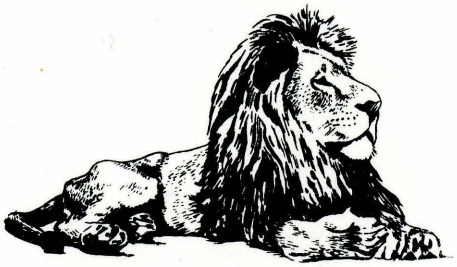
Weight Chart & Weekly Consumption	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Male Grizzly Bear Birth: 1-15-72 Wt: 1 lb. 3½ oz.	Jan22 1 lb 5½ oz	Jan29 2 lb	Feb 5 2 lb 9 oz	Feb12 3 lb 6 oz	Feb19 5 lb 6 oz	Feb26 7 lb 11 oz	Mar 4 10 lb	Mar11 12 lb 4 oz	Mar18	Mar25 15 lb 14 oz	Apr 1 17 lb 14 oz	last weight Apr 5 18 lb 14 oz							
	33½	39½	33½	37	47½	64½	59½	65	60		107½	Died Apr 6							
Female Grizzly Bear (Tammy) Birth: 1-22-73 Wt: 1 lb.	Jan27 1 lb 10 oz	Feb 2 2 lb 7 oz	Feb 9 3 lb 13 oz	Feb16 4 lb 12 oz	Feb23 5 lb 13 oz	Mar 2 7 lb 3 oz	Mar 9 8 lb 5 oz	Mar16 9 lb 13 oz	Mar23 11 lb	Mar30 13 lb 6 oz wean- ing	Apr 6 15 lb 9 oz	Apr13 16 lb 5 oz	Apr15 18lb		May 6 24 lb May18 29 lb				
	26½	38½	56	64½	71½	85	91½	107½	118	177½	158								
Fe Grizzly Bear Birth: 1-17-75 Wt: 11 oz.	Jan23 1 lb 6 oz	Jan30 2 lb 4 oz	Feb 6 3 lb 7 oz	Feb13 4 lb 14 oz	Feb20 6 lb 5 oz	Feb27 6 lb 5 oz	Mar 6 9 lb	Mar13 10 lb 3 oz	Mar20 10lb 12 oz	Mar27 10 lb 11 oz									
	47½	84	95½	121½	128	107	101	90½	89½	62½									

Weight Chart & Weekly Consumption	WEEK 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Male Polar Bear Cub Birth 12-20-72 Wt. 1 lb 7 oz	Dec 17 1 lb 12 oz 69½	Dec22 Died Brain Injury 22													
Female Polar Bear Cub Birth: 12-10-72 Wt: 1 lb 8oz	Dec17 1 lb 15oz 65½	Dec24 2 lb 4oz 55¼	Dec31 3 lb 8oz 58¼	Jan 7 4lb 10oz 58¼	Jan14 5lb 14oz 78oz	Jan21 7lb 3oz 82½	Jan28 9lb 102¼	Feb 4 11 lb 5oz 129¼	Feb11 11 lb 12oz 110	Feb18 13Lb 8oz 150	Feb25 14 lb 99½	Mar 4 14 lb 9 oz 119	Mar11 14lb 10 oz 107½	Last weight Mar12 15 lb 4 oz died Mar13	
Male Grizzly Bear Birth: 1-15-72 WT: 1 lb 3½oz	Jan22 1 lb 5½ oz 33¼	Jan29 2 lb 39½	Feb 5 2 lb 9 Oz 33½	Feb12 3 lb 6 oz 37	Feb19 5 lb 6 oz 45½	Feb26 7 lb 11 oz 64½	Mar 4 10 lb 59½	Mar11 12 lb 4 oz 65	Mar18 60	Mar25 15 lb 14 oz	Apr 1 17 lb 14 oz 107½	Last weight Apr 5 18 lb 14 oz Died: Apr 6			
Female Grizzly Bear (Tammy) Birth: 1-22-73 Wt: 1 lb	Jan27 1 lb 10 oz 26½	Feb 2 2 lb 7 oz 38½	Feb 9 3 lb 13 oz 56	Feb16 4 lb 12 oz 64½	Feb23 5 lb 13 oz 71½	Mar 2 7 lb 3 oz 85	Mar 9 8 lb 5 oz 91¼	Mar16 9 lb 13 oz 107¼	Mar 23 11 lb 118	Mar30 13 lb 6 oz weaning 177½	Apr 6 15 lb 9 oz 158	Apr13 16 lb 5 oz Last Weight Apr15 18 lb			May 6 24 lb May18 29 lb
Female American Black Bear (Ginger) Birth:1-27-74 Found:1-29-74 Wt. 12 oz	Feb 4 15 oz 31	Feb11 1 lb 5 oz 32	Feb18 1 lb 13 oz 40½	Feb25 2 lb 5 oz 44	Mar 4 3 lb 52	Mar11 3 lb 10 oz 59½	Mar 18 4 lb 12 oz 80	Mar24 6 lb 3 oz 88	Mar31 7 lb 94	Apr 7 8 lb 11 oz weaning 121	Apr14 10 lb 8 oz Last Weight Apr15 11 lb				
Female Grizzly Bear Birth:1-17-75 WT: 11 oz	Jan23 1 lb 6 oz 47¼	Jan30 2 lb 4 oz 54	Feb 6 3 lb 7 oz 95¼	Feb 13 4 lb 14 oz 121½	Feb20 6 lb 5 oz 128	Feb 27 6 lb 5 oz 107	Mar 6 9 lb 101	Mar13 10 lb 3 oz 90½	Mar20 10 lb 12 oz 89½	Mar 27 10 lb 11 oz 62½					

Weight Chart & Weekly Consumption	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Fe American Black Bear (Ginger) Birth: 1-27-74	Feb 4 5 oz	Feb11 1 lb 5 oz	Feb18 1 lb 13 oz	Feb25 2 lb 5 oz	Mar 4 3 lb	Mar11 3 lb 10 oz	Mar18 4 lb 12 oz	Mar24 6 lb 3 oz	Mar31 7 lb	Apr 7 8 lb 11 oz weaning	Apr14 10 lb 8 oz	Last weight Apr15 11 lb							
Found: 1-29-74	31	32	40½	44	52	59½	80	88	94	121									

Weight Chart & Weekly Consumption	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Male Polar Bear Cub Birth: 12-20-72 Wt: 1 lb.7 oz.	Dec17 1 lb 12 oz	Dec22 Died Brain Injury													
	69½	22													
Female Polar Bear Cub Birth: 11-20-72 Wt: 1 lb. 8 oz	Dec17 1 lb 15 oz	Dec24 2 lb 4 oz	DEc31 3 lb 8 oz	Jan 7 4 lb 10 oz	Jan14 5 lb 14 oz	Jan21 7 lb 3 oz	Jan28 9 lb	Feb 4 11 lb 5 oz	Feb11 11 lb 12 oz	Feb18 13 lb 8 oz.	Feb25 14 lb	Mar 4 14 lb 9 oz.	Mar 11 14 lb 10 oz	Last weight Mar12 4 oz Died Mar 13	
	65½	55¼	58¼	58¼	78	82½	102¼	129¼	110	150	99½	119	107½		



HENRY DOORLY ZOO
OMAHA ZOOLOGICAL SOCIETY
Riverview Park
Omaha, Nebraska 68108
(402) 733-8401

Director Dr. Lee Simmons

February 11, 1976

Dr. Frank C. Craighead
Box 156
Moose, WY 83012

Dear Dr. Craighead:

This letter is in reference to the paper "A Comparison of Nesting Raptors at Moose, Wyoming 1947 with 1975."

Being quite interested in raptorial birds and the question of whether man's increased use of wildlife habitat, limited or not, does actually have a definite impact on wildlife populations. The comparison of the two studies you and your associates made would seem to indicate there is cause for worry, at least about raptor populations. I am quite interested in your findings and would like to obtain a copy of the paper. I would be happy to re-imburse you for any costs incurred by you for such copying.

I found the copy of the report on the Yellowstone Grizzly population you gave me at the Boise Conference most interesting. I have attempted to keep abreast of the Yellowstone situation since I work with Grizzlies at the Omaha Zoo. I hope to be able to eventually do some graduate work on either the Grizzly or the Golden Eagle at the University of Montana so I try to keep up with research being done on both of these species.

I am enclosing some data on captive born, head reared weights of Grizzly wobs. You may already have such data, if not you may find it interesting.

Thank you very much.

Sincerely,

Dale M. Becker

Sent raptor report 2/20/76

dkw

Reprinted from *BioScience*

A Comment on the History of the Northern Yellowstone Elk

Douglas B. Houston

Elk (*Cervus canadensis*) are the most abundant ungulate in Yellowstone National Park. Those wintering on the Yellowstone River drainage in and adjacent to the park have come to be known as the northern Yellowstone herd. The primary objective of Yellowstone as a natural area is to maintain the park ecosystem in as near pristine conditions as possible, with these elk as an integral part. The management of these animals has a long history of concern and controversy.

Many biologists are probably familiar with the recent history of these elk, which has included periodic large-scale experimental population reductions within the park. The combination of park reductions and hunting of herd segments outside the park reduced winter numbers from 12,000± to 5,000± between about 1955 and 1968. The research program since 1969 involves testing a series of hypotheses to determine if such reductions are indeed necessary within the park or if the Yellowstone ecosystem is intact enough that numbers within the park will be regulated naturally. Recreational hunting is permitted outside the park on other segments of the northern herd.

It is not my purpose to review the philosophy of the management of national parks, the rationale and research design behind the present program, or the results of recent work. These have been reviewed elsewhere (Cole[1,2], 1971, Houston[3], 1971, 1973, Meagher 1973). The purpose of this note is first to point out that some fundamental aspects of our interpretation of the history of the northern elk have changed and second to call attention to some far-reaching implications of this changed interpretation.

Yellowstone is fortunate to have a wealth of records available to reconstruct aspects of the history of the elk, including human influences on numbers and distributions, for the past 100 to 140 years. In fact, the volume of mostly unpublished materials to be covered was so enormous that only recently were sufficient manpower and time available for the task. Now largely completed, this note is abstracted from the report, which contains the supporting historical records[4].

For the past half-century nearly every account of the population dynamics of the northern elk, every interpretation of habitat conditions, and many interpretations of the relations of elk with associated herbivores have been based upon one or more of the following premises: (a) the park area did not serve as historical winter range; (b) following establishment of the park the elk population erupted to 35,000 by the early 1900's; and (c) the population crashed to 10,000 to 12,000 between 1917 and 1920—attendant range deterioration is often suggested. My review of the historical data shows that these premises and interpretations were incorrect.

There are first-person accounts to show that large numbers of elk wintered historically on the northern range. Reports to the contrary seem to have been based upon misinterpretations of one or two early comments. The reported population eruption seems to have resulted from three erroneous interpretations: First, gross estimates of numbers of elk summering in the entire park were misinterpreted as referring to just those wintering on the Yellowstone River. Summer herds are composed of animals from many discrete winter herds surrounding the Yellowstone Plateau. Second, the early definition of the "northern herd" included elk wintering on three to five other major river drainages in addition to those wintering on the Yellowstone River and its tributaries within and adjacent to the park (the current definition). Third, some early census attempts and calculations of increase rates were clearly faulty. Better organized censuses and evidence from first-person accounts indicate that an eruption did not occur. The evidence suggests that winter herds numbered mostly 12,000 to 15,000—which, incidentally, yields winter densities comparable to many other herds in the Rocky Mountains. The reported population "crash" resulted from accepting as established fact the administrative *suggestion* of large-scale winter mortality to explain discrepancies between two population estimates. There are abundant first-person accounts from independent sources to indicate that a population crash did not occur. This is but a brief summary of what proved to be an intriguing detective story.

Subsequent reports and publications built upon and reinforced a largely incorrect historical account of the northern Yellowstone elk in a manner analogous to that reported by Caughley

Douglas B. Houston is with Yellowstone National Park, Wyoming 82190.

This paper is a contribution from National Park Service Natural Sciences Project YELL-N-29b.

[1] Cole, G. F. 1969. The elk of Grand Teton and southern Yellowstone national parks. Mimeographed Research Report. Yellowstone National Park, Wyoming. 192 pp.

[2] Cole, G. F. 1969. Elk and the Yellowstone ecosystem. Mimeographed Research Note. Yellowstone National Park, Wyoming. 14 pp.

[3] Houston, D. B. 1971. Research on ungulates in northern Yellowstone National Park. Symposium on Research in National Parks, American Association for the Advancement of Science, Washington, D.C., in press.

[4] Houston, D. B. 1974. The northern Yellowstone elk. Parts I and II: history and demography. Unpublished report. Mimeographed. Yellowstone National Park, Wyoming. 185 pp.

(1970) for the Kaibab deer of Arizona. These accounts were then used to support, in part, various management programs for the northern elk which have ranged from predator control and winter feeding to large-scale population reductions within the park. In turn, I have observed that the traditional "history" of the Yellowstone elk, often complete with graphic accounts of the population eruption and crash, has been (a) used (sometimes with the Kaibab deer story) to buttress the need for ungulate population reductions in other national parks of the world, (b) used to caution against establishment of new national parks, (c) used as the rationale to support the "need" for sport hunting of ungulates, and finally (d) taught to students as examples of ungulate habitat relations, the role of predation, and so on.

This is not to say that population reductions of the northern herd in Yellowstone Park will be unnecessary in the future, but simply that any future programs will be carried out from a different historical perspective. Nor do I wish to imply that periodic reductions of ungulates are unnecessary in other parks of the world which are not complete ecological units; but the traditional "history" of the northern Yellowstone elk should not be used to buttress such programs. Furthermore, there are legitimate biological and sociological rationales for sport hunting. To use the traditional "history" of the northern elk as support only weakens the case for continued recreational hunting.

The objective of maintaining pristine ecosystems, with modern man restricted to nonconsumptive uses, can only be partially met for the northern elk because the park does not contain the complete ecological unit for one segment of the population. We have not yet determined if elk wintering in the park will be regulated naturally, that is, density-dependent homeostatic mechanisms will result in the equation: natality + immigration = mortality + emigration. We have not determined if a recreational hunting program to manage those elk that winter outside the park is workable. Evaluation of these hypotheses is a complex undertaking which involves studies of the demography and behavior of elk, of relations among faunal species, of vegetation and plant succession, and of fire history and climate. Demography will change as the elk population increases from levels imposed by past herd reductions. The dynamics of herd segments within the park will be different from those outside the park, which are more frequently influenced by human predation (recreational hunting). These differences will affect fecundity, age structures, and mortality patterns.

