known grizzly-caused fatalities in the Park (Olsen, 1969). We noted

TABLE 3
Grizzly Bear Maulings in Glacier National Park, Montana

	Date	Location	Number in Party	Number Injured
1	6/18/1959	Mount Altny	2	1
2	6/21/1960	Otokomi Trail—1 mile from Lake	5	5
3	7/8/1960	Otokomi Trail	1	1
4	7/8/1962	Near Granite Park Chalet	1	1
5	7/23/1963	Brown's Pass Trail	2	2
6	11/9/1967	North Fork Flathead River	3	1
7	5/21/1968	Below east side tunnel	1	1
8	7/15/1973	Feather Plume Falls	2	1
9	7/25/1974	Feather Plume Falls	1	1
10	5/26/1975	Belton-Nyack Trail	2	2
11	7/16/1975	Logging Lake Campground	1	1
12	7/26/1975	Hidden Lake	3	3
13	8/7/1975	Grinnell Glacier Trail	3	3
14	9/7/1975	0.5 miles from Rockwell Falls	2	2
15	9/15/1975	Stoney Indian Trail	3	2
16	8/17/1978	Cracker Lake Trail	2	1
17	9/12/1979	Jackstraw Lake	2	1
18	7/21/1981	6 miles north of Polebridge	1	1
19	7/31/1981	Camas Creek Drainage	1	1
20	7/10/1983	Kintla Lake	1	1
21	6/26/1984	Boulder Pass Trail near Waterton Lake	at least 3	1
22	7/1984	Near Many Glacier	1	1
23	9/4/1984	Fifty Mountain Campground	2	2
24	7/7/1986	Base of Mount Siyeh	2	1
25	9/11/1986	0.75 miles from Granite Park Chalet	2	2
26	7/1/1987	Near Marias Pass	1	1
27	9/23/1987	Piegan Pass Trail	2	1
28	7/24/1988	Cracker Lake Trail	1	1
29	9/11/1986	0.75 miles from Granite Park Chalet	2	2
30	7/17/1989	Cracker Lake Trail	2	2
31	8/1/1990	Iceberg Lake Trail	2	2
32	8/30/1991	Iceberg Lake Trail	1	1
33	10/5/1991	Trout Lake Trail—top of Howe Ridge	2	2
34	8/21/1992	Near Bullhead and Windmaker Lakes	1	1
35	6/22/1993	Cracker Lake Trail	2	1
36	8/1/1993	Cracker Lake Trail	2	2
37	7/15/1993	Medicine Grizzly Area	1	1
38	9/23/1993	Firebrand Pass Trail	1	1
39	9/29/1993	Flattop Trail near Fifty Mountain	2	1
40	8/28/1994	Iceberg-Ptarmigan Trail	1	1
41	9/12/1995	Fifty Mountain Campground	2	1
42	9/16/1995	Preston Park	1	1
43	6/5/1996	Avalanche Creek Trail	1	1
44	10/24/1998	Cracker Lake Trail	2	2
45	8/12/1999	Scalplock Lookout Trail	3	3

Source: Anonymous, 1960, 1962, 1963a, 1963b, 1967, 1973, 1974, 1975a, 1975b, 1975c, 1975d, 1975f, 1978, 1979a, 1979c, 1981b, 1983, 1984ba, 1984b, 1986, 1987a, 1989, 1990a, 1990b, 1991, 1992a, 1992b, 1992f, 1993a, 1993b, 1993e, 1994a, 1994c, 1994d, 1994e, 1995a, 1995b, 1998c, 1998d; Kennedy, 1984a, 1987a, 1989a, 1990, 1991a, 1991c, Gildart, 1981; Lindler, 1990; Mills, 1995a, 1995b; Nelson, 1960.

