GRIZZLY BEARS, INSECTS, AND PEOPLE:

BEAR MANAGEMENT IN THE MCDONALD PEAK REGION, MONTANA

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ABSTRACT: Historically, grizzly bears congregate July through September on McDonald Peak in the Mission Mountains on the Flathead Indian Reservation to feed upon an aggregation of ladybird beetles (Coccinelidae) and army cutworm moths (Noctuidae). Recreational use of the McDonald Peak region has increased from essentially no use in the mid-1950's to eight to ten parties per week climbing the Peak in 1980. The Confederated Salish and Kootenai Tribal Council has closed the area to public use from mid-July to October 1 since 1981. Objectives of the closure were to provide for human safety and to protect a site critical to the Mission Mountain grizzly bear subpopulation. The closure will decrease bear exposure to people, possibly reducing the rate of habituation. Since grizzly bears must occupy the heavily populated Mission and Swan valleys in the spring and fall, the closure will allow them to remain at high elevations for a longer time where there are fewer threats to life, fewer opportunities for people-bear conflicts, and better opportunities to gain enough weight on high-protein insects to make interaction with humans later in the year less likely. Although a major concern was the public's response to closing a popular hiking area, visitor compliance was nearly complete and attitudes were positive and supportive. Furthermore, we observed 10, 11, and eight bears in 1981, 1982, and 1983. There were indications the closure aided the bear population by decreasing mortality and increasing bear use of the Peak.

INTRODUCTION

Grizzly bears (Ursus arctos horribilis) inhabit the Mission Range in western Montana. They den above 7,000 ft, spend spring in both the Mission and Swan valleys below 4,000 ft, generally summer above 7,000 ft, and spend fall in the Mission Valley (Servheen 1983; USDI, BIA 1985).

The population is declining because of high mortality from people-bear conflicts in the valleys (Claar and others in press). The Confederated Salish and Kootenai Tribes (CS & KT) and the Bureau of Indian Affairs (BIA) have an active management program to limit this mortality and to reverse the downward population trend (CS & KT and BIA 1981). The management plan's goal is to secure and maintain a viable, self-sustaining population in critical habitat on the Flathead Indian Reservation (FIR). An important element of this plan is to protect habitat and to minimize human-bear competition. The purpose of this paper is to describe the management of a unique area in the Mission Mountains: the McDonald Peak region.

East McDonald Peak, at 9,820 ft, is the highest mountain in the Mission Range with a relief of approximately 6,600 ft in 4 airline miles (fig. 1). The Mission Range is protected by two wilderness areas: an 89,500-acre tribal wilderness area and a 73,000-acre component of the National Wilderness Preservation System (CS & KT 1982). Timberline varies between 7,500 and 8,000 ft, depending upon aspect. Davis (1916), Harrison and others (1969), and Pardee (1950) provide a detailed geologic description of the Mission Mountains; Alt and Hyndman (1972) provide a more general description. Servheen (1981, 1983) and Servheen and Klaver (1983) described the grizzly bear habitat on the FIR.

BACKGROUND ON THE MCDONALD PEAK REGION

Grizzly Bears

Records of grizzly bears congregating on McDonald Peak extend for over 60 years (table 1). Although these records are not complete, they show a consistent pattern of family groups on the Peak from late July through August. Jack Romer (1982) observed "literally hundreds of grizzly bears," mainly females with young, between 1932 and 1956 in his many visits to the Peak.

Bud Cheff, Sr. (1985) observed grizzly bears on McDonald Peak from the late 1920's to the present. He mainly saw the bears in August

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A

B

Figure 1.--A, McDonald Peak from U.S. Highway 93 near St. Ignatius, MT. B, Basin on McDonald Peak where the grizzly bears aggregate. Photo is taken from the observation post for censusing.