All aspects of elk mortality in relation to the objectives of the park have required reappraisal. Records show that substantial mortality has occurred during periodic severe winters since modern man was first present as a witness. This occurred with varying levels of predation by native carnivores and modern man; it appears to be characteristic of ungulate populations in areas with large annual fluctuations in the absolute abundance and relative availability of forage. This mortality is not a priori evidence of overpopulation, that is, ungulate densities which cause unnatural retrogressive plant succession. Substantial mortality of elk during occasional severe winters is expected to recur. Interpretations that this mortality represents a loss is inappropriate within the park where dead elk become necessary food supplies for endemic carnivores.

REFERENCES

Caughley, G. 1970. Eruption of ungulate populations, with emphasis on Himalayan thar in New Zealand. *Ecology* **51**: 53-72.

Cole, G. F. 1971. An ecological rationale for the natural or artificial regulation of native ungulates in parks. *Trans. N. Am. Wildl. Nat. Resour. Conf.* **36**: 417-425.

Houston, D. B. 1971. Ecosystems of national parks. *Science* **172**: 648-651.

———. 1973. Wildfires in northern Yellowstone National Park. *Ecology* **54**: 1111-1117.

Meagher, M. M. 1973. The bison of Yellowstone National Park. *Nat. Park Serv. Sci. Monogr. Ser. No. 1.* 161 pp.

ED HERSCHLER, Governor
A. J. "JACK" HULL, Pres., Laramie
FLOYD CARR, Vice Pres., Sundance
CHARLES H. BROWN, Wheatland
JAMES P. CASTBERG, Powell
GENE BONDI, Sheridan
ROGER WEIDNER, Evanston
DAVE WHEELER, Lander

State of Wyoming

JAMES B. WHITE
Director
EARL M. THOMAS
Assistant Director
REX CORSI
Chief Game Warden
W. DONALD DEXTER
Chief Fish Warden
EVA M. SORAN
Chief Fiscal Officer
CHESTER C. ANDERSON
Chief Research & Development

Sent copy to John

GAME AND FISH DEPARTMENT
CHEYENNE 82002

March 23, 1976

In Reference to FWS/SE:

Keith M. Schreiner, Director
Office of Endangered Species
United States Dept. of the Interior
Fish and Wildlife Service
Washington, D.C. 20240

Dear Sir:

Management of the grizzly bear (Ursus arctos) in Wyoming has been made difficult by conflicting viewpoints and emotionalism. Wyoming is concerned with the perpetuation of the species and has and will continue to manage the grizzly bear on the basis of sound biological data. We would urge the U. S. Fish and Wildlife Service to cooperate with this Department in gathering data on grizzly bear population dynamics and movements and the effects of legal harvest.

As outlined in the Department's "Strategic Plan" it is our goal to:

"Manage grizzly bear in their natural habitats such that they will:
1. Maintain themselves in sufficient numbers to provide for all types of ecological, recreational, esthetic, educational and economic uses.
2. Not become injurious to human health or cause excessive damage to private property."

Further, we recognize the need for protection of habitat critical to the survival of this species. We suggest, however, that the designation of critical grizzly bear habitat should be accomplished after carefully considering data that are available concerning the species and the ramifications of such a designation with regard to the management of other wildlife occurring in northwestern Wyoming. We do not agree with the designation of the entire area artificially established as the Yellowstone Ecosystem. The designation of the entire known range of this species as critical to its survival is unnecessary and not substantiated by any available data of which we are aware.

However, the State of Wyoming does wish to perpetuate grizzly bear populations outside Yellowstone National Park. Grizzly bear have inhabited this area since Wyoming became a state. During this period the grizzly survived in the face of licensed but unlimited hunting. Wyoming has in the past eight years implemented and presently practices a much more restrictive program of hunting control and management. We point out that in 1968 and 1969 our Department declared a moratorium on hunting grizzly. Since that time only limited hunting has been allowed under restricted permits and on April 30, 1974, our Commission again placed a two-year moratorium on hunting to take effect in 1975 and 1976.

The wintering population of grizzly bear in Wyoming outside Yellowstone was estimated at 80 in 1975. The Department's objective for 1980 in this area is 100 grizzly bear providing 200 hunter recreation days at a rate of one bear per 40 days of hunter effort.

The Wyoming Game and Fish Department has defined "Critical Grizzly Bear Habitat" as an area of continuous natural habitat essential for the maintenance of a self-sustaining population which will guarantee the perpetuation of the species. It is the recommendation of this Department that the following described geographic area lying within the state of Wyoming be identified as "Critical Grizzly Bear Habitat": that portion of Yellowstone Park lying within the borders of the state of Wyoming. We suggest that Yellowstone Park meets the requirements of our definition as well as the requirements defined in the Endangered and Threatened Species Act (Federal Register, Vol. 40, No. 78, pp. 17764-65, April 22, 1975).

Our justification for designating Yellowstone Park as "Critical Grizzly Bear Habitat" is as follows:

1. Yellowstone supports a viable population of grizzly within the park boundaries as well as providing a nucleus population for surrounding areas in Wyoming. The natural mortality of the elk, bison and other animals of Yellowstone Park furnish an important food source during the spring period prior to annual vegetative growth.

2. The park boundary provides the best line that is enforceable as a fully protected area.

3. A wilderness buffer zone nearly surrounds the park within Wyoming. This wilderness has adequate regulation and restrictions to protect the park population of bears, i.e., no timbering, vehicle travel, etc.

4. Establishment of a highly restrictive geographic area outside of Yellowstone and within Wyoming as critical grizzly habitat could adversely affect other uses in the area (e.g., cattle grazing, camping, outfitting, etc.) and is not essential to perpetuation of the species.

5. During the past few years it has consistently been the opinion of John and Frank Craighead that there should be limited hunting of grizzly outside Yellowstone Park to minimize bear-human conflicts. For support we quote from Wyoming Game and Fish Commission

meeting minutes where Frank Craighead was invited to advise the Commission on grizzly management. The following are excerpts from these meeting minutes:

April 30, 1968

"Frank Craighead asked the Commission to recognize the grizzly as a trophy animal and that it be hunted on a restricted basis. He feels it would not be wise to completely close the hunting season for extended periods of time because bear numbers would build up and cause trouble to stockmen and there is a problem of bear-human relationships...Census within Yellowstone National Park showed 174 grizzly. Mr. Craighead believes this number to be the carrying capacity of Yellowstone National Park."

March 3, 1969

"Mr. Frank Craighead advised that the grizzly should be hunted on a restricted basis outside of Yellowstone National Park."

April 29-30, 1974

"Mr. Craighead feels that the grizzly may be in critical condition due to high mortalities on this population which reproduces so slowly...He does not favor placing the bear on the endangered species list unless it becomes absolutely necessary...There is a need to control this large and dangerous animal when and where it is necessary. The best and most effective way to accomplish this control is by limited trophy hunting."

6. After thoroughly reviewing all the available research data for the Yellowstone region, the Committee on the Yellowstone Grizzlies, National Academy of Sciences determined that a population of 234 grizzlies in the Yellowstone Ecosystem was a conservative estimate and that there was no indication that the grizzly population density in Yellowstone was significantly lower than in other areas where viable populations exist. They also concluded that the population model used by the Craigheads was "rigid," "unrealistic" and would lead to extinction irrespective of what initial population figures were used because "no compensatory mechanisms are built into the model." The committee stated "our evidence does not suggest that there are compensatory mechanisms adequate to maintain the Yellowstone population under impact of continued mortality as high as that which occurred in the years 1970-72." However, through efforts of all state and federal agencies in the Yellowstone region mortalities decreased greatly in 1972, 1973 and 1974. In 1975 no known mortalities occurred in the Yellowstone Ecosystem. In conclusion, the committee made the strong

statement that "there is no convincing evidence that grizzly bears in the Yellowstone Ecosystem are in immediate danger of extinction." Since the bulk of the committee's data pertained only to the Park, it would then be reasonable to conclude that, with precautions to avoid excessive and unnecessary mortalities, the Park's grizzly population is stable and able to maintain itself.

Sincerely,

James B. White
Director

JBW/DS/gc
cc

THE STATE OF WYOMING

ED HERSCHLER
GOVERNOR

Game and Fish Department

CHEYENNE, WYOMING 82002

JAMES B. WHITE
DIRECTOR

March 9, 1976

MEMORANDUM TO: Forest Supervisors, Bureau of Land Management District Offices, Cattlemen's Association, Wool Growers' Association, Farm Bureau, Sportsmen's Organizations, Outfitters' Association, Forest Service Regional Offices, Wyoming Meat Processors

FROM: Rex M. Corsi, Chief Game Warden

SUBJECT: Cooperative meetings - 1976

COPIES TO: Commission Members, Staff, Game Division Personnel

All agencies, groups and interested persons are hereby notified that meetings will be held to discuss big game hunting seasons for 1976. We will also discuss the use of baits for the taking of black bear and the trapping regulations for furbearers for the 1977 season. These meetings will be held at 7:00 p.m. with dates and locations as listed below:

April 16	Green River	- District Office (Wyo. G & F)
April 19	Jackson	- Wyoming Room at Wort Hotel
April 21	Riverton	- Science Building Room 134 - Central Wyoming Junior College
April 23	Lovell	- National Guard Armory
April 26	Sheridan	- District Office (Wyo. G & F)
April 28	Casper	- District Office (Wyo. G & F)
April 30	Laramie	- District Office (Wyo. G & F)

All seasons, recommendations, bag limits, dates, etc. should be firmed up with local groups before these meetings. The state maps and orders will all be written out by this time and only major problems should be aired at these meetings. This is not a substitute for local meetings.

Rex M. Corsi

Rex M. Corsi
Chief Game Warden

RMC:kz

Frank

FT Myers News Press
Jan 8 76

Grizzly Bear No Match For 'Little Runt' With Gun



Jim Murray
Syndicated Columnist

He could take the mightiest pass protection pocket and destroy it with one swipe of his right paw. He could take the fiercest pass rush and crush it without a grunt. He's an all-time All-American, all right. He was here before the Indians.

Sack the quarterback? He could eat the quarterback. Mean Joe Greene? Mean Joe Greene would climb a tree if he saw him coming.

His name is "Ursus Horribilis" and, no, he's not a placekicker from Crete, he's a native-born North American. "Bear" Bryant got his nickname from wrestling a bear, but this fellow wrestles bears all the time. He could break the back of an ox with a blow. He weighs 1,500 pounds — evenly distributed over all nine feet.

He's not a Chicago Bear, he's a grizzly bear, and no NFL line or linebacker could stop him. He can run 30 miles an hour, play in any kind of weather. Muhammad Ali wouldn't fight him for Fort Knox.

Of course, he's not a very good team player. He's a loner. He won't stay in a zone. On the other hand, he doesn't have an agent. He probably works for peanuts — Literally.

You would think an awesome creature like this would not have to be protected from its enemies. But the sad fact is, the American Grizzly, one of the most magnificent physical specimens in all of nature, is no match at all for one pot-bellied, near-sighted, false-teethed dyspeptic little runt with a hearing aid — and a gun.

He is being run out of existence by the most efficient predator in all the wild kingdom — man.

He is one creature that cannot stand man. He doesn't fear man, he just dislikes him. Which is why you never see the American Grizzly begging from cars or feasting in garbage dumps. He is becoming as extinct as the plains bison.

He has been placed on the "endangered" species list, which will be good news to all grizzlies but even better news for horses. To hunt grizzlies, you first take one horse, kill 'em — and then leave the carcass out to attract the king of bears. Try that in a Disney movie sometime. Think the kiddies would like to see My Friend Flicka set out as bear bait by a bunch of guys with hunting licenses?

Actually, Larry Pate, who's a biologist with the Wyoming Game and Fish Commission, thinks that Disney's "personalizing" of animal characters has done wide damage to what he called "good game management."

Grizzly bears, Pate points out, never walk out of the woods wearing pointed boy scout hats to warn children not to light matches. To a child, and sometimes even to papa and mama, a bear is Yogi Bear or Gentle Ben or Smoky. To the bear, they're food. The story of Goldilocks and The Three Bears would be a lot bloodier if it were a documentary.

Still, you got to be awfully unlucky to be attacked by a grizzly. There are only about 250 to 400 of them left in the Wyoming Yellowstone area. Nor are they likely to make a comeback unless someone starts running guns into them. They breed only once every two years — usually twins.

They can travel more than 35 miles overnight, grazing as they go on anything that comes their way — fish, berries, backpackers. And its no use to hide under the car on them. They can smell clear across two state lines. And if a bear runs away from you, it ain't a grizzly.

Grizzly bears are on a longer losing streak than Chicago's. Most of them have been turned into rugs. It's too bad they can't be suited up and taught the iformation, and put on scholarship. Because this country takes a lot better care of its Chicago Bears than its real ones.

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TELEPHONE
(714) 621-2971

January 29, 1976

Dr. Frank Craighead
Environmental Research Institute
P.O. Box 156
Moose, Wyoming 83012

Dear Frank:

What do you think of this January, 1976, Audubon article?

Cordially,

Stephen I. Zetterberg

SIZ:cj

Enc.