TABLE 4
Human Fatalities in Glacier National Park, Montana

	Date	Location	Number in Party	Number Injured
1	8/13/1967	Granite Park Campground	2	1-fatality; 1-seriously injured
2	8/13/1967	Trout Lake Campground	4	1
3	9/23/1976	Many Glacier Campground	1	1
4	6/24/1980	Illegal campsite on Sandbar of Divide Creek	2	2
5	9/26/1980	Elizabeth Lake Campground	1	1
6	7/23/1986	Natahki Lake	1	1
7	4/25/1987	Elk Mountain	1	1
8	10/3/1992	Loop Trail near Granite Park	1	1
9	5/18/1998	Scenic Point Trail	1	1

Source: Anonymous, 1976, 1981a, 1985, 1987b, 1992c, 1998a; Berg, 1998; Brooks, 1992a, 1992g; Kennedy, 1987b, 1987c; Olsen, 1969; Robbins, 1988; Schneider, 1977.



FIGURE 3. Location of grizzly bear maulings in Glacier National Park, Montana.

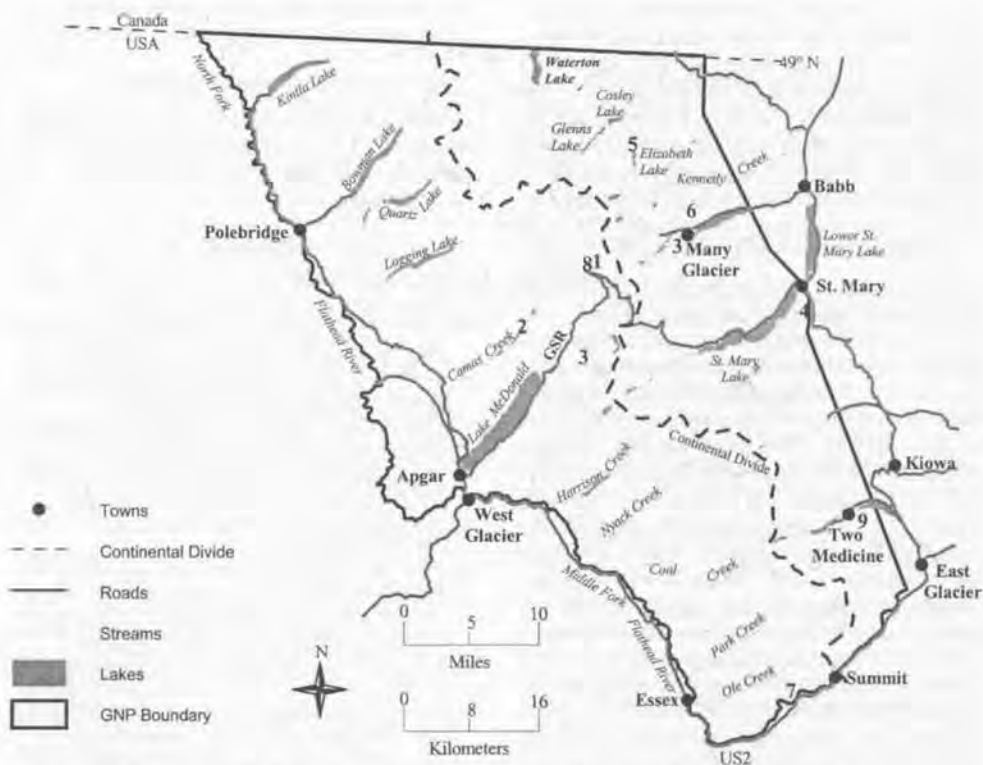


FIGURE 4. Location of human fatalities in Glacier National Park, Montana.

five incidents involving six victims on the east side of GNP. All incidents took place between April and October, with the majority befalling visitors in July, August, and September. These months correspond with the highest influx of visitors to GNP during the year. The incidents at Natahki Lake and on the Loop Trail occurred because the victim surprised a single bear, inducing an attack. The Elk Mountain attack and the Scenic Point Trail incident involved a sow and her cubs.

