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RESTORATION OF NATURAL POPULATIONS OF GRIZZLY AND BLACK BEARS  
IN YELLOWSTONE NATIONAL PARK

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Abstract: Yellowstone National Park began an intensive bear management program in 1970, with the stated goal of restoring and maintaining natural populations of grizzly (Ursus arctos) and black bears (U. americanus). The park closed the last of its large open pit garbage dumps in 1971. During the decade 1970-79, bear management went through 3 phases. The years 1970-72 spanned the intensive phase of translocating and/or removing incorrigible bears that had developed strong ties to sources of human foods. This period also included intensive efforts to educate people, increased law enforcement, intensified sanitation, refinement of management techniques, and development of a monitoring system to provide management information. The next period, 1973-78, represented a transition from emphasis on correction of a situation to awareness that a high level of preventive bear management must be a routine and never-ending part of park operations. With the summer of 1979, the bears

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with prior knowledge of sources of unnatural foods within the park appeared to have disappeared or been eliminated from the populations. Thus, in 10 years park management appears to have attained the objective of restoring the populations of bears to subsistence on natural forage to the extent that outside influences beyond the park's control will permit. The future of the grizzly bear in and around Yellowstone appears increasingly dependent on management decisions which give the bear adequate priority over human desires.

Key words: Black bears, grizzly bears, management, natural populations, Yellowstone National Park.

Yellowstone National Park began an intensive bear management program in 1970, with the concurrent objectives of restoring a grizzly bear population to subsistence on natural forage and reducing bear-caused injuries to humans. Although the emphasis was on grizzly bear management, proper black bear management was a necessary and inseparable corollary. Cole (1976) evaluated the management program 1970-75. He concluded that the management program appeared to be accomplishing its intended objectives. Two subsequent evaluations for the years 1976 and 1977 provided current information and discussed ongoing management problems (Meagher 1977, 1978). This report provides a review and perspective for the entire period 1970-79. Management considerations for the future are included.

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This report would not be complete without acknowledgement of the contributions to bear management made by many park employees. Additionally, retired Superintendent Jack Anderson is singled out for his leadership in implementing the program. In this, the professional contributions of former Supervisory Biologist Glen Cole were invaluable. The Scientific Advisory Board, headed by Dr. A. Starker Leopold, provided perspective, support, and advice. We thank G.F. Cole, D.B. Houston, C.J. Martinka, N.J. Reid, and P. Schullery for helpful reviews of the manuscript.

#### BACKGROUND INFORMATION

Yellowstone's bear problems spanned approximately 90 years before the National Park Service combined technology and determination to set about complete restoration of natural feeding conditions for bears within the park. The problems which led to the management program initiated in 1970 evolved largely through circumstances beyond technological control and as a function of the knowledge and attitudes of the times. Developed areas within the park came into being because of proximity to major scenic attractions, coupled with the distance which could conveniently be traveled in 1 day by horse or stage. Convenience dictated the locations of both the casual stopovers and the more formal camps and hotels. Concurrently, as a result of deliberate feeding, inadequate food storage, careless garbage disposal and the establishment of dump sites, bear problems began. These are first mentioned as occurring

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on a widespread basis in 1891 (Schullery 1980). Likewise, because people fed bears, the better to see them, black bears began begging along roadsides as early as 1900 (Meagher unpubl. data). Haines (1977) provided a comprehensive historical account of the human attitudes and activities prevalent when bear problems began to develop. Schullery (1980) traced the history of bears and bear management together with the technological means and accompanying attitudes for dealing with bears in Yellowstone from the earliest years of the park to the present. Cole (1972) reviewed and summarized in detail the management efforts 1930-69. All of these accounts indicated that the scope, scale, and detail of the linkage of bears to artificial food sources varied but inevitably escalated over time.

Information from the above sources and additional reviews of park files and archives indicated that:

1. Impressive populations of black and grizzly bears existed before modern man's use of Yellowstone Park.
2. An apparent increase in bear numbers between 1900-30 reflected, at least in part, increased visibility as bears became linked to human foods.
3. The kinds and numbers of bear problems which were tolerated when relatively few people visited Yellowstone Park could not be permitted as human use increased.
4. A mixture of attitudes, dominated by a desire to have bears readily visible for the touring public, led to an astounding tolerance for bear problems while

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recognizing artificial foods as the root cause. By 1930 the National Park Service acknowledged the desirability of maintaining bears under natural conditions. However, attitudes had not yet crystallized regarding the degradation of bears seeking garbage and handouts and the impossibility of having natural populations of bears while artificial foods were available.

