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INCIDENCE OF HUMAN CONFLICTS BY RESEARCH GRIZZLY BEARS

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The capture, immobilization, and marking of wild grizzly bears (*Ursus arctos*) for research has occurred in western Montana since 1975. Field studies by state, federal, and university personnel have recently come under public criticism regarding the handling of this species.

Considerable media attention and speculation have been generated concerning the long-term effects of this research on the behavior of grizzly bears (McRae 1986). Media comments and public perception suggest that bears handled by researchers behave differently from, and are more prone to conflict with man, than bears not handled. Unfortunately, there is no way to test this hypothesis. To do so would require knowledge of the behavior, activity patterns, and history of human-bear encounters of nonhandled grizzly bears. It was possible, however, to draw inferences on this question by investigating the activities of "research bears" subsequent to capture. The objectives of this analysis were to determine the percentage of research bears that conflicted with man, document the types of offenses committed, and compare these data to known problem grizzly bears.

STUDY AREAS

Data on the activities of research bears were collected from 4 areas within the Northern Continental Divide Grizzly Bear Ecosystem (Fig. 1) as described in the Grizzly Bear Recovery Plan (U.S. Dep. Inter. 1982).

The South Fork of the Flathead River is mountainous terrain west of Hungry Horse Reservoir. There is no private property in this area administered by the U.S. Forest Service. Livestock were not grazed where research was conducted (Zager et al. 1983).

The North Fork of the Flathead River was west of Glacier National Park in the Whitefish Mountain Range. The study area did not include research activities in adjacent British Columbia, as land-use practices are dissimilar. The valley floor of the North Fork has about 8,550 ha (7% of area) of tracts owned by seasonal and perennial residents. Several landowners graze livestock, but it is primarily subsistence ranching. Most of the area is administered as multiple-use lands by the U.S. Forest Service.

The East Front study area, east of the Continental Divide, included the ecotone between the Rocky Mountains and the Great Plains. Resident grizzly bears occupy low elevation sites extending into the Plains. Land ownership patterns are a complex mixture of state, federal, and private parcels. Thirty-six percent of the East Front study area (190,105 ha) is private or state-leased lands where livestock and livestock carcass dumps (boneyards) were attractants. In 1985, 21 grizzly bear conflicts were recorded in the study area, 14 of which involved relocations.

The Mission Mountains study area was south of Flathead Lake on the Flathead Indian Reservation. This mountain range abuts a valley where agriculture and livestock grazing are common. Many low-elevation wet areas attract grizzly bears throughout their active season as do abandoned apple orchards in autumn (Servheen 1981). Conflicts between man and bears occur annually in this study area (Claar et al. In press). Seventeen percent (139,806 ha) of the area was inhabited by man.

METHODS

Between 1975 and 1985, 81 grizzly bears were captured and released for various field studies. These "research bears," to the best of our knowledge, were never involved in a conflict with man prior to initial capture. They were captured with Aldrich foot snares or culvert traps and immobilized with phencyclidine hydrochloride in conjunction with the tranquilizers promazine

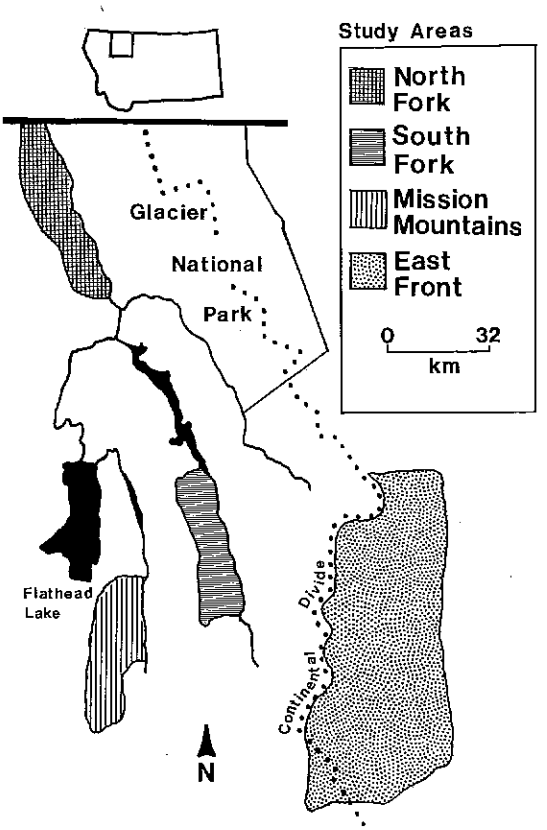

Fig. 1. Locations of areas where grizzly bears were captured and handled for research, Montana, 1975–1985.

or acetylpromazine. Ketamine hydrochloride and xylazine hydrochloride were used on several bears.

Individuals were marked with ear tags and lip tattoos and fitted with neck-mounted radio transmitters. Handling took 1–1.5 hours. Because snares were checked at 24-hour intervals, the animal may have been held captive for several hours prior to handling. Bears were aged (Stoneberg and Jonkel 1966) as adult (≥4.5 years), subadult (1.5–3.5 years), or cub of the year.

Fates of bears were as follows: (1) alive in 1985, and caused no conflict with man, (2) legally harvested, (3) illegally harvested, and (4) conflicted with man to the point where control action was necessary.