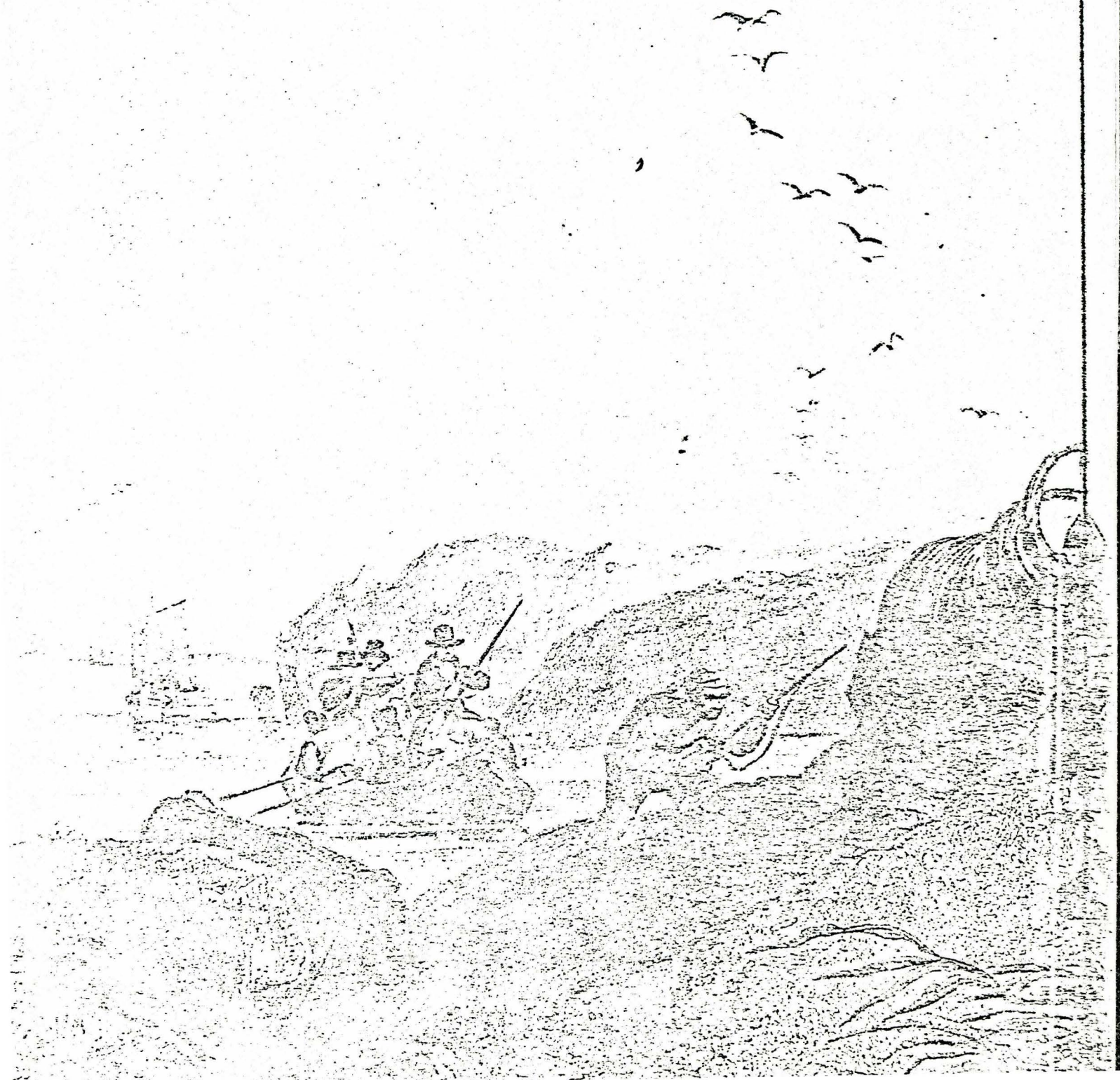
cc: Mr. and Mrs. Walker
Mrs. Martha Shell, w/enc.

From: Audubon, , January,1976

The Great Grizzly Controversy

It is time to call a truce in the acrimonious debate over bear research and management

The Thomas Gilcrease Institute of American History and Art, Tulsa, Oklahoma

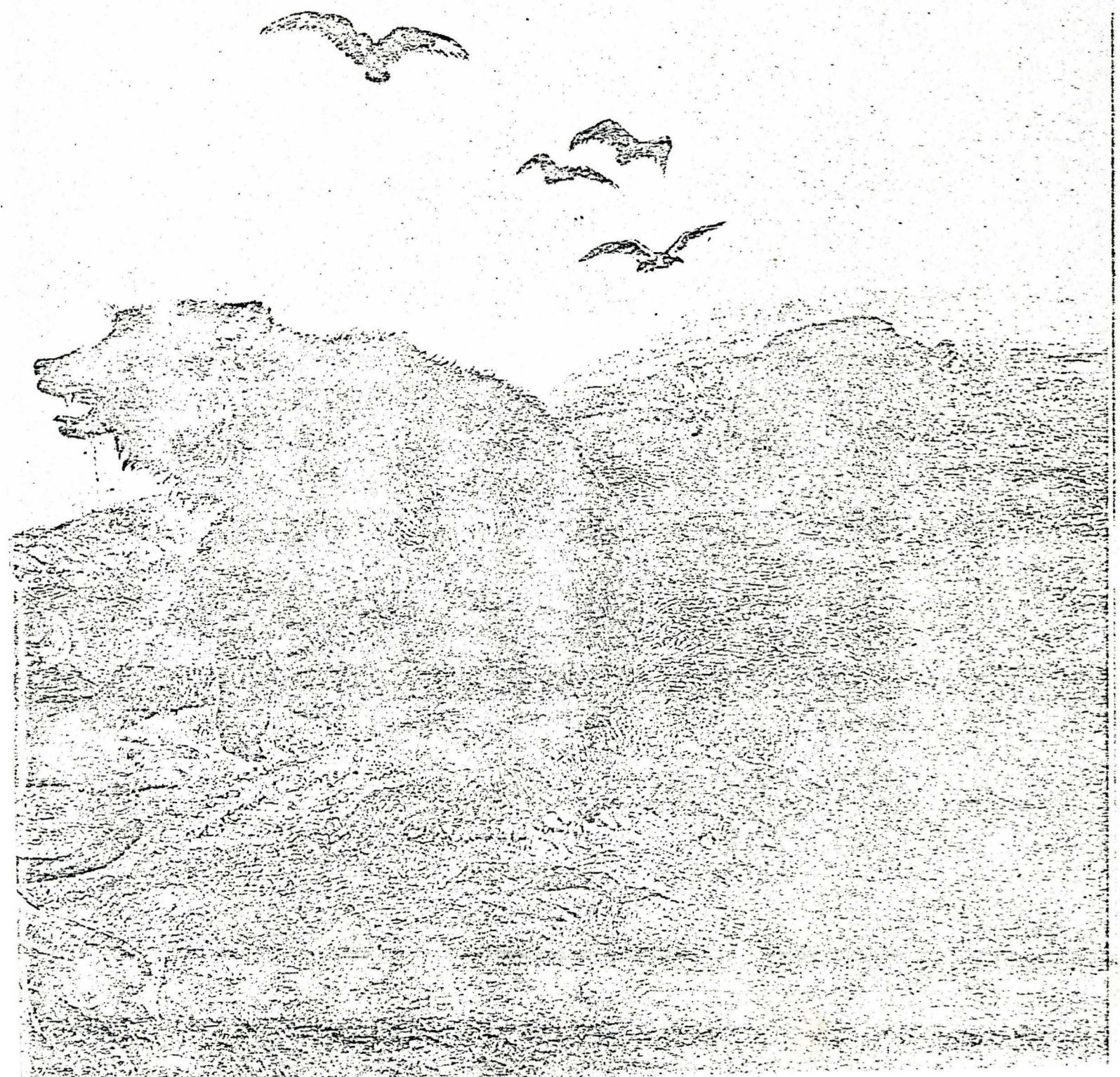


by BIL GILBERT

DURING HISTORICAL TIMES in what has become the United States there has been only one land mammal indisputably able and occasionally inclined to threaten man directly and physically. This is the grizzly bear, *Ursus arctos*. On the other hand, man has been the only mammal sufficiently formidable to prey on the grizzly. Because of this rough balance of power, men and grizzlies until about a century and a half ago chose or were forced to coexist where their ranges overlapped. Men killed some grizzlies for food and to protect themselves or their property. Some bears also were killed for sport and glory—but not many, because of the risks of going against a grizzly with a stone-tipped arrow, lance, or even musket. Similarly, bears in defense of their vital interest, perhaps sometimes capriciously, attacked men and killed them often enough to maintain their reputation.

Three changes which occurred in the

In a dramatic encounter drawn in 1833 by Swiss artist Karl Bodmer, passengers from a keelboat on the upper Missouri River find that opportunistic grizzlies have cleaned out a cache of meat left by an advance contingent of hunters.



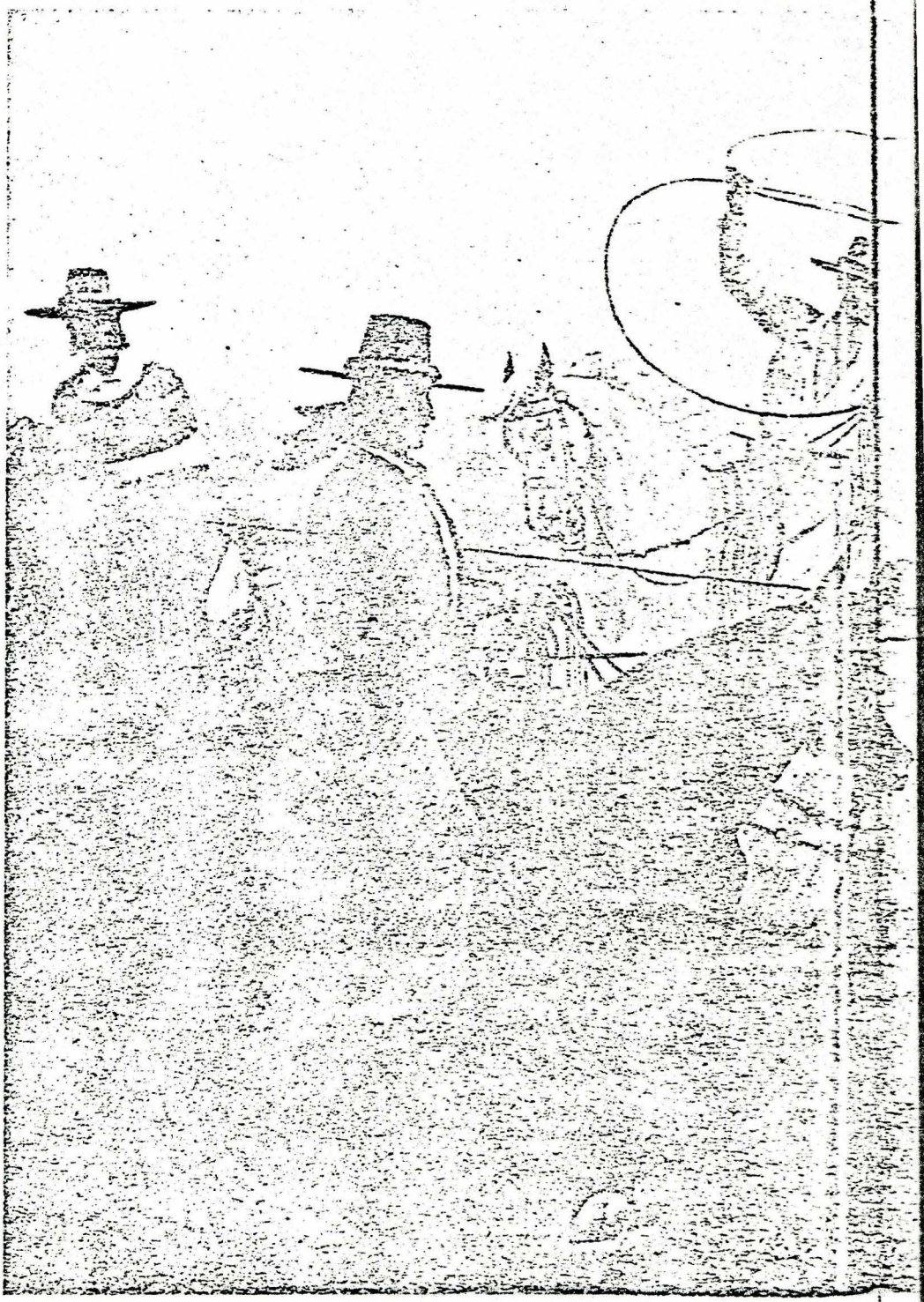
middle of the nineteenth century dramatically altered this balance, tipped it heavily against the grizzly. First was the influx of white settlers into the West. Whereas roving Indians, fur trappers, and mountain men had found the grizzly an awesome nuisance, the settlers decided bears were a bottom-line threat to establishing ranches and farm communities, to general peace and prosperity. As they were motivated to build roads, dig wells, fence land, turn the sod, they were motivated to do something about grizzlies. Secondly and thirdly, the settlers either came with or soon obtained two tools with which they could deal with bears effectively and in fair safety: the repeating rifle and strychnine-based poisons.

Equipped with these weapons, western settlers went to war against the bear. The grizzly became extinct in North Dakota in 1870, and there were probably no plains grizzlies left anywhere by 1880. In California, where it was most numerous, the grizzly was gone by 1922. The grizzly was eliminated from Utah in 1923, from Arizona by 1930, and from New Mexico by 1931. The grizzly disappeared from northern Colorado in the 1920s, but three animals were killed in the southern part of the state between 1950 and 1970 and there are continuing though unverified reports that a remnant population still survives in the San Juan Mountains.

Southern Colorado aside, there are three remaining areas in the lower 48 states (Alaska has a largish population) where grizzlies are known to exist. A very small population survives in the Selway-Bitterroot area along the northern Idaho-Montana border. A more substantial number of grizzlies is thought to inhabit the 3,500,000 acres of what is sometimes called the Bob Marshall ecosystem in the mountains of north-central Montana. Another population of grizzlies is located to the south, roaming over 5,000,000 acres where the states of Montana, Wyoming, and Idaho conjoin. A significant common feature of these latter two areas is that at the center of each is a sizable sanctuary, Glacier National Park in the north and Yellowstone National Park in the south. Circumstantial evidence overwhelmingly supports the thesis that the remaining grizzlies are where they are because the parks are where they are.

As to how many grizzlies remain in these three areas, nobody pretends to have ever counted them. Guesses range from a low of 500 to a high of 1,300. In between are about as many different estimates as there are bear students.

The fact that no one authority has been able to prove to the satisfaction of others that he knows approximately how many grizzlies remain, and the question of what to do or not to do about the survivors, are the basic causes of the Great Grizzly Controversy—a bitter one which has racked the wildlife establishment for the better part of a decade. In the course of this violent dispute, traditional alliances between wildlife agencies and powers have been broken and improbable new ones formed. Jobs have been lost (so it is charged), reputations tarnished, legal actions initiated, and claims of corruption, coverup, stupidity, and barrages of other hard words have been hurled. So much has been said and charged, so much heat and so little true light generated, that even a summary of the quarrel is neces-



sarily lengthy, complicated, and almost inevitably leads to offending adherents of one position or another.