Table 1..--Historical observation on McDonald Peak

Date	Total	Number of adults	Number of young	Citation
Previous to 1924	1			Elrod (n.d. a)
Following year	7	5	2	Elrod (n.d. a)
Aug. 1924	1	1		Elrod (n.d. b)
Aug. 3, 1932	12			Chapman and others (1955)
July 26, 1946	7	2	5	Underhill and Underhill (1950)
Aug. 3, 1949	3	1	2	Wright (1982)
July 22, 1951	2	2		Wright (1982)
Sept. 19, 1952	0			Wright (1982)
Shortly after Aug. 15, 1953	4	1	3	Wright (1982)
Aug. 23, 1957	1	1		Stockstad (1959)
Approximately Aug. 15, 1965	4	2	2	Pfeiffer (1982)
Approximately Aug. 15, 1966	4	2	2	Pfeiffer (1982)
Summer 1967	1	1		Pfeiffer (1982)
Summer 1977	3	1	2	Pfeiffer (1982)

eating insects on the Peak and grazing in the surrounding meadows. The bears usually gathered in the evenings when the insects became more active. All ages and sexes were observed on McDonald Peak, but females with young were common.

There is some debate about why bears are on McDonald Peak in the summer months. Chapman and others (1955) reported that the bears were eating ladybird beetles (Hippodamia caseyi Coleoptera: Coccinellidae) and army cutworm moths (Euxoa [Chorizagrotis] auxiliaris Lepidoptera: Noctuidae). Shoemaker (Elrod n.d. b, Romer 1982; Chapman and others 1955) observed the bears consuming ladybird beetles. Chapman (Chapman and others 1955) collected 15 scats; nine consisted largely or entirely of army cutworm moths, and none contained ladybird beetles. Pfeiffer (1982) observed bears licking rocks with high magnesium chloride content. Romer (1982) believed the females also gathered to protect their young from males.

Insects

Ladybird beetles make long migrations from prairie valleys to mountaintops for hibernation (Fields and McMullen 1972; Harper and Lilly 1982). Edwards (1957) and Harper and Lilly (1982) believed that ladybird beetles hibernate on mountaintops for protection from the extreme cold of the prairies; the mountain snowpack providing insulation from the cold. Heavy mortality can occur during hibernation as masses of dead bodies may be found in summer months (Chapman 1954; Chapman and others 1955; Edwards 1957).

Aggregation sites in south-central British Columbia (Fields and McMullen 1972) were on south-facing uppermost slopes among fractured boulders covered with lichens. The beetles were in crevices between rocks. These aggregation sites became snow-free earlier in the spring than did other parts of the mountain because of the south aspect, topography, and wind that created shallow snowpacks. Ladybird movements to aggregation sites began in early September and finished by mid-October; dispersal began in early June and was completed by late June. Some ladybirds were at all elevations in July and August, but the greatest densities were in the valley alfalfa fields.

These observations from south-central British Columbia generally describe the situation on McDonald Peak; however, Chapman and others (1955) reported seeing large aggregations of the beetles (5 to 10 gallons could have been collected in a day) on August 3, 1932. They speculated that these could be overwintering beetles since snow fields were still abundant.

Army cutworm moths migrate from the Great Plains in the spring to mountaintops for estivation in order to escape the high temperatures (Cook 1927; Pepper 1932; Pruess 1967; Walken 1950). The same individuals return to the plains in the fall (Pruess 1967). Before the moths migrate, their bodies are approximately 70 percent protein. When they return in the fall, the moths have gained weight as fat (Pruess 1967); so the moths are active during estivation (Chapman and others 1955; Pruess 1967; Johnson 1969). They are only sometimes diurnally active at treeline, but are usually found near alpine meadows in dry places under rocks during the day (Pruess 1967).

Army cutworms are not a serious pest in the Mission Valley (Bratton 1985). The closest area with a large army cutworm infestation is the Three Forks, MT, region (Jensen 1985), approximately 160 airline miles from the Mission Valley. Army cutworm moths apparently are able to migrate 300 miles between spring and summer (Pruess 1967).

People

Recreational use of the McDonald Peak Basin has increased substantially since 1950. Stockstad (1959) described Cliff Lake, located at the base of McDonald Peak, as having no signs of human use. He had "never seen an area that was as free from the mark of man."