Garbage-habituated bears were associated with all fatalities that occurred prior to 1987. The Granite Park incident of 1967 was attributed to this type of bear. A garbage dump near the Granite Park Chalet and upslope from the campground was used to lure bears for entertaining guests, which eventually led to this fatality. The campers and the victim at Trout Lake that same night left their garbage

strewn about their campsite, enticing the bear with human food scents. Garbage was also implicated in the deaths of two campers on a gravelbar in Divide Creek in 1980, although not directly. The two victims were Park concession employees who had just completed a training session on general Park policies and procedures, including issues of safety while hiking. The campers stayed in an undesignated campsite that, according to investigators of the incident, was in a pathway used by grizzly bears to reach a dumpsite outside the Park boundary. If these campers had been in a designated camping area they may not have encountered bears traveling to a dumpsite. Conversely, if the dumpsite had been removed, the bears would not have been traversing that path and the campers most likely would have survived. The 1987 Many Glacier Campground fatality

may have been a result of garbage-habitation, but this conclusion was never confirmed. Bears in this area had ample opportunity to obtain human garbage, especially from careless campers. In this case, the victim's campsite was clean, but the condition of surrounding campsites could have led to the incident.

SUMMARY AND CONCLUSION

Grizzly bear-human encounters are inevitable in recreational areas where humans venture into bear territory. As more people visit these locations of prime grizzly habitat, the greater the potential for bear encounters. The number of visitors to the Park has increased every decade since the 1910s, ending the twentieth century with nearly 1.9 million visitors per year. The number of grizzly attacks increased from 8 incidents in the 1960s to 32 incidents in the 1980s. A more vigorous bear management policy, enforcing trail closures during prime berry season or if carrion that could attract bears is near a trail is removed, probably accounts for a decline in incidents (20) in the 1990s. The temporal distribution of incidents corresponds with the general seasonal migration patterns and available food sources of grizzly bears, especially in late summer and early autumn when huckleberries and other late season berries and tubers are plentiful along popular backcountry trails. The 19 attacks (3 charges, 13 maulings, and 2 fatalities) occurring near or after September 7 of any given year supports previous statistics that grizzly-human confrontations may increase as the number of hikers in the backcountry decreases. Bear specialists in GNP speculate that this increase is due to biological changes in bears' metabolisms prior to hibernation (Anonymous, 1993e).

While grizzly bears are not the primary cause of visitor deaths in Glacier National Park, grizzlies are one of the most feared hazards in the Park. GNP personnel recognize this and provide extensive literature to the public regarding what to do before, during, and after a grizzly bear attack. However, despite the Park's educational and trail-management efforts, bear-

human confrontations continue and may continue into the twenty-first century.

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REFERENCES

- Anonymous. 1960. Destroy Otokomi Trail grizzly. *Hungry Horse News*, August 5: 1, 4.
- . 1961. Suing government on grizzly case. *Hungry Horse News*, June 23: 4.
- . 1962. Bear injures man in sleeping bag. *Hungry Horse News*, July 13: 4.
- . 1963a. Publicity dismays grizzly victim. *Hungry Horse News*, July 26: 1, 4.
- . 1963b. Lady injured by bear, recovering. *Hungry Horse News*, August 2: 4.
- . 1964. Grizzly attack brings suit. *Hungry Horse News*, May 1: 4.
- . 1967. Bear mauls hunter up North Fork. *Hungry Horse News*, November 9: 1, 10.
- . 1973. Foresters Experience Grizzly Encounter. *Hungry Horse News*, July 20: 1.
- . 1974. Dr. Edwards tells of attack by grizzly. *Hungry Horse News*, August 2: 1, 10.
- . 1975a. Glacier experiences first bear attack. *Hungry Horse News*, May 30: 1.
- . 1975b. Bear attacks three visitors. *Hungry Horse News*, August 7: 1, 4.
- . 1975c. Hospital stay ends for bear victims. *Hungry Horse News*, August 14, 1, 5.
- . 1975d. Less injuries in '76. *Hungry Horse News*, August 26: 1, 3.
- . 1975e. Grizzly attacks pair on Stoney Indian Trail. *Hungry Horse News*, September 16: 1, 3.
- . 1975f. Bear incidents. *Hungry Horse News*, November 20: 1.
- . 1976. Grizzly kills girl at Many Glacier Campground. *Hungry Horse News*, September 23: 1, 4.
- . 1978. Surprise, surprise . . . A happy grizzly story. *Hungry Horse News*, August 24: 1.
- . 1979a. 1978 bear incidents increase. *Hungry Horse News*, February 15: 6.
- . 1979b. Close encounters with grizzlies. *Hungry Horse News*, September 13: 1.
- . 1979c. Grizzly mauls Glacier hiker. *Hungry Horse News*, September 13: 1.
- . 1981a. Bears—close calls but no tragedies. *Hungry Horse News*, October 15: 6.
- . 1981b. Glacier Park grizzly issue reviewed. *Hungry Horse News*, February 5: 4.
- . 1983. Park tabulates bear sightings. *Hungry Horse News*, November 10: 5.