5. In 1970 the park committed its best efforts and knowledge to restoring grizzly and black bear populations to natural foraging conditions. The timing of the program was influenced by Executive Order 11507, which required closure of open pit garbage dumps on Federal lands as a sanitation measure.

## METHODS

### Management Procedures

Management involved: (1) garbage handling, (2) public education, and (3) control of problem bears. To remove sources of garbage, the Rabbit and Trout Creek dump sites (Fig. 1) were closed by the park in 1970 and 1971, respectively. Three nearby town dumps with influences on park bears were subsequently closed: West Yellowstone, 1971; Gardiner (dump located just inside the park boundary), 1978; and Cooke City, 1979. Three incinerator sites and 2 sanitary landfills used within the park in the 1970's were enclosed in bearproof fencing. By 1979, cooperative arrangements were made for all park and adjacent town garbage to be hauled to 2 sanitary landfills beyond park boundaries (West Yellowstone, enclosed in bearproof fencing; Livingston, 55

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miles north). Bearproof tops were installed on all garbage cans within the park (mostly complete by July 1970). All garbage was collected daily. When necessary collections were scheduled late in the day, or twice daily, to prevent overflow and to minimize the attractiveness of odors to bears.

Intensified efforts to inform park visitors of proper food handling and storage procedures in bear country were coupled with the dissemination of information on the consequences of feeding bears (increased injuries to humans and the need to destroy bears). This information program was reinforced by establishment of special regulations and increased law enforcement. Finally, bears were removed that could not be discouraged from seeking food in developed areas or that became excessively dangerous to humans.

#### Management Information and Evaluation

A centralized bear monitoring system was designed, refined, and utilized for day-to-day management information and for evaluation of the program (Meagher 1978). As experience with the system increased park management intensified efforts to acquire details. All reported observations, depredations, confrontations, injuries to humans, dead bears, and translocations of problem bears were recorded daily. Efforts by recorders to obtain sightings made by observers on the ground have probably varied somewhat from year to year, but because there was no systematic effort to sight bears, this variable was not considered important. Sightings made by research personnel from fixed wing

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aircraft, beginning in 1973, increased the annual totals of bears seen in the wild but this extra effort reflected the observability of bears consistent with other observations for any specific year. The system was not designed to provide unduplicated samples of bear numbers; however reports obviously representing the same bear on the same day were recorded as one observation. For management purposes experienced observers were not necessary; bear reports uncertain as to species were listed as unknowns. The records were computerized after 1974; earlier records did not contain sufficient detail to justify inclusion. The system provided information for preventing or dealing with front country problems; it also provided useful backcountry information which may be of more importance in the future.

### Results

Observations of grizzly bears in developed areas progressively declined from 178 to 3 between 1970 and 1979 (Table 1). Comparable observation records for black bears were not maintained until 1975 (Table 2). However black bears were more commonly sighted in developed areas than grizzlies when the present bear management program began in 1970 (G. Mernin pers. comm.); in 1979 only 13 black bear observations were recorded in such areas. Repetitive translocations of 4 problem black bears accounted for the doubling of developed area observations to 147 in 1977 (Meagher 1978). No black bears were reported begging or scavenging on artificial foods adjacent to park roads after June 1977

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(Meagher unpubl. data).

Numbers of grizzly and black bears seen in the wild (Tables 1 and 2) varied each year. As noted by Cole (1976) these sightings indicated that bears were widely distributed according to natural conditions as compared to artificially influenced concentrations. The sightings did not indicate population numbers nor trends, but the numbers of reports, coupled with an assessment of the different bears involved (based on sighting date, location, sex, age, and color) indicated viable populations.

Grizzly bear control actions (bears translocated or removed from the population) decreased from a high of 70 in 1970 to 1 in 1979. Concurrently the number of different grizzlies handled decreased from 50 to 1. Twenty-four grizzlies were destroyed in the park 1970-72; 6 were destroyed 1973-79 for an average of 1 a year. Percent of successful translocations (calculated annually) was variable, but generally high as incorrigible bears were removed. Two of the grizzly bears destroyed since 1975 had been translocated in previous years: the adult female of 1976 was moved once in 1974; the adult male of 1978 was moved once in 1976 and twice in 1977. Both bears were of an age that suggested that some experience had been acquired with sources of human foods prior to closure of the last large garbage dumps in 1971.