By 1978, the situation at Cliff Lake had drastically changed (Rockwell and others 1978). The lake had 17 campsites, 15 of which could accommodate one or two tents, had one or two fire rings, and had lost a moderate amount of vegetative ground cover. The other two sites had moderate loss of vegetative ground cover. The Cliff Lake and McDonald Peak area received 1,400 visitor-days over a 136-day season in 1979, as recorded at the Glacier Lake trailhead (CS & KT 1985). These data do not represent an exceptionally high level of use relative to surrounding areas, but do indicate a strong trend of increasing use.

McDonald Peak, besides being the highest peak in the range, is also the most scenic. It is within 4 miles of a major north-south highway, U.S. 93. Easily seen from this popular route to Glacier National Park, it is within 40 miles of Missoula, population 33,000 and 70 miles from Kalispell, population 11,000. The Peak is easily climbed from several faces without technical equipment or skill. The chance of observing grizzly bears on the Peak has been another major attraction (Underhill and Underhill 1950).

People have seldom had confrontations with grizzly bears on the Peak, although observations of bears were common. The basin on McDonald Peak where the bears aggregate is also the best route for climbing the mountain. McDonald Peak and the surrounding basins are above timberline so few escape routes exist if someone surprises a bear. Before 1980, we had no formal reporting system for these close encounters of the ursid kind, but we know of at least one report. A hiker played dead after observing a bear at close range. The

bear smelled the hiker and left; neither bear nor hiker was injured. We have received only two reports of bear-human confrontations since 1980, both in 1981.

MANAGEMENT OF THE MCDONALD PEAK AREA

Management direction was being developed for the McDonald Peak area between 1980 and 1982. The Council of CS & KT was developing a wilderness management plan for the area (CS & KT 1982) and they approved the FIR Grizzly Bear Management Plan (CS & KT and BIA 1981) in June 1981. One provision in the grizzly bear plan allowed the Chief of Tribal Fish and Game Conservation Department to close areas when grizzly bears remain in a specific backcountry area.

Several events led to the decision to close an area surrounding McDonald Peak in 1981. During a routine radio-tracking flight on July 22, 1981, an unmarked female with cubs was observed on McDonald Peak; subsequent flights revealed an additional female but with older young. We received two reports of parties of climbers having encounters with grizzly bears on the Peak.

The Tribal Council decided that the region surrounding McDonald Peak should be closed to all public use on July 28, 1981. The proposed date to reopen the area was originally September 15, and later extended to October 1, since grizzly bears were still on the Peak in mid-September.

The closed area included all lands surrounding McDonald Peak that grizzly bears might use in their normal movement patterns (fig. 2). Closure of this area allows the bears to remain undisturbed and without contact with people. Additionally, its topographical boundaries make it easily defined to the public.

Objectives of this closure were to ensure human safety and to protect a critical site for grizzly bears.

These objectives made the closure different from those of other agencies. Historically, closures were short term and primarily to protect human safety. This 10,000-acre closure was to allow bears an extended time free from human disturbance. We expected the closure to last a minimum of 6 weeks and were attempting to slow the rate of habituation.