- _____. 1984a. Fewer bear sightings reported this summer. *Hungry Horse News*, November 15: 5.
- _____. 1984b. Hikers injured Tuesday in Glacier bear attack. *Hungry Horse News*, September 6: 1.
- _____. 1985. Grizzlies struck twice on fateful 1967 night. *Hungry Horse News*, July 17: 48.
- _____. 1986. Rangers patrol mauling site. *Hungry Horse News*, September 17: 5.
- _____. 1987a. Griz attacks Texas hiker on Little Dog Mountain. *Hungry Horse News*, July 5: 5.
- _____. 1987b. Grizzly blamed in hiker death. *Hungry Horse News*, October 14: 1.
- _____. 1987c. Last mauling death at Elizabeth Lake. *Hungry Horse News*, April 29: 10.
- _____. 1987d. Whitefish hiker hurt there, too. *Hungry Horse News*, April 25: 10.
- _____. 1989. Horse party finds victims; helps them out of canyon. *Hungry Horse News*, July 19: 1.
- _____. 1990a. Bear quiet in Glacier Park. *Hungry Horse News*, December 13: 5.
- _____. 1990b. Wise words to live by: Hikers play dead, survive bear attack. *The Atlanta Journal and Constitution*, August 8: A-18.
- _____. 1991a. Yesterdays—30 Years Ago—June 23, 1961. *Hungry Horse News*, June 27: 22.
- _____. 1991b. Mauling hikers walk to safety. *Hungry Horse News*, October 10: 1.
- _____. 1992a. St. Mary Seasonal Employees help Oregon Man after grizzly mauling. *Hungry Horse News*, August 27: 1, 12.
- _____. 1992b. Mauling hiker said he surprised griz. *Hungry Horse News*, September 24: 1, 12.
- _____. 1992c. Griz kill nine. *Hungry Horse News*, October 8: 1.
- _____. 1992d. Photographer who found body says victim ran from bruises. *Hungry Horse News*, October 15: 5.
- _____. 1992e. Technicians search for clues in hiker death. *Hungry Horse News*, October 15: 8.
- _____. 1992f. Two attacked by griz a year ago. *Hungry Horse News*, October 15: 8.
- _____. 1993a. Griz attacks Park hikers, wrangler. *Hungry Horse News*, July 1: 1, 8.
- _____. 1993b. Mauling Park hikers surprised grizzly. *Hungry Horse News*, August 5: 1, 11.
- _____. 1993c. Spray stops charging Park grizzlies. *Hungry Horse News*, October 7: 1, 5.
- _____. 1993d. Bear charges hikers on top of Ahern Pass. *Hungry Horse News*, October 7: 5.
- _____. 1993e. Fall finds Park griz on the move. *Hungry Horse News*, October 7: 5.
- _____. 1994a. Backcountry usage drops during 1993. *Hungry Horse News*, January 27: 1.
- _____. 1994b. Park ranger stops charging griz with pepper spray. *Hungry Horse News*, July 28: 1, 7.
- _____. 1994c. Rangers search for clues in Park bear mauling. *Hungry Horse News*, September 1: 1, 9.
- _____. 1994d. Bear alert—Griz roam Logan Pass, Ptarmigan Trail reopens. *Hungry Horse News*, September 22: 6.
- _____. 1994e. Rangers search for clues in Park bear mauling. *Hungry Horse News*, September 1: 1.
- _____. 1995a. Bear injures area man in second Park attack. *Hungry Horse News*, September 21: 1, 10.
- _____. 1995b. Grizzly mauls Glacier Park visitor. *Hungry Horse News*, June 6: 1.
- _____. 1998a. Park hiker found dead; Grizzly nearby. *Hungry Horse News*, May 21: 1, 8.
- _____. 1998b. Yesterdays—10 Years Ago—August 24, 1988. *Hungry Horse News*, August 27: 28.
- _____. 1998c. Yesterdays—30 Years Ago—May 24, 1968. *Hungry Horse News*, May 28: 24.
- _____. 1999. Grizzly mauls three in Park. *Hungry Horse News*, August 19: A1, A7.
- Berg, Emmett. 1998. Park bear was moved from Many Glacier—Man-eating grizzly had record from '83. *Hungry Horse News*, August 6: 1, 8.
- Blanchard, B. M. 1983. Grizzly bear-habitat relationships in the Yellowstone area. *International Conference on Bear Research and Management*, 5: 118–123.
- Brooks, Tad. 1992. Mauling death may prompt hiking restrictions. *Hungry Horse News*, October 15: 1, 12.
- _____. 1992. Rangers kill bears after seven-day hunt. *Hungry Horse News*, October 15: 5.
- Butler, D. R. 1992. The grizzly bear as an erosional agent in mountainous terrain. *Zeitschrift für Geomorphologie N.F.*, 36: 179–189.
- Butterfield, B. R., and C. H. Key. 1986. Mapping grizzly bear habitat in Glacier National Park using a stratified LANDSAT classification: a pilot study. *Proceedings—Grizzly Bear Habitat Symposium*, 58–66. USDA Forest Service General Technical Report INT-207.
- Chadwick, D. H. 1986. The Apgar grizzly. *Defenders*, 61: 6–90.
- Clark, T. W., Paquet, P. C., and A. P. Curlee. 1996. Special Section: Large Carnivore Conservation in the Rocky Mountains of the United States and Canada. *Conservation Biology*, 10: 936–939.
- Craighead, J. J., Sumner, J. S., and G. B. Scaggs. 1982. A definitive system for analysis of grizzly bear habitat and other wilderness resources utilizing LANDSAT multi-