We collated information from 40 known problem grizzly bear captures in western Montana between 1975 and 1984 to determine which age and sex classes were most frequently involved in human conflict situations. This sample of problem bears was then compared to the research bear sample using Chi-square and Student's *t*-tests (Lund 1985). To further compare the age distributions, a test of skewness (g_1) was also performed on the 2 samples (Sokal and Rohlf 1981:114–117).

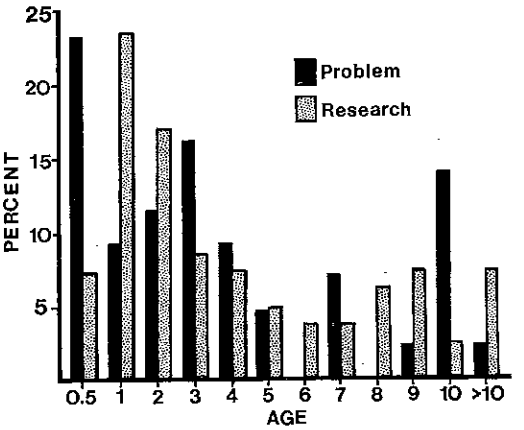

Fig. 2. Comparative age structure of grizzly bears handled for research or relocated because of damage problems, Montana, 1975–1985.

RESULTS

Age and Sex of Captured Bears

The age distributions of captured grizzly bears was skewed towards younger animals (g_1= 1.4). Forty-one percent of all research captures in the Northern Ecosystem were either 1.5 or 2.5 years old (Fig. 2). Fifty-nine percent of the research bears were male.

Fate of Bears

Sixty-eight of 81 research bears (84%) did not conflict with man to the degree where agency control actions were necessary (Table 1). Forty-three of these 68 bears (63%) were assumed to be alive as of 1985, 13 (19%) were legally harvested, and 12 (18%) were nonhunting mortalities.

Thirteen of 81 research bears (16%) conflicted with man subsequent to capture (Table 1). Of the 12 cases where age and sex were known, 6 were female. Median ages were 2.5 years for sexes combined, 2 years for males, and 3.5 years for females. Subadults and cubs totaled 58.3% of the 12 animals.

Eleven of the 13 conflicting bears were involved in livestock depredations. One individual was killed by a landowner as it loitered

Table 1. Fate of grizzly bears captured and handled in 4 areas of Montana (Fig. 1) during 1975–1985.

Area	Alive	Dead		Problem
		Legal	Illegal	
South Fork	6	3	3	0
North Fork	12	2	4	1
Mission Mountains	8	3	2	6
East Front	17	5	3	6

near his residence, and 1 bear was killed in defense of human life.

A relationship may have existed between the percentage of conflicting research bears in each study area and the percentage of each study area inhabited by man or used to graze livestock ($r^2 = 0.41$, $n = 4$, $P = 0.36$). Where human encroachment was relatively high, a greater percentage of research bears became problem animals.

Comparison with Known Problem Bears

Forty problem grizzly bears of known sex were relocated in the Northern Ecosystem since 1975, 53% of which were male. In comparison, 59% of research bears were male and there was no difference between the 2 samples in terms of sex ($\chi^2 = 0.49$, 1 df, $P = 0.48$). Both samples were skewed towards younger ages ($g_1 = 1.4$ and 1.2 for research and problem bears, respectively).

The median age of research bears (sexes combined) was 2.5 years and for known problem bears was 3.5 years. There was no difference in mean age between these 2 samples ($t = -0.79$, 120 df, $P = 0.42$).

Subadults and cubs dominated both samples, and there was a difference between age-class frequencies of research and known problem bears ($\chi^2 = 6.7$, 2 df, $P = 0.03$). Cubs were the major contributor to this significant difference. This age class was inflated in the data because several captures of adult females also included 1–3 cubs. When cubs were included as subadults, there was no difference in the age-class frequencies of research bears and known problem bears ($\chi^2 = 0.12$, 1 df, $P = 0.72$).

SUMMARY AND CONCLUSIONS

The fate of 81 research grizzly bears from 4 areas in Montana was investigated to document the percentage of bears involved in human conflicts subsequent to capture and handling. Eighty-four percent of these research bears did not conflict with man. One-half of the offending bears were female. Subadults and cubs totaled 58.3% of the 13 conflicting animals. Eleven of the 13 conflict records involved livestock depredations.

The percentage of research bears involved in control actions varied by geographic area; areas with the greatest human land-use levels showed the highest levels of conflict. Only 1 bear in the more remote North and South Fork areas conflicted with man. Conflict levels in the East Front and Mission Mountains were relatively high because more humans and their livestock occupy low elevation grizzly bear habitat. Eighty-five percent of the conflicts were directly related to the presence of livestock.

Age and sex classes of research bears were compared to 40 known problem bears. Both capture samples were skewed towards younger animals and there was no age difference ($P = 0.42$) between research and problem bears. Therefore, bears captured for research were the same subset of the population prone to be problem animals. Consequently, it is inevitable that some research bears will conflict with man. As long as grizzly bears are permitted to cooccupy low elevation habitats with man, research animals will occasionally be involved in problem situations. From this analysis there is no indication that capturing and handling of grizzly bears leads to an artificially high level of human conflict.

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