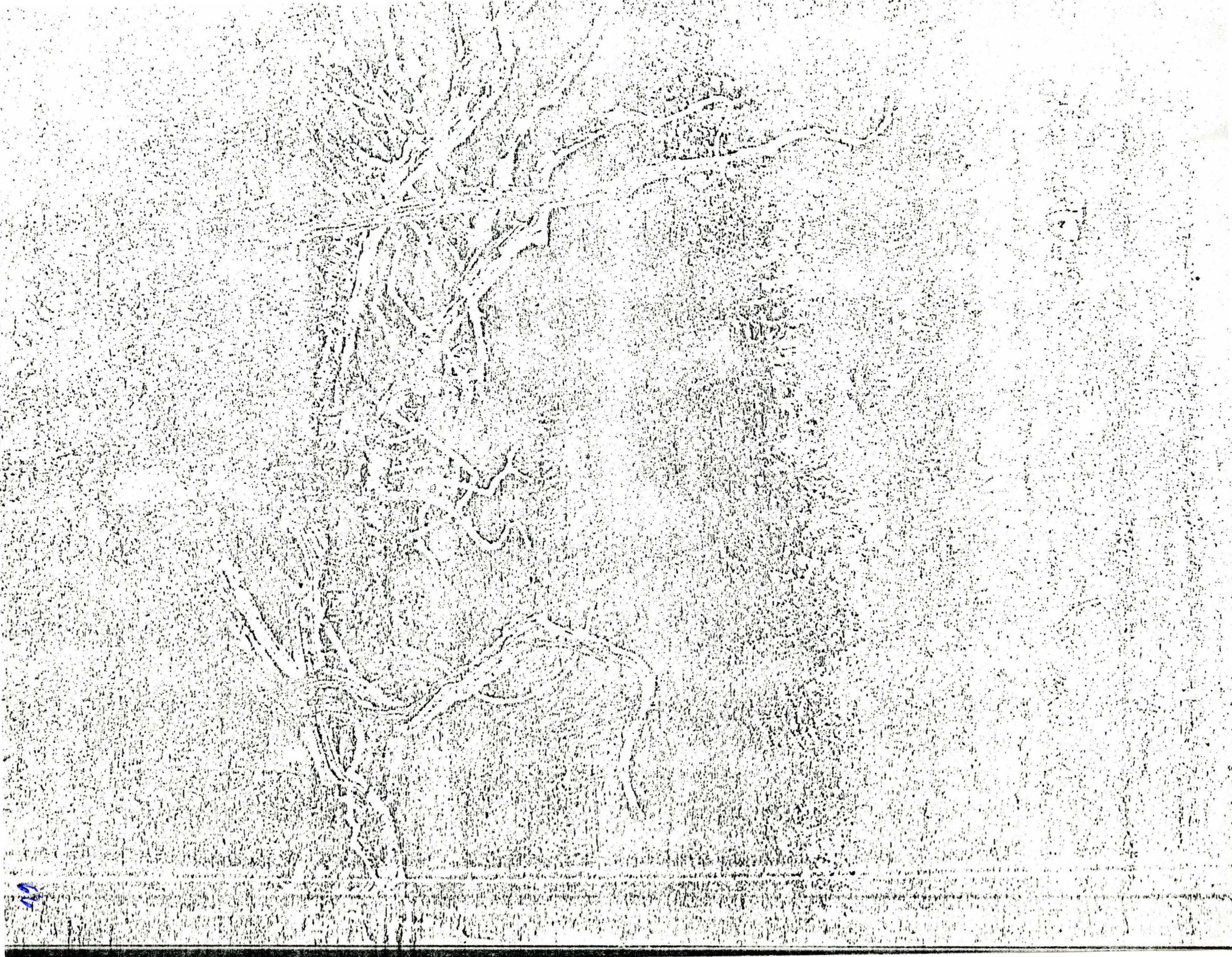
Though there may be as many or more bears living in the Bob Marshall area, the Great Grizzly Controversy has centered on the status and management of the species in the Yellowstone ecosystem. There were grizzlies in Yellowstone when the national park was dedicated in 1872, of course. Nobody knows how many, and about all that is known is that originally there seemed to be more grizzlies than black bears. Through the years, presumably because of changes associated with the development of the park, blacks became more plentiful and came to outnumber grizzlies by two to one or more. From the 1920s on, casual, incomplete, and irregular estimates of the grizzly population in the park and adjacent areas ranged from 100 to 300 animals.

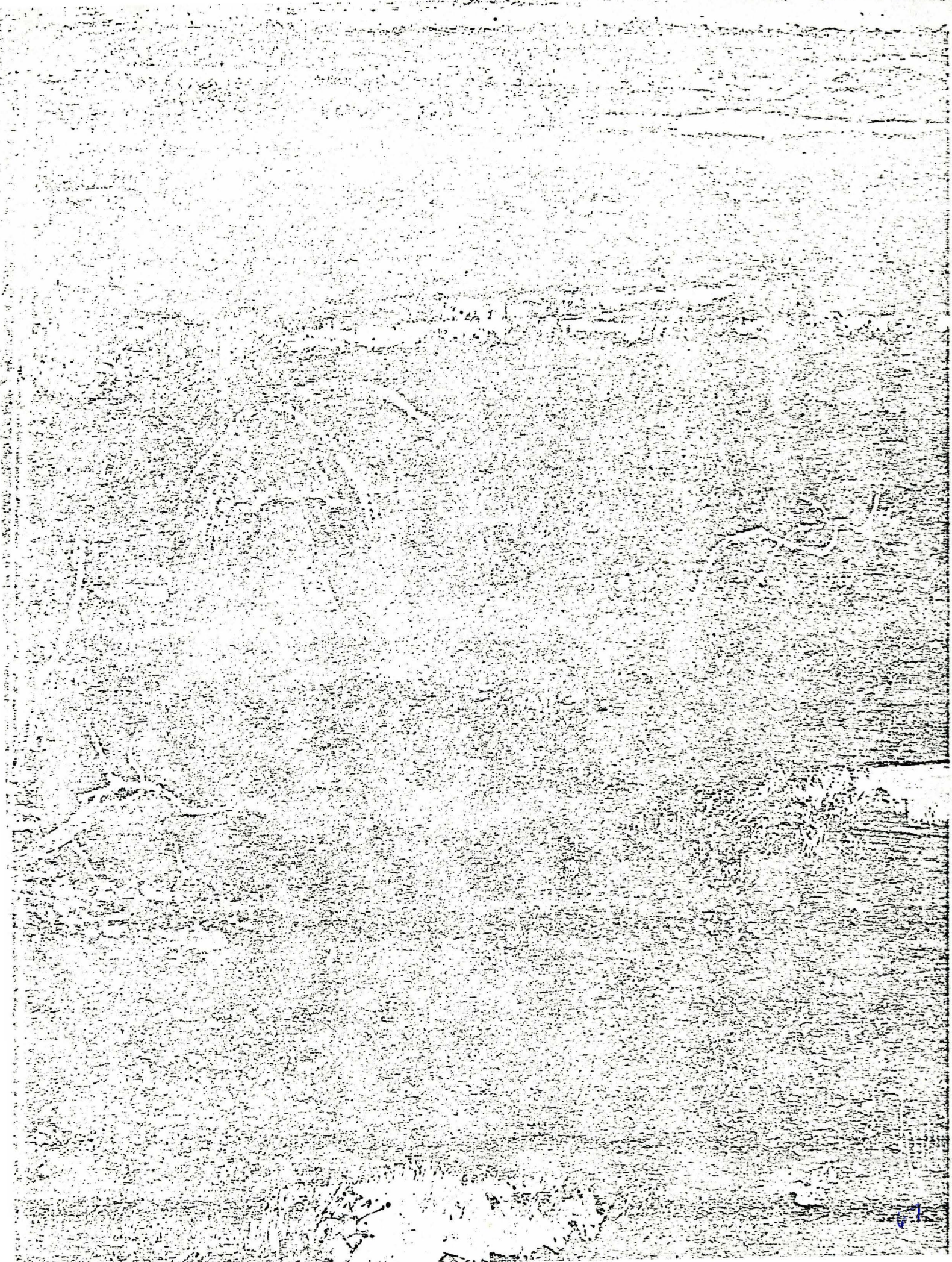
Another bit of historical information

James Walker's 1877 painting depicts Spanish-American vaqueros roping a grizzly. These colonial California cowboys would drag the bear back to their ranch to pit it against bulls in the public arena. Overleaf: A modern grizzly portrait by noted American wildlife artist Bob Kuhn.



James Walker painting courtesy the Denver Art Museum. Bob Kuhn painting (following page) from the collection of William J. Walker Jr.







Above: Courtesy the Bancroft Library. Below: The Thomas Gilcrease Institute of American History and Art, Tulsa, Oklahoma



important to recent developments is the fact that shortly after the national park was opened, a number of garbage pits were established. Yellowstone bears soon learned that these open pits contained edibles, and generation after generation congregated and fed at the garbage dumps. During the 1920s watching grizzlies sort through garbage was one of the great public attractions, one which the National Park Service encouraged visitors to enjoy. Later, for esthetic reasons and because of the risk of injury, tourists were excluded from garbage disposal areas. But until 1971, Yellowstone grizzlies remained garbage addicts.

WITH THE INTENT of learning more about the status and biology of the grizzly, an ambitious study was launched in Yellowstone in 1959. The research team was headed by Frank C. Craighead Jr., professor of ecology at the State University of New York in Albany, and John J. Craighead, professor of ecology at the University of Montana in Missoula and also leader of the Montana Cooperative Wildlife Research Unit. In this latter position John Craighead is an employe of the U.S. Fish and Wildlife Service.

Since the 1930s, when they wrote a book and published articles in *National Geographic* about their experiences as teenage falconers, the Craighead twins have led active, adventurous, and publicized lives. They have been well regarded within the scientific community as field researchers and teachers, well known to the public because of popular articles, books, and television and movie productions about their activities as wildlife students, whitewater canoeists, and survival experts. Indeed, the Craigheads (other relatives also have important natural history interests and credentials) have been a glamour family within the wildlife establishment.

Western lore is rife with fanciful tales of grizzlies attacking men, but enough stories were true to maintain the bear's reputation. In a nineteenth-century lithograph, a mountain man named S. E. Hollister fights off a she-grizzly whose cubs he molested. The trapper was terribly injured but killed the bear with his knife. Another true incident that occurred during a Wyoming grizzly hunt is graphically recorded in W. R. Leigh's 1914 oil painting, "A Close Call."

The Yellowstone grizzly study represented a cooperative agreement between the National Park Service and the Craighead research team. The Park Service in a sense provided the bears and, according to John Craighead, a few thousand dollars a year of the operating costs. However, the remaining funds (well over $1,000,000 was spent on the project) and facilities were obtained elsewhere. Among other contributors were the National Science Foundation, National Geographic Society, Philco Corporation, Boone and Crockett Club, and the New York Zoological Society.

The Craighead study was a wide-ranging one concerned with age-sex ratios, reproductive and mortality rates, movement, reactions to man, hibernation, habitat relationships. A principal method of obtaining data was to trap grizzlies and mark them with tags, colored streamers, and radio transmitter collars. The Craighead team trapped and marked bears mostly in the vicinity of garbage dumps for the obvious reason that the grizzlies congregated and were most easily caught there. During an eleven-year period, 264 grizzlies were marked in one way or another. (This is a cumulative figure. At no one time were there ever 264 positively identified grizzlies in Yellowstone.) By the late 1960s the Craigheads felt they had identified about 75 percent of the grizzly population of the ecosystem, estimating that there was a total of 245 grizzlies in 1967.

Here it must be noted, because it becomes crucial to the controversy, that these figures and extrapolations were not unanimously accepted. Later, Glen F. Cole, the supervisory research biologist for Yellowstone National Park, was to object that there were 50 to 100 animals which have been referred to as a backcountry population. These were grizzlies Cole believed did not come to the garbage dumps and thus were not accounted for in the Craighead calculations. Cole reasoned that the Craigheads had marked less than 75 percent of the Yellowstone bears and that the total grizzly population for the ecosystem should be in the 300 to 350 range. His belief in the existence of the backcountry bears was based on his own observations plus those of a team of University of Colorado researchers who had been studying black bears in the Yellowstone backcountry.

This party of researchers found only four percent of the grizzlies they encountered bore the visible marks of identification by the Craigheads at the garbage dumps.

Whatever the merits of the assumptions, it was felt by the Craighead project personnel that if more bears would be identified and their population estimates would become increasingly accurate. However, in 1967 a series of events combined to lead to the acrimonious termination of the study.

In August 1967, on the same night but in widely separated localities of Glacier National Park, two different grizzlies attacked and killed young women. The two deaths became an immediate public sensation, and the National Park Service was severely criticized for general management practices and specifically for the fact that one of the attacks took place near a small backcountry chalet where there was an open garbage dump. Grizzlies, presumably including the killer, regularly visited the dump—and park rangers were among the spectators who watched them. The campground in which the woman was killed was only a few hundred yards away.

Although the problem was Glacier's, repercussions were immediately felt in Yellowstone National Park, which had both grizzlies and garbage. In retrospect, the National Park Service position is that long before the Glacier tragedies—in fact since 1930—they had been closing down open garbage pits and in time would have eliminated the dumps altogether. Despite bureaucratic assurances that everything was proceeding on schedule, both logic and gossip have it that the Glacier killings put considerable pressure on Yellowstone officials to do something quickly about their garbage-eating grizzlies.

Coincidentally, only a few weeks separated the Glacier deaths and the submission by the Craigheads of the preliminary report on their grizzly study. The Craighead paper included some of the data they had collected but noted that much of the information remained to be analyzed and would in time appear in other reports and scientific publications. Additionally, their report included a series of recommendations to the National Park Service on grizzly bear management in Yellowstone. The crucial ones had to do with the bears and garbage.

For esthetic reasons, for the welfare of



A detail from a Charles M. Russell painting, "Death Battle of a Buffalo and Grizzly Bear." Russell based this 1902 work on an account witnessed by an early Montanan who led a wagon train across the plains in 1877.

the grizzlies, and to reduce the possibility of human injury, the Craigheads said they favored eventual closing of the Yellowstone garbage pits. However, they emphatically warned that this should be a gradual process, with garbage feeding being eliminated over a ten-year period. The Craigheads viewed the Yellowstone system, esthetics aside, as a good one for segregating bears and humans—by gathering the bears at dumps well removed from tourist traffic or campgrounds. To shut down the dumps abruptly might cause the garbage-habituated bears to disperse erratically, the Craigheads predicted. Very likely the bears would move toward and into the campgrounds hunting for scraps. This would increase the risk of people being hurt by bears. Also, if there were more bears around campgrounds, park rangers would be forced to kill or remove more of them to protect visitors. Thus the Craigheads suggested that abrupt closing of the garbage pits would be bad for both people and grizzlies.

The reaction of National Park Service officials to the Craigheads' report might fairly be characterized as testy. Memos flew back and forth between Yellowstone and Washington suggesting that the Craigheads were off base by offering recommendations before they had published their data: that a gradual closing of the dumps would simply result in more and more bears gathering around smaller and smaller food supplies; that the Craigheads should find out what official policy was before making recommendations and then keep their recommendations within policy "parameters."