- spectral imagery and computer technology. Wildlife-Wildlands Institute Monograph No. 1. Missoula: University of Montana Foundation.
- Dickinson, Gordon, and Kevin Murphy. 1998. *Ecosystems*. London: Routledge.
- Gildart, Robert C. 1981. Roaming their last domains, grizzlies may clash with Man. *Smithsonian*, August: 78-86.
- Hamer, D. and S. Herrero. 1987. Wildfire's influence on grizzly bear feeding ecology in Banff National Park, Alberta. *International Conference on Bear Research and Management*, 7: 179-186.
- Hayward, G. D. 1989. Historical grizzly bear trends in Glacier National Park, Montana: A critique. *Wildlife Society Bulletin*, 17: 195-197.
- Herrero, S., McCrory, W., and B. Pelchat. 1986. Using grizzly bear habitat evaluations to locate trails and campsites in Kananaskis Provincial Park. *International Conference on Bear Research and Management*, 6: 187-193.
- Interagency Grizzly Bear Committee. 1987. *Grizzly Bear Compendium*. Washington, D.C.: The National Wildlife Federation.
- Keating, K. A. 1986. Historical grizzly bear trends in Glacier National Park, Montana. *Wildlife Society Bulletin*, 14: 83-87.
- . 1989. Historical grizzly bear trends in Glacier National Park, Montana: A response. *Wildlife Society Bulletin*, 17: 198-201.
- Kendall, K. C. 1983. Use of pine nuts by grizzly and black bears in the Yellowstone area. *International Conference on Bear Research and Management*, 5: 166-173.
- Kennedy, Brian. 1984a. "Horrible to watch animal eat you alive"—California couple recalls moments of grizzly terror. *Hungry Horse News*, September 13: 1, 8.
- . 1984b. Bear pulls boot off treed worker. *Hungry Horse News*, June 28: 1.
- . 1984c. Ranger's leap eludes grizzly. *Hungry Horse News*, July 5: 1.
- . 1986a. Glacier park workers at chalet heard victim's cries for help. *Hungry Horse News*, September 17: 1.
- . 1986b. Grizzly mauling victim still upset about incident. *Hungry Horse News*, September 17: 5.
- . 1986c. Park hikers survive grizzly bear attack. *Hungry Horse News*, September 17: 1.
- . 1987a. Grizzly gives up on feisty hikers. *Hungry Horse News*, September 23: 1.
- . 1987b. Man's last photos of deadly grizzly. *Hungry Horse News*, May 20: 1, 5.
- . 1987c. Park grizzly kills Libby photographer—Man ventures too close in search of better shot. *Hungry Horse News*, April 29: 1.
- . 1989a. Grizzly trees mushroom pickers. *Hungry Horse News*, May 31: 1.
- . 1989b. Rangers won't punish bears. *Hungry Horse News*, July 19: 1.
- . 1990. Bear mauls two Park workers at Many Glacier. *Hungry Horse News*, August 2, 1.
- . 1991a. Couple attacked on Avalanche Trail. *Hungry Horse News*, July 18: 1.
- . 1991b. Mauling hikers walk to safety. *Hungry Horse News*, October 10: 1.
- . 1991c. Victims saw cub, then heard sow roar. *Hungry Horse News*, July 18: 1.