Peak numbers of black bear translocations (34) and bears destroyed for control (8) in the decade 1970-79 occurred in 1972, 2 years later than the



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maximum numbers of similar management actions applied to grizzly bears. These figures probably reflected priorities in management effort, with attention initially focused on problem grizzly bears because of the danger to humans (G. Mernin pers. comm.). Translocations and numbers of black bears destroyed dropped sharply after 1972 and continued to decrease as incorrigible bears were progressively removed or disappeared naturally. The exception to this pattern, in 1976-77, reflected an insistence by some operational personnel on repeated translocations of problem bears. The behavior of the 4 black bears destroyed in 1977 (Meagher 1978) indicated considerable earlier experience with sources of human foods. The black bear destroyed in 1978 died of an accidental drug overdose; it had no prior history of causing problems.

Injuries to humans caused by grizzly bears in developed areas (Table 4) decreased from an average of 3.6 per year in the 1960's to an average of 0.4 per year in the 1970's, in spite of high levels of park visitation. Conversely, grizzly-caused injuries in backcountry areas increased from an average of 0.3 per year in the 1960's to an average of 1.0 per year in the 1970's. This increase reflected a 2 to 5-fold increase in backcountry use during the 1970's as compared to the use during the 1960's.

Black bear-caused injuries to humans decreased sharply in 1970 (Table 5), and decreased further between 1970 and 1979. Black bears which regularly sought foods from tourists along park roads caused most injuries prior to 1970

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(Yell. Nat'l Park files unpubl. data); the decreases from 7 injuries in 1970 to 0 in 1978 and 1979 apparently reflected the disappearance of roadside black bears.

#### DISCUSSION AND CONCLUSIONS

Cole (1976) hypothesized that the management applied during the 1970's would:

1. Restore more natural conditions as evidenced by bears widely distributed on natural foods and by decreases in the numbers of bears visiting or being controlled in developed areas.
2. Reduce bear-caused injuries to humans in developed areas from previous levels.
3. Not prevent the park's grizzly and black bear populations from maintaining or reestablishing their numbers at natural carrying capacity levels.

We used these hypotheses in evaluating the success of the bear management program 1970-79, which went through 3 phases. The most intensive level of management effort occurred 1970-72 following closure of the 2 large interior and 1 exterior garbage dumps. Most incorrigible bears were translocated or removed. Intensive efforts to educate people, increased law enforcement, intensified sanitation, and refinement of management techniques contributed to the marked decreases in numbers of bears visiting developed areas and being controlled. Additionally, the decreases in the number of bear-caused injuries to humans with the initiation of the program reflected the prompt removal of bears from developed areas (including black bears persisting along roadsides).

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The next period, 1973 through 1978, represented a transition from correction of a situation to awareness that a high level of preventive bear management must be a routine and permanent part of park operations. Problems continued at a comparatively low level; a few bears with prior experience that became incorrigible were removed from the populations. The period was noteworthy for the negative effects of transfers of personnel on the success of the program. Lack of first-hand experience with bears and complacency about bear-caused problems (especially those associated with black bears) produced the casual attitudes towards bear management apparent among employees in 1977 and emphasized the effort required to maintain a preventive program (Meagher 1978).

The importance of a very high level of sanitation was stressed at the old Trout Creek dump site (Fig. 1). Although no unnatural foods were available there after 1970 at least 1 grizzly bear dug shallow pits into the covered-over surface every year through 1979 (Meagher unpubl. data). This indicated that at least some bears would continue to visit sites of formerly good sources of food probably throughout their lifetimes.

By 1979 grizzly and black bears with prior knowledge of sources of unnatural foods within developed areas in the park appeared to be gone from the populations. This does not imply that all individuals were totally naive. The 1 grizzly translocated in 1979 had been moved once in 1977, but had not become an incorrigible bear or he would have returned to a developed area before 1979,

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or repeated his visits in 1979. The low level of bear sightings in developed areas in 1979 (3 grizzly, 13 black) further indicated that the problems which led to the program initiated in 1970 had been corrected and that the populations of bears were naive regarding sources of human foods within the park. Furthermore, 1979 was exceptionally dry during the growing season of April-June (D.G. Despain unpubl. data). Past experience by park personnel indicated that such a year had a very high potential for bear-caused problems, but only 1 grizzly bear control action was necessary. No black bear control actions occurred.