In the end the National Park Service in effect rejected the phase-out-the-garbage recommendations of its own consultants. In 1968 and 1969 the amount of garbage dumped in the pits was reduced and

efforts were made to separate edible from nonedible refuse. At the same time, new disposal systems and facilities were installed and a major effort was made to keep campgrounds clear of garbage. Then, in 1970 and 1971, all the remaining garbage dumps were closed and the bears put on a "cold turkey" program.

WHAT HAPPENED, at least initially, made the Craigheads look as good as prophets. The grizzlies did disperse and did appear to head toward campgrounds. According to Craighead tallies, about six bears a year became campground habitués during the 1959–68 period. During the next three years, 23 grizzlies a year became regular campground visitors. During the same period 30 individual grizzlies were captured in and removed from campgrounds by National Park Service employes, while during the preceding nine years only 57 animals had to be so handled.

There was also a considerable increase in man-caused mortality among the grizzlies. During the 1959–67 period an average of 18.9 bears a year were removed from the Yellowstone ecosystem, including those taken by hunters and predator control agents outside park boundaries. In the 1968–73 period, 31.5 grizzlies a year were removed from the ecosystem. The major reason was increased bear removal within Yellowstone National Park itself. From 1968 through 1972, 33 grizzlies were shot in the park in "control" actions, seven were killed by vehicles, nine were taken to zoos, nine were killed by drug overdoses. This latter cause of bear mortality is a positive matter. Protectionists have cited these figures to indicate that Park Service agents are inexperienced, callous in their handling of trapped and drugged bears. However, in fairness it should be noted that ten grizzlies died during the Craighead research period from overdoses of drugs as the team was "developing and improving" immobilization techniques.) Undisputably, the National Park Service had more bear troubles during (and the assumption is because of) the garbage elimination period. However, it is unclear whether park visitors had more trouble with bears. The Craigheads' records show that from 1968 through 1970 [illegible] persons were injured in Yellowstone by grizzlies. They say this rate of injury, [illegible] per year, was double the rate during the preceding nine-year period. On the other hand, Glen Cole, the Yellowstone biologist, has data which shows that in the same period there were eleven bear injuries for a 3.66 rate—but that this was about the same as during the 1959-67 period, in which there were 30 grizzly-related injuries, not 15 as the Craigheads claim. As with so many other issues in the Great Grizzly Controversy, there is no way to determine where the truth lies.

It is, however, a matter of record that in 1972 a grizzly killed a camper in Yellowstone. (There had been two fatal bear attacks previously, both more than fifty years earlier.) The victim was a young Alabamian, Harry Walker, whose parents sued the National Park Service in U.S. District Court in California. The Park Service claimed Walker was illegally camped and had been careless with his garbage, but in March 1975 Judge A. Andrew Hauk found for the plaintiffs and issued a stinging rebuke of several park management practices, specifically citing prior predictions by the Craigheads that the abrupt closing of the garbage dumps would increase the danger of grizzly attacks on visitors. The court ordered the National Park Service to pay $87,417.67 in damages to Walker's heirs.

Long before this legal confrontation, the relationship between the Craigheads and the National Park Service had deteriorated badly. The researchers stayed in the park after the new garbage policy went into effect but remained critical of it. In 1970 the Park Service offered the Craigheads a new cooperative agreement. However, according to the Craigheads, it was so festooned with restrictions on their research activities, their freedom to publish and comment independently, that they rejected it. "I showed that agreement to some of my professional colleagues at the University of Montana," recalls John Craighead. "They said, 'John, if you accept that you can no longer call yourself a scientist.' "

The Craigheads and their associates left Yellowstone National Park for good in the spring of 1971. Their equipment and facility were removed. Also, as National Park Service employes picked up grizzlies to transport to backcountry areas (between 1970 and 1973 there were 125 such actions) the identifying markers affixed by the Craigheads were removed. Since 1971 the only grizzly bear data coming from Yellowstone has been issued by Park Service sources.

BUT THE EXIT of the Craigheads from the national park did not end and, if anything, hotted up the Great Grizzly Controversy, as a summary of current opposing views indicates:

The Craigheads: "A Population Analysis of the Yellowstone Grizzly Bears" by the Craigheads and their colleague Joel R. Varney was published in 1974 as Bulletin 40 of the School of Forestry, University of Montana. The thrust of the highly technical report is that since 1968 the rates of man-induced and natural mortality among grizzlies in the Yellowstone ecosystem have exceeded the reproductive rate. Therefore the bear population has declined steadily. The Craigheads state that according to the most probable estimates there were 183 grizzlies in the ecosystem in 1971, 152 in 1972, 139 in 1973, and 136 in 1974. The most optimistic estimate, according to the Craighead statistical models, is that there were 233 bears in 1974; the most pessimistic estimate puts the grizzly population at 82 for 1974. In all three models the bear population is declining—and unless conditions are somehow altered the curve will reach the zero mark around the end of the century.

Assuming the natural mortality rate will remain relatively constant, the Craigheads suggest that "an increase in the reproductive rate or a further reduction of man-caused mortalities must occur before the population will stabilize." The Craigheads believe the best bet is to reduce man-caused mortality principally by restricting both hunting and control activities. "If state and federal agencies wish to pursue a fail-safe management for the grizzly, we believe they should base their hunting and control mortality allowances on this conservative estimate for the population level." (The conservative estimate is predicated on a 1974 population of 82 bears and a reproductive rate of .544.)

John Craighead comments that such fail-safe management involves restrictions which will insure that less than ten bears a year are removed from the Yellowstone ecosystem, at least until the population has stabilized and begun to increase. According to the records of the Montana Fish and Game Commission, the average annual mortality rate for grizzlies in the Yellowstone ecosystem was 32.8 for the 1970–74 period. Hunting accounted for 27 percent of these deaths and nonhunting losses for the remainder.

The National Park Service: Based mostly on the investigations and reports of Glen Cole, the National Park Service has rejected many of the Craigheads' premises and conclusions. Cole believes that because of the existence of a population of backcountry grizzlies, Yellowstone bears were far more numerous in 1967 than the Craigheads estimated and thus the base for subsequent estimates should be raised. The Park Service admits that during and immediately after the dump-closing period the increased need for control actions increased bear mortality rates. However, this was a temporary situation, and since 1972 the need for bear control has been sharply reduced. According to Cole no bears were removed from Yellowstone National Park in 1973 and only two were taken out in 1974.

Finally, Cole claims the grizzly population has recovered nicely from the high mortality period of the early 1970s. He bases this claim largely on a continuing compilation of sightings made by himself and other observers whom he characterizes as being highly qualified members of the Yellowstone staff. He believes these observations give him a good census base from which he is entitled to make sound population estimates. He feels there was a population of 250 to 300 grizzlies in the Yellowstone ecosystem in 1968, that this may have dipped to about 250 bears in 1970-71, but then their numbers began to increase. Cole's 1974 estimate for the grizzly population in the entire ecosystem is 319 to 364 animals.

Cole attributes the population rise to the fact that the grizzlies compensated for the garbage pit closures in several beneficial ways. Again based on reports from his cadre of in-park observers, Cole believes that more females are now bearing cubs than formerly, though the rate of cubs per female is less than previously reported. Also, he feels more cubs are surviving to yearling status. He speculates that when the bears were heavily concentrated around garbage dumps, intraspecific competition reduced the number of young females who bred and bore cubs and also worked a hardship on cubs. Now, without the attraction of garbage dumps, Cole believes the bears are more naturally and beneficially distributed throughout the ecosystem.

"I feel the grizzly population in the park is now viable," said Cole in October 1975. "I don't think the numbers game is that important, but I believe we have or soon will reach the carrying capacity of the park for grizzlies."

As to how the carrying capacity of the park can be recognized if and when it occurs, Cole says, "We should begin seeing the emigration of young animals and older ones past their prime, socially subordinate individuals, from the park into adjacent areas of the ecosystem. When this happens I see no reason why moderate hunting outside the park should be biologically objectionable."

The Craigheads' rebuttal: There are many specific points where the Craigheads are in direct disagreement with Cole's data—reproductive rates, compensatory capabilities, the existence of an original backcountry population, human injury rates from bears, etc. However, there are two fundamental objections. The first is that since 1971 no independent observers have been able to verify the data collected within Yellowstone. Secondly, Cole's case rests on sight observations—by individuals of varying qualifications—of unmarked bears which the Craigheads feel cannot be positively and consistently identified.

"Occasionally," says John Craighead, "there is a bear with unique physical characteristics that can be unmistakably identified in the field. This is the exception rather than the rule. Even very good, experienced observers can make mistakes in such simple things as distinguishing between a large, early cub and a small yearling. When it comes to making more difficult distinctions about the age, sex, and identity of animals, this is usually impossible in the field unless the animals are visibly marked. The park population estimates are nothing more than elaborate guesswork."

The Craigheads spell out this fundamental objection in the conclusion of their 1974 publication. "Without color-marked or instrumented animals, it will be extremely difficult, if not impossible, to obtain accurate annual counts and sex and age designations of the grizzly bears in the Yellowstone ecosystem. We are convinced that more accurate population estimates and trends can be obtained from simulations with the model than from field censusing of unmarked animals."

The National Park Service rebuttal: Glen Cole says his data is more recent than the Craigheads' and that their computer models are too rigid, do not make sufficient allowance for the adaptability of the bears, their compensatory characteristics. He vigorously defends the accuracy of his accumulated field observations. "I have gone over those reports very critically, thrown out and discounted any which were doubtful. I am convinced that the remaining observations provide acceptable data for making population estimates, projecting trends."

As to the matter of color-marking with visible tags, Cole says those affixed by the Craigheads were removed because they offended visitors, especially photographers. "If the park were simply a research station, then perhaps as a biologist I would want some of the bears visibly marked. However, there are other important considerations besides research in a national park." Among considerations which make marking inadvisable, Cole mentions that handling grizzlies is dangerous for the handler and potentially dangerous for the bear because of overdoses of immobilizing drugs; that although there is no data supporting the theory, it is possible that once an animal is trapped, handled, and marked, he will subsequently display more aggressive behavior toward humans in general.

WITH THE TWO PRINCIPAL sources of grizzly data and theories in such profound disagreement, other individuals and agencies were inevitably drawn into the Great Grizzly Controversy—either as advocates of one position or the other or in attempts to reconcile the differences. Professional protectionists jumped in on the side of the Craigheads (which is hardly surprising, since if nothing needs protection there is no work for protectionists). Among the most active and belligerent has been Lewis Regenstein, an ex-CIA employe who is now the man in Washington for the Fund for Animals. At various times Regenstein has characterized the National Park Service grizzly management policy as being "a wholesale slaughter of the animals with the objective of largely exterminating them in Yellowstone" and as "brutal and unscientific." He accused the Park Service of mounting a "vicious smear campaign" against the Craigheads because "they refused to be muzzled by the Park Service bureaucracy." Regenstein was also instrumental in bringing or threatening several legal actions aimed at making the

Interior Department either explain or change its grizzly management policies.

With Regenstein and others shouting about starving and expiring bears, corruption and coverups in the bureaucracy, the dispute became a juicy public one. Columnist Jack Anderson picked up on the grizzly controversy as did *The New York Times*, *Washington Post*, and the wire services. Senators and representatives began making inquiries. All of this put a lot of heat on upper-level politicians in Interior to do something or at least look like they were doing something about the controversy.

In such situations a traditional fail-safe move for bureaucrats is to summon fact-finding committees, study groups, blue-ribbon panels—which if nothing else tends to provide new targets for critics. In keeping with this tradition, then Secretary of Interior Rogers C. B. Morton requested the National Academy of Sciences to provide a contingent of impartial experts to look into the who-struck-Johns of the grizzly dispute. The NAS study committee was headed by Ian McTaggart Cowan, dean of graduate studies at the University of British Columbia. In 1973 the six-man group began to pore over the published literature, seek out private opinions, and interview concerned parties. Much of this collected data was made public in a massive report issued in July 1974.

In several crucial areas the National Academy of Sciences study was openly critical of the National Park Service. It decried the fact that "restrictions on studies of the grizzly [have] virtually excluded other agencies" from the park. It also repeated allegations that not all grizzly control actions had been recorded by the park. The committee made no value judgment on this serious matter but commented: "If this allegation is true, such failure jeopardizes rational research and management programs... within the national parks."

The committee did not find there was



John Woodhouse Audubon, one of two sons of John James Audubon, painted this stylized pair of grizzlies for THE VIVIPAROUS QUADRUPEDS OF NORTH AMERICA. The first hand-tinted edition appeared in 1848.

Courtesy Amon Carter Museum of Western Art, Fort Worth, Texas



"Crippled but Still Coming" is the title of this 1913 oil painting by Charles M. Russell of a wounded grizzly charging a cowboy whose horses are bolting. The bear's attacks on men were rarely capricious; most incidents were provoked.

sufficient data to support large claims about a sizable backcountry grizzly population and generally was more receptive to the base population estimates of the Craigheads than to those of the National Park Service. In the fundamental matter of the quality of observations, the experts came down hard on Glen Cole: "The observations summarized derive from many different types of observers . . . do not represent any constant or reported number of observers or hours in the field or miles traveled. Such a table has little if any meaning, since there is no basis for comparisons of results from year to year . . . Estimates of bear numbers for 1971 to 1973 are based on hypothetical calculations, and there are no data to verify them."

While the committee referred to the Craigheads' studies as "the most intensive and sustained ever conducted on any grizzly population," it by no means judged the Craigheads the winner in the debate. Just as Glen Cole claims, the committee concluded that "the rigid characteristics of the model [for population estimates] seem, a priori, to be unrealistic, because no compensatory mechanisms are built into the model."



Overall, the National Academy of Sciences committee found there was not enough clear information about the grizzly to either determine its status or to pass judgment on the effectiveness of management programs. The effect of its report was to certify that there was indeed a grizzly bear controversy. By 1974 this scarcely qualified as news.

ALSO IN 1973, largely at the behest of the Interior Department, an Interagency Grizzly Bear Study Team was created to conduct and coordinate research in the Yellowstone ecosystem. The team is composed of representatives from the National Park Service, U.S. Fish and Wildlife Service, U.S. Forest Service, and the Montana, Idaho, and Wyoming fish and game departments. A University of Idaho professor, Richard Knight, was hired by the National Park Service to act as the team leader. Currently the team's annual budget is $200,000.