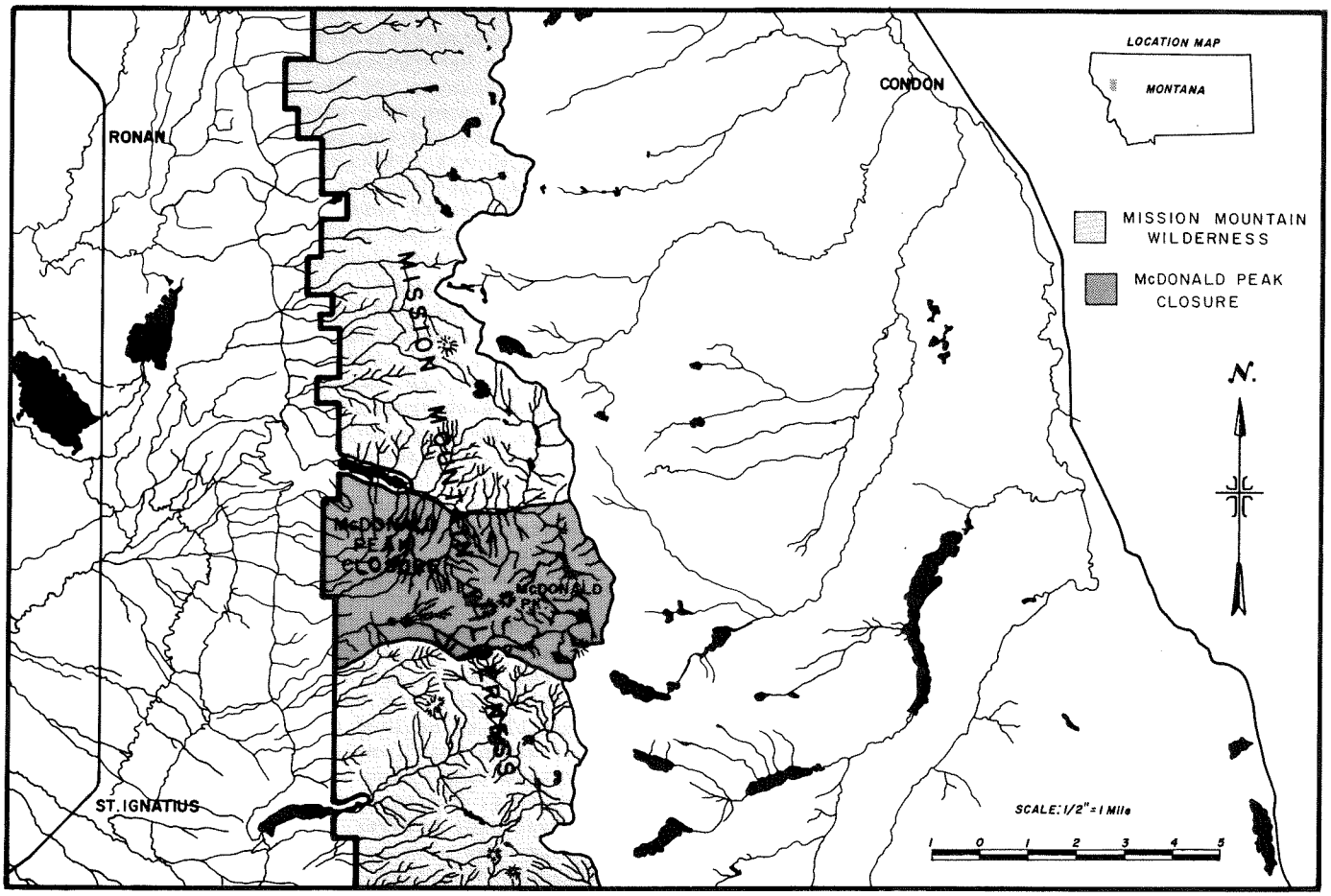

Figure 2.--Mission and Swan valleys showing the McDonald Peak Grizzly Bear Closure and the CS & KT Mission Mountain Wilderness.

Closing the area to human use would allow the bears to feed undisturbed. Few bears are killed at high elevations in the Mission Range (Claar and others in press) so the longer the bears remain undisturbed on the Peak, rather than being forced to move to the Mission Valley, the safer they would be. Because their stay in the Mission Valley below 4,000 ft would be shorter, the Valley's residents would also benefit. Finally, if the bears were well fed on insects throughout the summer, we hoped they would be less tempted to depredate livestock or become involved in other causes of bear-human conflict.

We did not want bears to become habituated to people, especially since they must live close to residences in the spring and fall (Servheen 1983). Residents of the Mission Valley have been intolerant of bears that were not wary of people. McArthur Jope (1982), Jope (1985), and McCullough (1982) believe that frequent and innocuous contacts with people resulted in habituation.

Habituation toward people of female grizzly bears with young has not been observed and probably occurs at a slower rate than for the rest of the grizzly bear population (McArthur Jope 1982, 1983). Because females with young were an important segment of the bear aggregation, we did not want females teaching their young aggression toward people. This was especially important to us, because many of these bears would be living next to homes a few weeks later (Servheen 1983). Additionally, females with young are more likely than other bears to avoid areas with high human use (McArthur Jope 1983). McArthur Jope (1982) recommended prohibiting human use of areas used by females with young.