We concluded that the bear management program within Yellowstone National Park during the 1970's had achieved the goal of restoring populations of grizzly and black bears to natural foraging conditions. Concurrently the management program reduced bear-caused injuries to humans in developed areas.

The status of the bear populations relative to natural carrying capacities was less obvious. Although the number of bear sightings in the wild (Tables 1 and 2) indicated viable populations, numbers and trends were not apparent from the management data. Cole (1976) assessed various earlier estimates for numbers of grizzly bears; he estimated 250-320 for the park only. The Interagency Study Team (Roop 1980) estimated 300-350 grizzlies in the park and adjacent areas; this estimate was inferred from the number of animals seen and handled in the field. More recently Knight et al. (1981) estimated 247 grizzlies in the total

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area; Knight (pers. comm.) also used a range of 200-400 animals and indicated he favored the more conservative number. These estimates were also inferential. Cole (1976) also estimated about 650 black bears in the park, based on extrapolations from a study conducted during the mid-1960's. No field data was available subsequently.

Most man-caused grizzly bear mortality occurred outside the park after 1972 (Meagher 1978, Blanchard et al. 1980). Legal hunting ceased after 1974; thereafter the total known annual mortality for the population did not exceed 11. Blanchard et al. (1980) stated that illegal kills outside the park appeared to be the greatest source of mortality for the Yellowstone grizzly. Additional unreported illegal kills probably increased the totals by at least a few animals each year. The extent to which man-caused mortality of black bears outside the park impinged on the park population was not known; within-park mortality appeared insignificant (Table 5).

We concluded that the natural carrying capacities within the park for populations of grizzly and black bears were not known. However after 1972 removals necessitated by the park's management program did not appear to be a probable cause of a long-lasting depression of numbers from those which would be dictated by natural conditions.

#### THE FUTURE

The restoration of the bear populations within Yellowstone National Park

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to natural foraging conditions does not necessarily ensure their future well-being, particularly that of the grizzly. The park is the core of a much larger contiguous area of occupied grizzly bear habitat subject to the jurisdictional authority of 7 Federal agencies and 3 states. The grizzly bear population of the area is one unit; the bears freely cross jurisdictional lines (Blanchard and Knight 1980).

Yellowstone National Park is administered as a natural area with the objective of maintaining the ecosystem in as nearly pristine a condition as possible (Houston 1971), but the park is becoming somewhat of a biological island. Pressures on public and private lands external to the park accelerate: timber harvesting, energy development, recreational use, and homesite development. These increased uses are added to long-existing conflict situations such as livestock grazing. Any one proposal or existing use may not have great potential for harm to the grizzly bear population but the cumulative effects of these changes must be considered. The extent of illegal kill is unknown but appears to be increasing as the value increases for parts of bears (hides, claws, teeth) and as more conflict situations occur.

Sources of unnatural foods continue to attract bears outside the park. Some bears regularly obtain food in and around Cooke City and West Yellowstone, in spite of dump closures. Gardiner's lack of sanitary garbage collection is a potential attractant. Small "back yard" feeding sites exist from time to time.

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Jurisdictional concern and authority are needed to ensure proper disposal of garbage.

Within the park the program for prevention of bear problems through intensive sanitation, public information, law enforcement, and prompt translocation of any bear that persists in a developed area must continue to receive high priority for funding and personnel. Recreational use of the backcountry by people must continue to be regulated through use of designated campsites, trail and campsite closures, and group size restrictions. Additionally, it is increasingly apparent that prime areas of grizzly bear habitat should be considered for closure to all recreational use.

Ultimately the survival of the grizzly bear population in the Yellowstone area will depend on giving the bear adequate priority over human desires. Research on the populations status, trends, and dynamics of grizzly bears will help to guide management decisions regarding proposals for use, conflict situations, and regulation of human activity, both internal and external to the park. However research cannot substitute for genuine commitments to the welfare of the bear. The decisions made by administrators, land users, and residents, influenced by a concerned public, will determine the long-term survival of the grizzly bear in the Yellowstone area.

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Table 1. Numbers of grizzly bears observed on a daily basis in developed areas and in the wild within Yellowstone National Park, 1970-79.<sup>a</sup>

	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979
No. in Dev.	178	146	105	54	26	5	65	45	21 <sup>b</sup>	3 <sup>c</sup>
No. in Wild	614	320	349	348	426	216	331	528	406	346

<sup>a</sup> Data 1970-75 from Cole (1976).