- Kenner, Brian C. 1988. Granite Park Grizzly. *Montana Magazine*, 91: 66-73.
- Lindler, Bert. 1990. Mauling hikers recount tale of fight against attacking bear in the dark. *Hungry Horse News*, August 9: 1.
- Mace, R. D., and C. J. Jonkel. 1986. Local food habits of the grizzly bear in Montana. *International Conference on Bear Research and Management*, 6: 105-110.
- Maguire, L. A. and C. Servheen. 1992. Integrating Biological and Sociological Concerns in Endangered Species Management: Augmentation of Grizzly Bear Populations. *Conservation Biology*, 6: 426-434.
- Martinka, C. J. 1971. Status and management of grizzly bears in Glacier National Park, Montana. *Transcripts of the Thirty-sixth North American Wildlife and Natural Resources Conference*, 312-322. Washington: Wildlife Management Institute.
- . 1972. *Habitat relationships of grizzly bears in Glacier National Park, Montana*. West Glacier, Montana: National Park Service Progress Report, National Park Service, Glacier National Park.
- . 1974a. Population characteristics of grizzly bears in Glacier National Park, Montana. *Journal of Mammal*, 55: 21-29.
- . 1974b. Preserving the natural status of grizzlies in Glacier National Park. *Wildlife Society Bulletin*, 2: 13-17.
- Martinka, C. J., and K. C. Kendall. 1986. Grizzly bear habitat research in Glacier National Park, Montana. *Proceedings of the Grizzly Bear Habitat Symposium*; 19-23. USDA Forest Service General Technical Report. INT-207, Washington, D.C.
- Mattson, D. J., Herrero, S., Wright, R. G., and C. M. Pease. 1996. Science and management of Rocky Mountain grizzly bears. *Conservation Biology*, 10: 1013-1025.
- McArthur, K. L. (no date). *About Bears*. West Glacier, Montana: Glacier National Historical Association.
- Mills, Randy. 1995a. Grizzly attacks Park hiker. *Hungry Horse News*, September 14: 1.
- . 1995b. Ohio EMT saves mauling victim

- after bear attack. *Hungry Horse News*, September 14: 1.
- Nelson, Alan G. 1960. Nelson Tells Story of Grizzly Encounter. *Hungry Horse News*, July 22: 4.
- Noss, R. F., Quigley, H. B., Hornocker, M. G., Merrill, T., and P. C. Paquet. 1996. *Conservation Biology*, 10: 949-963.
- Olsen, J. 1969. *Night of the Grizzlies*. New York, NY: Putnam.
- Robbins, Jim. 1988. When species collide. *National Wildlife*, 26(2): 20-27.
- Schneider, Bill. 1977. Will this grizzly attack? *National Wildlife*, 15(2): 4-9.
- Singer, F. J. 1978. Seasonal concentrations of grizzly bears, North Fork of the Flathead River, Montana. *Canadian Field-Naturalist*, 92: 281-286.
- Zager, P., Jonkel, C. and J. Habeck. 1983. Logging and wildfire influence on grizzly bear habitat in northwestern Montana. *International Conference on Bear Research and Management*, 5: 124-132.