Not surprisingly, the Interagency Grizzly Bear Study Team had some difficulties getting started and was not operative until 1974. Though everyone involved favored the concept of cooperation, there were long-standing rivalries and conflicts of interest. The three federal agencies often have been at odds in wildlife matters. Also, one of the practical facts of American wildlife management is the suspicion, if not hostility, that exists between state and federal operatives. The states have a traditional fear that the feds are plotting to take over *their* animals—especially through the endangered species program. Balanced against this is the tendency of federal game managers to feel that perhaps they *should* take over because state wildlife agencies are responsive only to hunting interests.

Also, though it has been touted as a sort of superagency, the interagency team does not have an entirely free hand. For example, it must get permission to operate within Yellowstone National Park. "Our major request so far was to put radio collars on two bears in the park," says Knight. "Permission was granted, so no problem. If we want to do more we will take that up when the time comes. But we do have to ask."

The U.S. Forest Service, however, turned down a request from the team to put radio collars on bears in a wilderness area in the Yellowstone ecosystem. Also, though it was recommended in the National Academy of Sciences study, the Forest Service has not yet substantially reduced grazing permits to ranchers in the ecosystem. The rationale behind this suggestion is that if there is less stock there is less likelihood of stock being killed by grizzlies and of grizzlies in turn being killed as stock predators.

Administrative matters aside, the major problem for the Interagency Grizzly Bear Study Team has been the same that others have had to cope with—the difficulties of conducting a field study in this rugged, mountainous area. This past summer, for example, the team had the equipment and manpower to put radio collars on at least 20 grizzlies, but by fall had working collars on only five bears. "It is not simply a matter of picking up where the Craigheads left off with their radio telemetry work," says Knight. "They were working around the garbage dumps where the bears were reasonably accessible. All the dumps in the park and all but one outside the park are now closed. We don't have that concentration. Our problem is basic—a lack of bears.

"I think the Park Service missed the boat so far as research is concerned when the dumps were closed," Knight continued. "If they had put collars on some of those bears we might have a pretty good idea of how they dispersed, how the population is distributed. When I first started with this project it seemed reasonable that there might be a backcountry population, separate from the animals that had used the dumps. This still seems reasonable, but the Craighead figures are looking better to me."

Otherwise, Knight has been doing a lot of flying, trying to locate grizzlies from the air. It has been frustrating work, not only because he has found it difficult to identify, much less age and sex, individual grizzlies from a plane, but also because this past year was bad for all bear-watchers. By late fall, the sightings of both the interagency team and those made by observers within Yellowstone National Park had been far fewer than those made during an equivalent period in 1974.

"It is possible that there are many fewer grizzlies to be seen," says Knight, "but my opinion is that the sightings are down because it has been much harder to see bears this year. A crusted snow stayed on the ground well into the spring and probably kept them in the high country, where they are less often observed. Foliage is lush this year, and there are a lot of berries. The animals may well be dispersed over an exceptionally wide area and be shielded from sight in heavy cover."

Knight feels the Interagency Grizzly Bear Study Team has not identified enough grizzlies to make new and original contributions regarding the bear's status. However, working mostly with previously collected data, the team's first annual report for 1974, issued in March 1975, suggested there might be anywhere between 237 and 540 grizzlies in the Yellowstone ecosystem.

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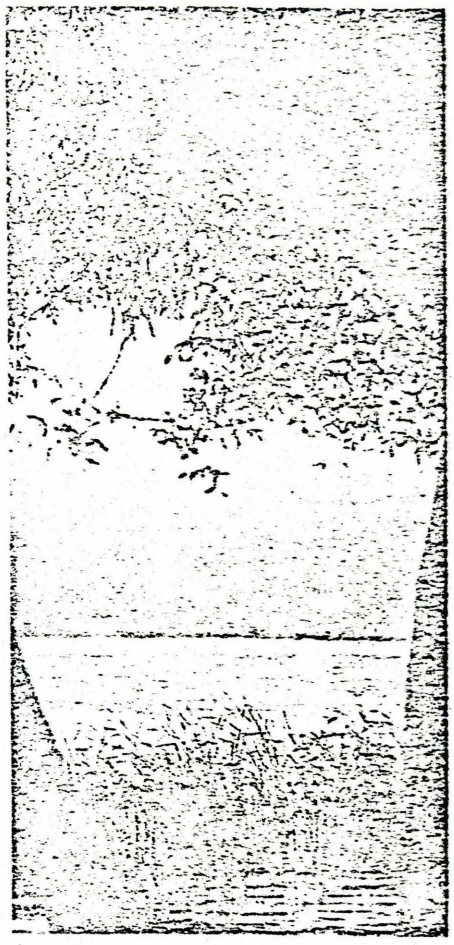


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MEANWHILE, the U.S. Fish and Wildlife Service has become independently involved in the Great Grizzly Controversy. Through the years its agents killed a good many grizzlies in connection with predator control activities. However, in 1966 the Fish and Wildlife Service declared the grizzly to be officially endangered. Two years later the species was removed from the endangered list. Spokesmen now offer several explanations for these moves. First, it is said that the status of the grizzly was not well researched in 1966. Secondly, at the time there was no provision in the law for regional classification: a species was either endangered everywhere or nowhere so far as the law was concerned. The problem was that the grizzly seemed plentiful in Alaska, and Alaskans objected to the restrictions imposed by the endangered classification. (There is speculation about another possible reason: It would not have looked good for one Interior agency, the National Park Service, to start killing a large number of grizzlies in Yellowstone as part of a control action, while a sister group, the Fish and Wildlife Service, was insisting the animal was in danger of extinction.)

After 1968 the U.S. Fish and Wildlife Service was very quiet about grizzlies. Even though one of its senior scientists, John Craighead, was in the midst of the controversy, the bureau gave the impression of a pacific man caught in a barroom brawl who hopes to go unnoticed by slouching down in a back booth.

However, a variety of outside pressures finally smoked the Fish and Wildlife Service out of its neutral position. In 1974 the agency initiated a review of the grizzly's status. No new research was undertaken, but existing data was pawed through once again, and in July 1975 the grizzly was listed as threatened in the lower 48 states. (The Endangered Species Act of 1973 permits regional classifications.) As a result, federal and state agencies worked out an agreement concerning bear hunting. In the Selway–Bitterroot ecosystem, no grizzlies may be legally killed except in defense of human life. In the Yellowstone ecosystem (outside the national park), hunting is now banned but bears may be killed in defense of human life or when they are certified as predators on livestock. This prohibition of grizzly hunting in the two areas was more a symbolic federal gesture than it was a change in management



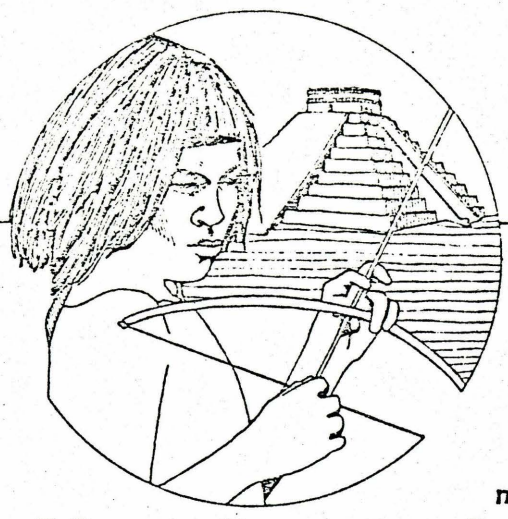
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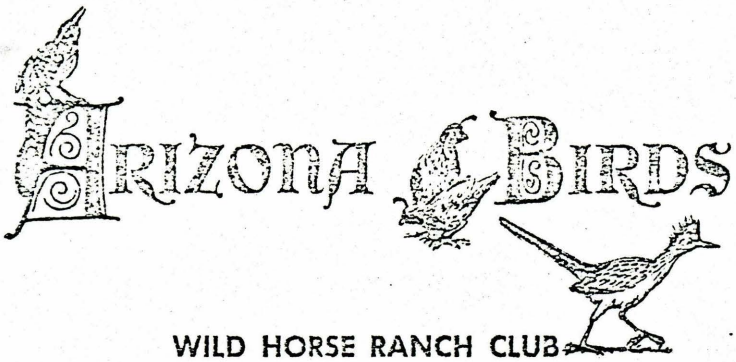
practices. Idaho, in which most of the Selway-Bitterroot area lies, has not allowed grizzly hunting since 1947; Montana halted sport hunting within the Yellowstone ecosystem in 1974, and Wyoming in 1975.

To the north, in the Bob Marshall ecosystem, the grizzly's new status was translated into a different kind of management program. It was decided that grizzlies were more numerous here. Clifford J. Martinka, the Glacier National Park research biologist, estimates that there is a stable population of about 200 bears within the park. While such estimates are backed by even less data than is available in Yellowstone, a ballpark figure of 500 to 650 grizzlies is often used for the entire northern population. Whatever the total, it was believed there were enough grizzlies so that 25 bears could be removed each year. Sport hunting is permitted, but the hunting kill is added to other grizzly kills and the total must remain under 26 animals. For example, if prior to the hunting season two bears have been "controlled" in Glacier park, two killed as stock predators outside the park, and one killed on a road, then hunters may kill only 20 bears.

Kenneth R. Greer, a Montana Fish and Game Department biologist and that state's representative on the Interagency Grizzly Bear Study Team, provides some background on how the 25-bear quota was established. Since 1967 Greer has been keeping painstaking records of grizzly mortality from whatever cause. Greer says: "Schreiner [Keith M. Schreiner, an associate director of the U.S. Fish and Wildlife Service] came out to look over the situation. My records show that the hunter kill in the northern ecosystem averaged 29 bears a year between 1967 and 1973. He said it might be safer, look better, to cut that back a little, so the figure of 25 was suggested."

So much for the science of wildlife management.

Last year was the first under the 25-bear quota, and hunters had 20 bears to shoot for, five animals previously being killed. Greer considers the system workable and said he thought state agents could stop the hunt after the twentieth and before the twenty-first bear was killed. "We don't plan to let it go down to the wire," he told me in October. "When we begin to approach the limit we can begin to shut things down. Hunters have 48 hours in which to report kills, and that



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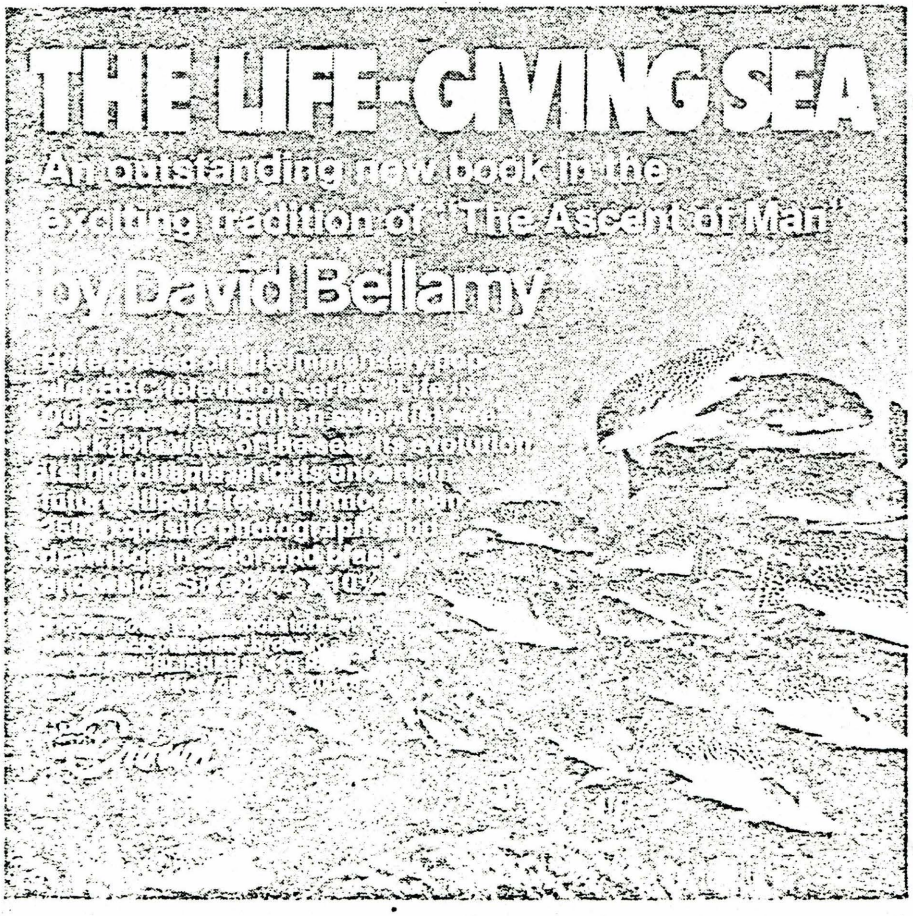
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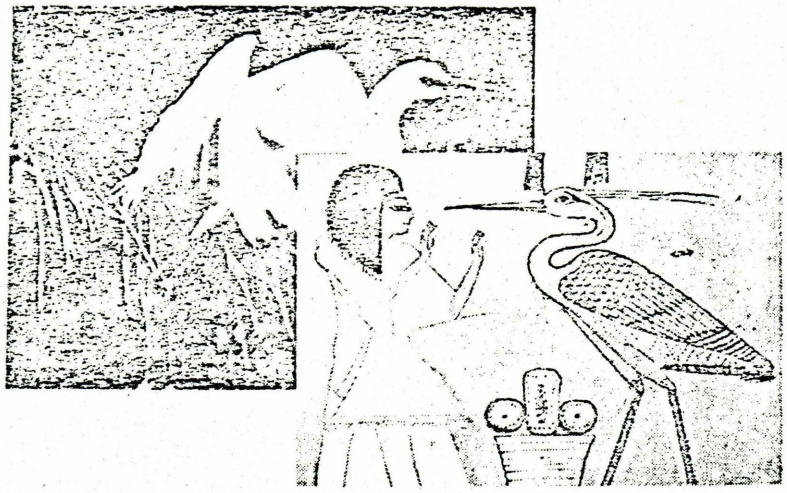
is enough time for us to get the word out if we have reached or are near the limit."

Montana game officials feel there are enough bears in the north so that they can continue to permit hunting. They cite the case of Idaho, where bear hunting has been prohibited since 1947 but the grizzly population remains small and is very likely still declining. This, says the Montana Fish and Game Department in a September 1975 statement, proves that a hunting ban didn't help the grizzly in Idaho (and by inference would not help the species in Montana). Of course this is simply another theory. It is just as likely that what the Idaho experience proves is that grizzlies had been reduced below the recovery point prior to 1947. More clearly, such statements indicate that Montana would like to maintain an open season on grizzlies as long as possible.