<sup>b</sup> Developed area sightings corrected from original end-of-year total.

<sup>c</sup> Two of these are tenuous.

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Table 2. Numbers of black bears observed on a daily basis in developed areas and in the wild within Yellowstone National Park, 1975-79.<sup>a</sup>

	1975	1976	1977	1978	1979
No. in Dev.	57	60	147	15 <sup>b</sup>	13
No. in Wild	347	441	499	221	271

<sup>a</sup> No comparable data available prior to 1975.

<sup>b</sup> Developed area sightings corrected from original end-of-year total.

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Table 3. Records of grizzly bear control actions in developed areas,  
Yellowstone National Park, 1968-79.<sup>a</sup>

	Control Actions <sup>b</sup>											
	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979
Old Faithful	1	0	22	1	0	0	1	0	3	3	1	1
Canyon	14	16	9	11	10	3	6	0	0	0	0	0
Lake Outlet	16	25	11	20	13	4	5	0	10	3	0	0
Bridge Bay	8	9	0	1	3	3	2	0	1	2	1	0
Grant Village	20	5	15	5	0	0	0	0	0	0	0	0
11 other developed areas	0	2	13	1	0	0	0	0	1	1	0	0
Total	59	57	70	39	26	10	14	0	15	9	2	1

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Table 3. (Cont.)

No. different bears	?	?	50	33	21	7	11	0	9	7	2	1
% successful												
translocations <sup>c</sup>	/— 33 —/		60	80	74	70	77	0	57	77	0	100
No. bears destroyed	5 <sup>d</sup> (3)	10 (5)	12 (6)	6 (2)	6 (4)	0	2 (1)	0	1	1 (1)	2	0
No. bears to zoos	0	0	8	0	1	0	0	0	0	0	0	0

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<sup>a</sup> Data 1968-75 from Cole (1976).

<sup>b</sup> Numbers of times a bear was captured for translocating, shipped to a zoo, or destroyed.

<sup>c</sup> Successful translocations calculated on an annual basis only.

<sup>d</sup> Yearly totals, with number that were unintentional because bears charged personnel, came out of drug effects during handling, injured themselves in traps, or failed to recover from drugs shown in parentheses.

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Table 4. Numbers of injuries to humans from grizzly bears by periods and year, Yellowstone National Park, 1930-79.<sup>a</sup>

Years	No. grizzly-caused injuries per year		No. of park visitors (millions)
	Developed area	Backcountry	
1930's	0.6 (0-3)	0	0.16-0.49
1940's	1.2 (0-7)	0	0.06-1.13
1950's	0.6 (0-2)	0	1.11-1.60
1960's	3.6 (1-8)	0.3 (0-2)	1.44-2.23
1970	2	1	2.30
1971	0	0	2.12
1972	1	2 <sup>b</sup>	2.25
1973	0	0	2.06
1974	0	0	1.94
1975	0	2	2.25
1976	2	2	2.53
1977	0	1	2.49
1978	0	0 <sup>c</sup>	2.62
1979	0	2	1.87

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Table 4. (Cont.)

- <sup>a</sup> Data 1930-75 from Cole (1976).
- <sup>b</sup> Includes 1 fatality.
- <sup>c</sup> A backcountry injury of 1978 was recorded as caused by a bear of unknown species.

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Table 5. Park records on the numbers of human injuries caused by black bears and the number of bears transplanted and destroyed 1931-69 and from 1970 through 1979.<sup>a</sup>