To inform the public of the closure, trailheads leading to the closed area were posted. Some access roads were temporarily closed with a cable. Adjacent U.S. Department of Agriculture, Forest Service, ranger districts on the Flathead and Lolo National Forests notified their visitors of the closure at ranger stations and in the backcountry. They posted explanatory signs at trailheads on their land leading into the closed area.

CS & KT and BIA staff patrolled both back and front country locations. Management staff did not enter the closed area, but monitored the area from the perimeter. The primary purpose of these patrols was to inform and educate visitors, but personnel had enforcement capabilities as well. Public reaction was favorable. Visitors were happy to learn of the closure because they did not want to camp or hike with a high density of grizzly bears, and they wanted to protect and restore the bear population. The only negative comments were that we should not be specific when describing the bears' location because of concern about poaching and other sources of disturbance. The only group we discovered intentionally violating the closure was a Boy Scout troop from Missoula.

A major concern was the public response to closing a popular hiking area. We prepared two formal press releases and gave numerous interviews to radio stations and newspapers. These interviews gave us a chance to explain the need to exclude people from the area and helped to secure public support. To further enlist the support of backcountry users, we spoke to local wilderness groups, mountaineers, backcountry horsemen, and other users between the end of the 1981 closure and start of the 1982 closure. To date, we have not received any complaints about the closure of McDonald Peak during the height of the climbing season. We included a section on the closure in the FIR grizzly bear management slide program, which is presented to a variety of audiences about twice a month during the year.

The procedures established in 1981 have been used in subsequent years. The day the closure starts depends upon when the bears arrive on the Peak. We use fixed-wing aircraft to determine presence or absence of bears. Flights begin in mid-July and continue as needed. The closure began on July 21, July 27, and August 3, 1982, 1983, and 1984, respectively. The closure was lifted on October 1 each year.

MONITORING THE GRIZZLY BEAR POPULATION

The aggregation of grizzly bears on McDonald Peak appeared to be a unique opportunity to monitor the population in the Mission Range. We used fixed- and rotor-wing aircraft and ground observations, and the latter were the most useful. We established a base camp approximately 1 airline mile from the bears on a ridge to the southwest. Bears were observed with binoculars and spotting scopes early in the morning until they bedded for the day and again in the late afternoon until dark. Personnel generally spent 3 or 4 days per week in the camp for 2 separate weeks. We recorded age (adult, subadult, yearling, or cub), coat characteristics, and group size of all bears observed. These notes helped to distinguish individuals. The best time to count the bears on McDonald Peak was mid-August. We summarized observations by the census period, by the week, and by the field season. The total number of bears using the Peak in a field season was estimated using the descriptions of bears, the total maximum count, and completing the age/sex categories.

The number of bears observed was lower when aircraft were used. Helicopters gave the poorest results. We watched a female with cubs hide when she first heard the helicoptor. This is comparable to Ballard and others' (1982) observation that females with young were more secretive than other bears. Fewer bears were observed from fixed-wing aircraft than the ground observations; however, we occasionally had good results. We plan to use the technique of Maggnuson and others (1978) of simultaneously observing bears from the ground and fixed-wing aircraft to achieve a better population estimate.

The number of bears observed was 10, 11, and eight in 1981, 1982, and 1983, respectively (table 2). Servheen (1983) estimated the grizzly bear population in the Mission Range to be 25. The sex/age composition is comparable to the historical accounts. We hope these observations will allow us to estimate recruitment of cubs at 6 months, survivorship of cubs to yearlings, and population trend. The number of cubs explains the variation between years. Apparently, no cubs or yearlings died.