THIS IS HOW THINGS STAND at the moment among the *crème de la crème* of American grizzly students and would-be grizzly managers. Working from essentially the same raw data, they have arrived at profoundly different and often contradictory judgments and policies.

In these circumstances there is a strong temptation to retreat into cynicism, to conclude that self-interest rather than hard facts has largely determined the various positions. Thus we find the National Park Service proving that there is a sufficiency of Yellowstone grizzlies because that is just what it needs—sufficient bears to support a series of arbitrary administrative policies. (It would violate everything we know about bureaucratic behavior for the National Park Service to announce: "We have reviewed the record and now conclude that closing the garbage pits set off a chain of events which jeopardizes the survival of the grizzly and very possibly has increased the risk of humans being injured by bears.")

In the same vein the Montana Fish and Game Department has an interest in continued grizzly hunting, and the U.S. Forest Service has an interest in stock grazing, clearcutting of timber, and recreational development. A low estimate of the grizzly populations would be an embarrassment to these policies. The U.S. Fish and Wildlife Service finds fewer bears, few enough to call the grizzly a threatened species but not so few as to list it as an endangered species. The



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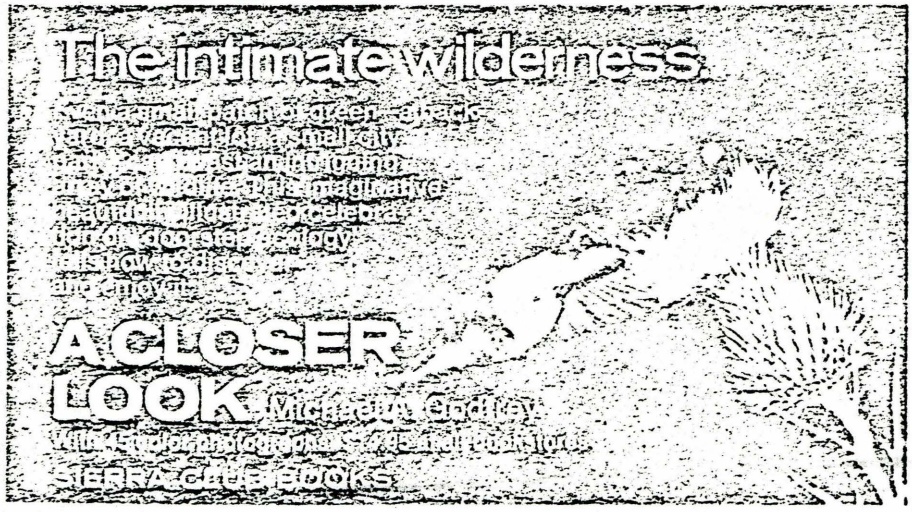
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Interagency Grizzly Bear Study Team, a creature of all these interests, is in the middle and makes estimates which do not offend anyone. The grizzly has been in bad trouble since 1970, say the Craigheads and their associates, and that is what the Craighead computers prove.

Consciously or not, we all are susceptible to self-interest. This is true of individuals and it is particularly true of bureaucracies, whose guiding principle is always and everywhere a negative one—don't rock the boat. Therefore, in such a controversy, in the main a bureaucratic one, the manifestations of self-interest are worth keeping in mind.

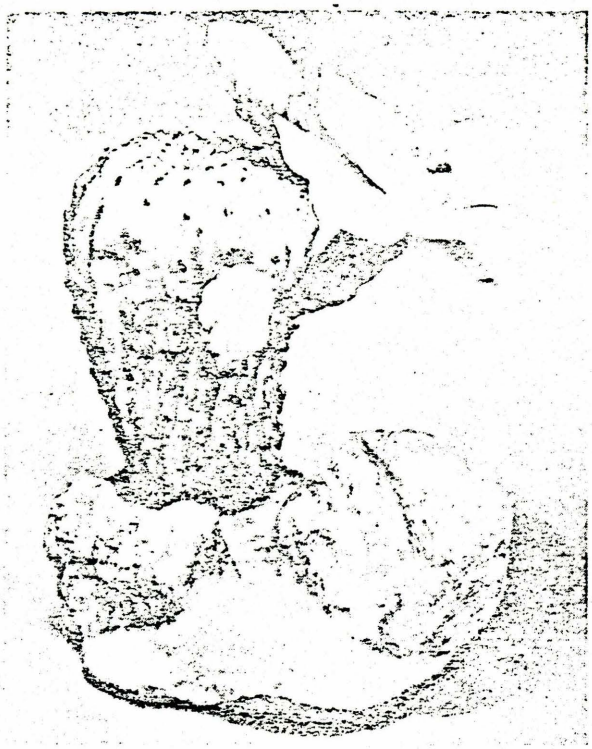
However, cynicism is not enough. One cannot deal with John Craighead, Kenneth Greer, Richard Knight, and Glen Cole and come away with the feeling that these are deceitful men, timid about their reputations and careers. Rather the impression is of decent, intelligent men who care passionately and professionally about the grizzly bear.

In this situation—conscientious men in violent disagreement—a fantasy scenario suggests itself. The Craigheads, Cole, Greer, Knight, et al, are manning a gigantic seine long enough to sweep through the entire Yellowstone ecosystem and strong enough to enmesh every grizzly living there. At the end of the sweep the men gather to look at their catch. It is a personal feeling that they would all agree on the count and those who had guessed wrong would profusely apologize to those who had been right.

Obviously there is no such device or technique. A more possible, though not necessarily probable, conclusion to the Great Grizzly Controversy is that someday it will become apparent that nobody has seen any grizzlies for a long time. Then agreement will be reached, apologies made, after it is too late to concern or benefit the grizzly.

IN THE MEANTIME, what evidence exists on the status of the grizzly bear in the lower 48 states remains essentially circumstantial and open to any interpretation. But even if there is no way to make a firm value judgment on the merits of the various opinions (there are already too many opinions stewing in this particular pot), there may be room for some reflections on the relationships between men and grizzlies—a matter which has been obscured in all the confusion about

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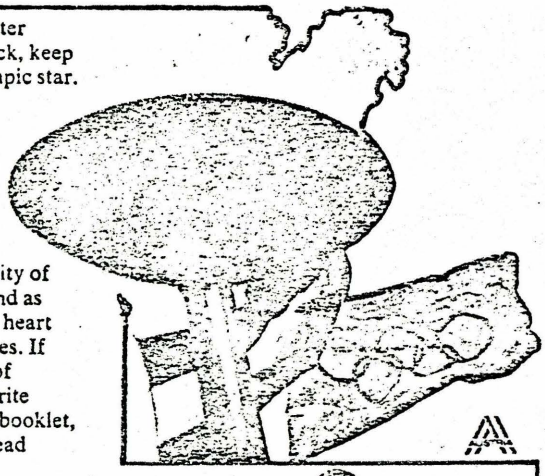
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which men are right about which grizzlies.

Lewis Regenstein, the vocal Washington operative in the controversy, has written that the elimination of the grizzly from most of its original range, the drastic reduction of its numbers, was the result of "remorseless persecution." This is standard protectionist rhetoric, implying that what happened to the grizzly was like what happened to the Jews in Nazi Germany—that it was a mindless exercise of spite and sadism. The rhetoric may be standard but it is nevertheless mischievous. There were substantial reasons, flowing from the nature of the two species, for what happened.

As another ball-park guess, it is sometimes said that there were 10,000 grizzlies in northern California at the time Americans took that acreage from the Mexicans. Whatever the true figure, the point is this: You cannot have present-day San Francisco and Sacramento and 10,000 grizzlies, any more than you can have Omaha, Nebraska, and 30,000,000 free-ranging buffalo. It is not so much that grizzlies would chop up the citizens as it is that an economy, social organization, and countryside that support San Francisco and Sacramento will not support 10,000 grizzlies—or, indeed, *any* grizzlies. It is presently fashionable in many circles to be peevish, Miniver Cheevish about this reality, to yearn for the good old "natural" days. The fact is that all of us, biologists, conservationists, protectionists, hunters, the citizenry at large, have opted for and continue to opt for San Francisco and Sacramento.

The grizzly is a magnificent, impressive animal. Also it has become a symbolic one, a reminder of what our West and we ourselves once were—but are no longer. The general feeling seems to be that it is desirable to keep a few grizzlies in the lower 48 states for symbolic and esthetic reasons, but that the tolerable number of grizzlies is very small. This is an observable truth. (In all of this debate it should be honestly admitted that the genetic, ecological, natural future of the species lies in Canada and Alaska.)

Much the same truth applies to grizzly habitat. It is possible that clearcutting, road-building, ranching, mining, oil drilling, and recreational development will one day dangerously reduce the amount of country suitable for bears. At the moment, however, there is a great deal of good grizzly country remaining in

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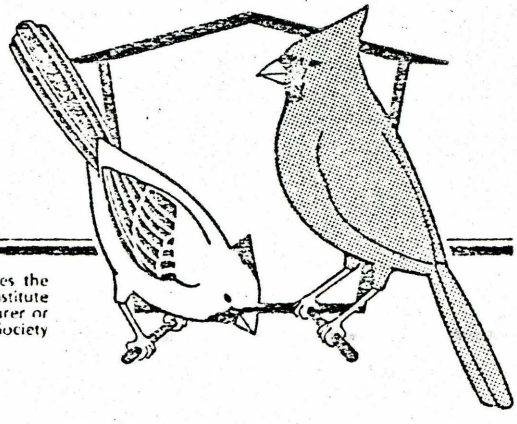
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the West. Indeed, much grizzly habitat in Arizona, New Mexico, Colorado, Utah, Idaho, Washington, and California has no bears in it. Some have suggested that grizzlies could be restocked in portions of their former range. Perhaps they can and should be, but no steps have been taken, largely because local residents and game managers have shown no eagerness to take part in such experiments. Dedicated protectionists may feel this reluctance is reactionary and shortsighted, but they are not the people who have backyards to which grizzlies could be transplanted. Just as we can tolerate only a small number of grizzlies, we can tolerate the animals in only a few places.

As if to underline this point, during the summer of 1975 five people were injured in grizzly attacks in Glacier National Park and two others were injured by grizzlies in Yellowstone National Park. Three of the injuries occurred in the same incident. A father and two children were hiking a trail in Glacier, made a turn, and came upon a grizzly. They had no food. The bear had no cubs. The hikers did not try to harass the animal but the bear charged and mauled them. Unquestionably he could have killed them. The grizzly has never been identified and presumably is still at large.

Cliff Martinka, the Glacier research biologist, says he has lain awake nights brooding about the incident. "I used to think that with prudent management we could largely eliminate bear–man incidents. Now I'm not so sure. I'm beginning to believe the grizzlies have reached the point where they have encountered so many people that it has affected their collective behavior. They may be losing their shyness of man but not losing their aggressiveness. It might be they are becoming behaviorally more like black bears, which now are very bold around people. If grizzlies get as bold as blacks it could be critical because they are altogether a more aggressive and dangerous animal."

To segregate grizzlies and people, officials in both Glacier and Yellowstone national parks have instituted bear monitoring and human traffic control systems. Because of bear activities, visitors are now excluded from certain localities at certain times. However, as the Glacier incident illustrated, there are limits to such preventive protection. Each year the parks have more visitors to both developed and backcountry areas, and





perhaps, as Martinka intuitively feels, each year the grizzlies become more habituated to visitors.

"I think it is almost inevitable that sooner or later we will have more tragic encounters," says Martinka.

All consideration of habitat, reproductive and mortality rates, good and bad management aside, the single greatest threat to the survival of the grizzly bear in the lower 48 states is this: If one summer the 1975 Glacier incident is repeated, with the difference that three people are killed, not just mauled; if this were to happen twice in a summer, as it could; if six people were killed by grizzlies in a season in the national parks, there would be a bear pogrom. Existing game laws, behavioral excuses, scientific justification, would not stop it.

For some reason we can tolerate thousands of traffic deaths, drug overdose deaths, industrial accident deaths, deaths in brushfire wars, but we can tolerate very, very few deaths caused by wild animals. This, and the fact that the grizzly is capable of death-dealing, are also observable truths.

In the Great Grizzly Controversy, acrimonious debate about technical research and management matters has taken us as far as it can. It would be more in the public interest—and in the interest of the grizzly—if a truce could be called and efforts made to stimulate an open, formal dialogue on the relationship between men and grizzlies. Such a dialogue could profitably include all points of view, from that of fervid protectionists to convinced consumers of wildlife. Its objective should be to reach an honest agreement on how many bears we can tolerate and where they are tolerable.

Given such an agreement, the now warring technicians could set to work establishing and managing some pieces of public land as true grizzly country. In such sanctuaries (and it is by no means certain that national parks are best-suited for this purpose) it should be agreed that the grizzly is supreme, its interests more important than those of lumbermen, miners, ranchers, hunters, photographers, tourists, even researchers and bureaucrats.

We might find that we want or need only a very few such areas and very few bears. However, only under such terms and in such truly inviolable retreats do the long-term prospects of keeping any grizzlies seem very promising. ☼

809 East 83 St.
Kansas City, Mo. 64131
May 6, 1976

Dr. Frank C. Craighead, Jr.
P. O. Box 156
Moose Wyoming 83012

Dear Frank:

It was good talking to you the other night -- had been such a long time since we talked and your call perked me right up.

Then today I received my copy of the letter Zetterberg sent the Walkers about the appeal of their case. I could not resist calling out there to get the low down on the situation.

Martin came on the 'phone and answered my questions. I asked him the meaning of having the Appellate Section of the Justice Dept. do the brief on the appeal and he said the government has a looney system of passing on cases from U. S. Attorneys to the Appellate Division in this way and said here we have someone who was not even at the trial and knows little about what really went on doing the briefs for appeals. (He was sort of laughing about it -- said the brief was just not very good.)

I asked him about what this would mean to the Walkers -- how long before the thing would now be handled and the arguments heard. He said it would be at least a year from the date the Zetterberg firm got the appellant's brief unless there would be grounds for the case to be heard very early as a hardship case. He also commented that the government didn't care -- they only have to pay interest at the rate of 4% if they lose whereas all others pay 7% interest. And he said he thought the government should be at least as concerned about the average citizen as our large corporations, but apparently it is not.

I asked him the basis on which the government was appealing. He said the government was saying that they had six "experts" testify in the case whereas the Zetterberg firm had only one and that one was not enough for the judge to really make a determination. (Upon which we both laughed and I said yes and most of the government's witnesses just sat there and lied.)