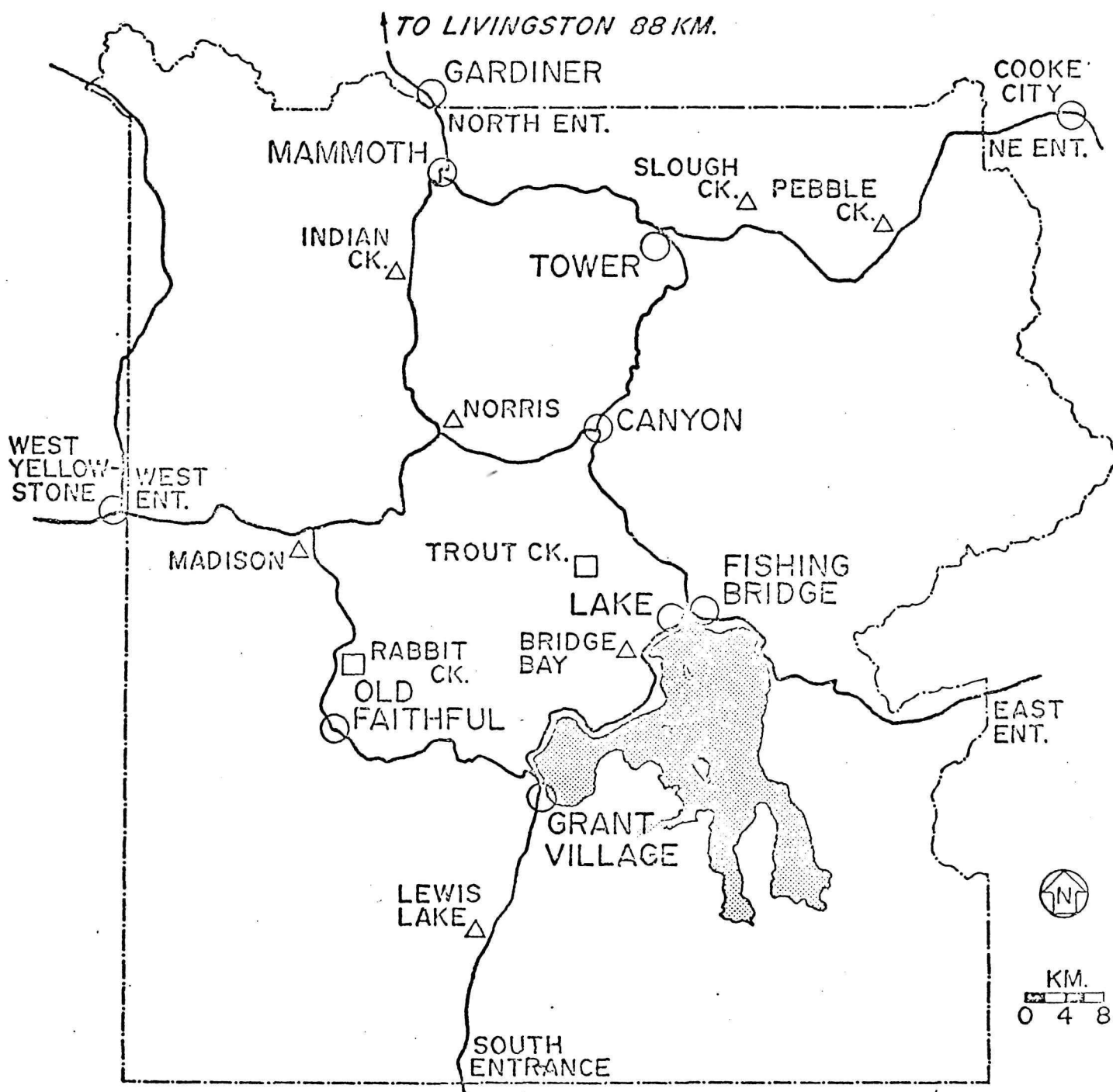
Years	No. captures and translocations	No. black bears killed <sup>b</sup>	No. injuries to visitors <sup>c</sup>	No. of park visitors (millions)
1931-69	--	24 ave./yr.	46 ave./yr.	1.00
1970	19	7 (1)	7	2.30
1971	15	4 (2)	9	2.12
1972	34	11 (3)	5	2.25
1973	13	3 (0)	5 (2*)	2.06
1974	11	3 (2)	7	1.94
1975	5	1 (1)	1	2.25
1976	13	4 (1)	4	2.53
1977	15	7 (3)	2	2.49
1978	0	1	1*	2.62
1979	0	0	0	1.87



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Table 5. (Cont.)

- <sup>a</sup> Data 1930-75 from Cole (1976).
- <sup>b</sup> Includes bears killed by human actions; those hit by autos are shown in parentheses for 1970-77.
- <sup>c</sup> Injuries 1931-69 presumably occurred along roads and in developed areas. Injuries 1970-79 occurred along roads and in developed areas, except those indicated by an asterisk, which occurred in backcountry.



LEGEND: ○ DEVELOPED AREA      □ GARBAGE DUMP  
 △ CAMPGROUND      — ROAD

Fig. 1. Yellowstone National Park, showing developed areas, adjacent towns, and two former interior garbage dumps.