An adult female with yearlings radio-tracked in 1979 provided data on the movement patterns of bears using McDonald Peak. She was on the Peak between July 11 and September 13. Of the 42 relocations between July 1 and September 20, 50 percent occurred on the mountain. Between July 1 and August 10 she spent 32 percent (n=22) of the time on the Peak, with several abrupt movements between the mountain top and the valley bottom. Between August 11 and 31, all her relocations (n=13) were on McDonald Peak. Between September 1 and 20, 12 percent (n=8) were on the Peak. She may have left McDonald Peak in early September because of the changing nutritive value of the vegetation and insect migration. The trip to McDonald Peak on September 13 may have been to feed on returning ladybird beetles.

The observations of grizzly bears on McDonald Peak in recent years are consistent with this pattern. Bears were on the Peak for 44, 54, and 39 days in 1981, 1982, and 1983, respectively. The greatest number of bears observed from the ground camp occurred on approximately August 20. Of the 12 bears for which it was possible to determine length of stay, 10 remained on the Peak for more than 20 days.

We are using these data as part of the overall data base on grizzly bears. We will not depend solely on this trend information until the technique is validated, because it may be biased in some fashion or reflect the status of only a portion of the population. We need to determine from how large an area the bears are attracted to the Peak, the percentage of the population that uses McDonald Peak, when and if males stop using the Peak, and how consistently individuals use the Peak.

Of special concern is the monitoring of a population in its best habitat. Kruck (1977) found that a mountain goat (Oreamnos americanus) population was declining, but the trend count from the best winter range was stable because the goats moved into this area when vacancies occurred. If grizzly bear monitoring followed this pattern, the population could collapse in the Mission Mountains even though numbers observed in prime habitat would remain stable until it was too late to correct the situation. Other sources of information we use to monitor the population are kill statistics, movement of radio-collared bears, trapping success, and direct observation in other areas of the range.

If this technique proves useful, it may be applied to other areas of the Northern Continental Divide Grizzly Bear Ecosystem. Places like Kintla Peak (Kendall 1985) and Bear Valley (McArthur Jope 1982) in Glacier National Park, and Scapegoat Mountain (Craighead and others 1982), for example, have aggregations of grizzly bears eating insects, roots, or berries. These areas and probably many more may be used to monitor grizzly bear populations. Care must be taken to ensure that the animals using these concentration areas are representative of the total population.

EVALUATION AND CONCLUSIONS

McDonald Peak is mainly used by females with their young. Radio-tracking of three male grizzly bears from July through August showed that they used lower elevation habitat (USDI, BIA 1985). Females may use the Peak to protect their young from males, which use different areas. Russell and others (1979) found that females with young were mainly on upper slopes and in hanging valleys, where escape routes were plentiful. They believe that this habitat use was to avoid males which used the valley bottoms or lower slopes.

Table 2.--Number and classification of grizzly bears observed on McDonald Peak, 1981-1983

Year	Total	Adults[1]	Female adults	Cubs	Yearlings	Subadults[2]
1981	10	2	2	2	2	2
1982	11		3	3	2	3
1983	8	2	1		3	2

[1]Adults of unknown sex.
[2]Ages 2-5 years.

Insect ecology needs to be better understood. It is necessary to know where the insects come from and their population dynamics in order to understand yearly changes in grizzly bear use of the mountain and their food habits. Additionally, army cutworms are serious agricultural pests and heavily sprayed with insecticides; grizzly bears may be bioconcentrating these organochlorides. Ladybirds are reported to taste bad to predators (Borror and others 1976) and thus may explain why they are not always found in scats. We need to determine the food value of the ladybirds and army cutworm adults to better understand their value to the bears. Pfeiffer's (1982) observation that the basin where the grizzly bears are found has areas high in magnesium chloride may explain why the army cutworm moths and ladybird beetles migrate there.

It is too early to determine the success of the McDonald Peak management program. There are, however, indications it may be working. Nine grizzly bears died in the 4 years before the closure, 1977-1980; only three died in the 4 years following the McDonald Peak closure (Claar and others in press; USDI, BIA 1985). A female grizzly bear that did not use the insect concentration when radio-tracked in 1978 and 1979 was observed on the mountain in 1982 and spent 3 weeks on the Peak in 1983. Visitors' compliance was nearly complete, and they supported the closure. These results and those from areas which subsequently adopted this plan provide some encouragement that this management action is working.

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