He also said the government is claiming Harry Walker was contributorily negligent, that the park owed him no duty to warn him and that the park gave him the warning normally given to visitors. Also the government claims that the failure to warn him did not cause his death. Also the reason given in the government's brief that no duty was owed Harry Walker is based on that ancient Wyoming statute they brought up in the case (which Judge Hauk called a kind of crazy statute or something like that). Martin said the statute is so old, out of date and has been battered around so much it is rather meaningless by now.

The government also brought up the matter of "discretion" -- that deal where if an agency has discretion on a management matter it can't be sued. Martin said he was not worried on this one at all -- apparently Leopold's testimony scotches any such claim by the government.

Martin said the big thing about the government's brief is that the government's attorney is supposed to describe ALL the facts brought out in the case, however, only those favorable to the government are mentioned. In this connection the government's attorney quotes Cole. (Here Martin had a big laugh, mentioning how Cole had been run all around the place by Judge Hauk during his testimony.) In fact, we both laughed.)

I told him about Cole's transfer and he said that was a pretty good sign that Cole was only in Yellowstone because of Anderson.

I also talked to the Walkers last night. Unfortunately neither they nor I had received the letter from Zetterberg about the appeal when we talked. Jenny answered the 'phone and I talked to her a few minutes. She has been ill with intestinal flu or some such thing. Louise came on the 'phone and she sounded the best of all -- seemed in real good spirits. Jenny is taking a business course -- has to drive eight miles from her home to the school. It is not a university course but some kind of short course, but she hopes to learn some bookkeeping etc. that will be useful there on the farm her mother said. Then I talked to Wallace and he sounded awfully tired. He has had arthritis in his neck and shoulders and said his knees are really bad. He asked me if I had ever heard of a case dragging on as long as theirs and I told him that I had. He said it had been almost four years since it was filed and that he didn't know if he was going to be able to hold out doing the hard work on the farm much longer. I feel so sorry for him -- he has really had it awfully hard physically since Harry's death.

I gave Martin about the same news of the Walkers as above and we both had some unpleasant things to say about the unfeeling government. He said there was one thing, however, that the Walkers might get out of it in the way of satisfaction at least -- and that was that the Park Service might be forced to put the Craigheads' recommendations and some of the others into effect in managing bears. We both commented on how the Walker family feels about this -- that others should be prevented from going through what Harry did, and what his family did, through decent management of the grizzlies.

In talking to everyone I definitely got some ideas of what I want to get across in the article and some things I want to change. For instance, Martin emphasized what a fool Cole made of himself in his court testimony, particularly when questioned by Hauk. So I feel we should cover Cole's court testimony thoroughly. Additionally, I am out from under that "feeling" I had about writing on the case when Wallace Walker specifically asked me not to until we found out definitely whether the government would appeal. That has now been done and I don't have to worry about the family maybe blaming me, or what I might have written, for influencing the decision to appeal.

Hope you get some good work done while you're away. I'll call you in about a week and think I can then get this whole thing (article) headed in the right direction. I certainly appreciate Esther's offer to check me out on the testimony. Meanwhile, I wanted to let you hear as much as I have learned about the appeal.

Sincerely,

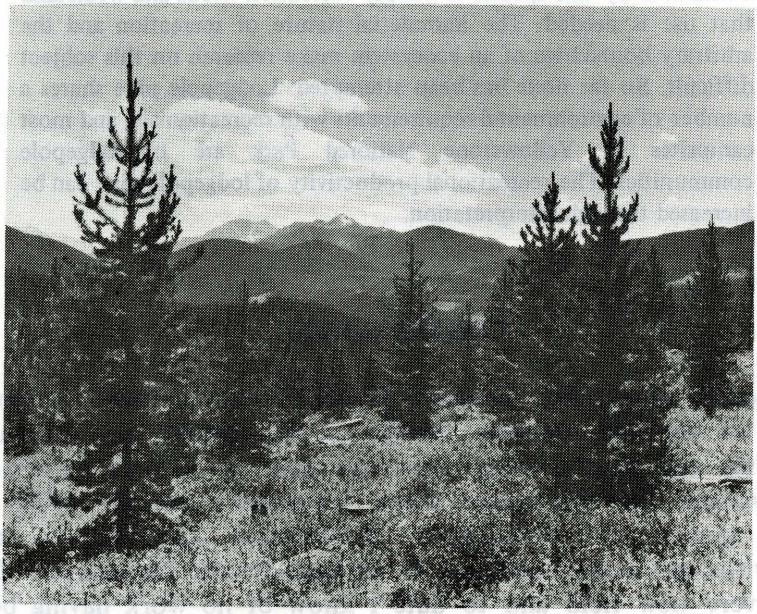
Martha

Martha Shell

Hi Esther!

Lodgepole Pine Ecosystems as Producers of Recreation

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ABSTRACT

Lodgepole pine covers a very large area of a region that sustains heavy recreational use. Information on the ability of ecosystems dominated by this species to supply recreation needs and withstand that use is needed. The immaterial nature of recreation and the arbitrary boundaries of an ecosystem make research on this subject difficult. So far none has been attempted. Lodgepole pine shares a number of environmental requirements with recreationists, and most campsites in Yellowstone National Park are in lodgepole communities. The recreational productivity of lodgepole pine can be increased through interpretation.

INTRODUCTION

Lodgepole pine (*Pinus contorta* Dougl.) covers a disproportionate part of the mountainous terrain of the central and northern Rockies and is the most abundant tree in a large variety of ecosystems. For this reason alone, information on the ability of this species to (1) produce recreational commodities and (2) withstand recreational use is of considerable importance. This is a very new field and to date I know of no work having been done in it. This paper will point out some of the pitfalls and difficulties that will be encountered in the study of the subject.

The use of our outdoor areas for recreation has steadily increased since records have been kept. The only exception was during World War II when restrictions were placed on travel and materials necessary for travel (Clawson and Knetsch 1966). This use has, for the first time, reached such proportions that an influentially large segment of our society is placing these nonmaterial "goods" above material goods in their value scales.

Ecosystems are being asked to supply us with nonmaterial "goods" on an ever-increasing scale and scope. It is thus important that we study the ability of the ecosystems to produce these commodities and the effect of these recreational uses. It is also important that the information gained from these studies be used in the management and interpretation of our ecosystems. So far recreation researchers have been more concerned with political boundaries than ecological ones (ORRRC 1962) and ecologists have not entered the recreation field, although some encouraging signs are appearing (Stankey and Lime 1973). A good review of literature in this field is beyond the scope of this paper but is badly needed.

DISCUSSION

RECREATIONAL PRODUCTIVITY

One of the major difficulties of measuring productivity of a recreational resource is its nonmaterial nature. It cannot be measured in kilograms per hectare or feet per second. It is more dependent on the condition of the participant, his emotions, education, and attitude than on any inherent feature of the resource (Clawson and Knetsch 1966). This assumes that the hunt is a recreation product but not the hunted. In order to obtain a measure of the value of lodgepole pine one would have to devise a measure of thrills per minute, or even a measure of thrill intensity and duration, perhaps even weighted by thrill type.

There are those who argue that such a qualitative thing cannot be measured. Therefore decisions should be made in the political arena (Wagar 1969). Others attempt to develop shadow dollars and put decision making in the market place and the field of economics. See Lerner (1962) for a review of this topic. Seckler (1966) brings out the point that the value of a dollar depends on our income and demand curve extrapolations generally do not account for this.

A new approach by Isard, *et al.* (1972) uses various techniques of regional analysis to include the ecosystem in the complex economic systems and avoid putting dollar values on the various processes and products. He measured productivity on an input-output basis in terms of dollars generated by various recreational activities, as well as other products, such as sewage and refuse, and their effects on other human activities as well as the various components of the ecosystem. But he does not attempt to measure the psychological output value of these systems.

McConnen (1969) has suggested the use of marginal analysis and opportunity costs as tools to aid in a decision-making process. And researchers at Montana State University have included recreation in a systems model (Bjerke, 1973).

On the other hand, we may assume that "man is the measure of all things" and the number of people using an area can be considered a measure of its value. This, however, ignores the possible depreciation of the resource as crowding increases. Watching Old Faithful erupt may be worth 1000 units, whether 5 people each get 200 units or 500 people each get 2 units. Or it may be worth only 0.5 units each if you have to watch it with 499 other people.

LODGEPOLE PINE

Variation in what we call lodgepole pine is amply documented elsewhere and needs no treatment here (Critchfield 1957, Jeffers and Black 1963). The common and scientific names illustrate very well that we can mean a wide variety of things when we say *Pinus contorta.*

ECOSYSTEMS

Natural systems have very diffuse boundaries. They are easy to talk about and describe. Models of them help us organize our

information and show us holes in our knowledge. But when it comes to drawing lines around one, the decision becomes very arbitrary. Before research on the recreational productivity of lodgepole pine ecosystems could begin we would have to decide what we want to include in the ecosystem. Do we include the nonforested park lands embedded in a lodgepole forest? Are the streams and ponds and their products a part of the system? Do we include all the forest where lodgepole does or can exist, or do we restrict ourselves to only the interior of those forests where lodgepole is the stable occupant? The objectives of the research will determine the answer to these questions.

Ignoring these handicaps and assuming "man is the measure of all things" we can do some constructive research on the subject. Yellowstone National Park is visited by more than 2 million people each year. Lodgepole pine covers 65 percent of it. People do not come to Yellowstone to see and appreciate lodgepole pine; in fact, those that can recognize the species usually complain about it. However, this hardy species provides the setting for Old Faithful, Yellowstone Lake, both Upper and Lower Falls, and the rest of Yellowstone's outstanding features. When you look from any high point, you see mostly lodgepole pine blanketing the landscape that people apparently enjoy looking at. Of the more than 2000 roadside campsites, 91 percent are under lodgepole pine. Of the more than 300 backcountry campsites, 71 percent are in lodgepole stands.

A cursory inventory of campsites in the national forest lands on Big Horn, Wind River, and Medicine Bow mountains shows that a similar relationship holds for other areas. The percent of campsites in lodgepole pine timber types is greater than the percent of area covered by lodgepole pine (Table 1). If we assume this is because people prefer to camp in forested areas, then the percent of campsites in lodgepole pine is more nearly the percent of timbered area covered by lodgepole pine.

It is apparent that people don't avoid lodgepole for campsites and may even prefer them slightly. In each area the largest

Table 1. Relationship of Camping Units to Total Area and Area of Forest Cover

	Percent Covered by Lodgepole Pine		
	Total Area	Forested Area	Camp Units
Yellowstone National Park	65	80	89
Bighorn National Forest	55	50	85
Shoshone National Forest[1]	41	53	87
Bridger National Forest[1]	13	48	58
Medicine Bow National Forest	30	62	54

[1]Includes only that portion on the Wind River Mountains.

campgrounds were invariably in lodgepole pine. In Yellowstone there are seven campgrounds of more than 100 units and all are in lodgepole pine. The two campgrounds of more than 400 units are the seasonal campgrounds that are open the longest.

Visitors, however, don't choose an area for its vegetation, or even esthetic appeal. Once a minimum physical setting is achieved, people choose campsites and campgrounds because they are convenient to other activities, or are along a travel route (Doll and Phillips 1973).

Lodgepole's greatest value lies in the fact that it grows in areas adjacent to popular forest recreation activities and is thus used by recreationists. It occurs high enough in the mountains to be cool in summer but not so high that it is too cold. It does well on well-drained soils and is able to withstand a great deal of soil compaction and abuse. It is aggressive and does well on nutritionally poor soils. It grows in the drier parts of the mountains, where rain in summer is not common.

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A great variety of management techniques can be applied to lodgepole pine. In Grant Village, the Park Service embedded a campground in a mature lodgepole pine forest. At Fishing Bridge, the mature forest was cut and lodgepole replanted. The young, open-grown pines are now providing good screening for the sites. At Canyon, a campground was carved into a dense "doghair" stand of lodgepole and provides fairly private camping.

In summary lodgepole pine is heavily used by recreationists, largely becaust it is there. But it is there because it has a number of environmental requirements similar to those of recreationists (Douglass 1969), as well as being a pioneer species in a number of habitat types. It is fortunate that such a species is so aggressive and hardy. Much work remains to be done to determine its carrying capacity and durability and which management techniques are most appealing to visitors.

My own experience is that much can be done to enhance the recreational productivity of lodgepole pine through interpretation and education. Its commonness masks a very interesting natural history. Litton (1968) has said of canopied landscapes: "Appreciation of the canopied landscape may require a good deal of knowledge. But this requirement is more an opportunity than a handicap. It is a chance for interpretation that makes a journey meaningful." Information about lodgepole pine could be made more available to the general public and enhance their appreciation of this species.

REFERENCES

Bjerke, Ardine L. 1973. SYSTEMS ANALYSIS OF THE ENVIRONMENTAL IMPACT OF RECREATION: THE DYNAMICS OF THE FISHING ECOSYSTEM. M.S. Thesis, Montana State Univ., Bozeman, Mont. 168 pp.

Clawson, Marion and Jack K. Knetsch. 1966. ECONOMICS OF OUTDOOR RECREATION. Johns Hopkins Press, Baltimore, MD. 328 pp.

Critchfield, William B.
1957. GEOGRAPHIC VARIATION IN *Pinus contorta.* Maria Moors Cabot Foundation. Publ. No. 3. Harvard Univ., Cambridge, Mass.

Doll, Fred G. and Clynn Phillips.
1972. CAMPING AND PICNICKING ACTIVITIES IN WYOMING. Outdoor Recreation in Wyoming. Vol. 6, 81 pp.

Douglass, Robert W.
1969. FOREST RECREATION. Pergammon Press, New York. 336 pp.

Isard, Walter, Charles L. Choguill, John Kissin, Richard H. Seyfarth, Richard Tatlock.
1972. ECOLOGIC-ECONOMIC ANALYSIS FOR REGIONAL DEVELOPMENT. New York Free Press, New York. 270 pp.

Jeffers, J. N. R. and T. M. Black.
1963. AN ANALYSIS OF VARIABILITY OF *Pinus contorta.* Forestry. 36:199-218.

Lerner, Lionel J.
1962. QUANTITATIVE INDICES OF RECREATIONAL VALUES. *In* Water Resources and Economic Development of the West, Committee on the Economics of Water Resources, Development of Western Agricultural Research Council Report No. 11, pp. 55-80.

Litton, R. Burton Jr.
1968. FOREST LANDSCAPE DESCRIPTION AND INVENTORIES–A BASIS FOR LAND PLANNING AND DESIGN. USDA, Forest Serv. Res. Rep. PSW-49, 64 pp.

McConnen, Richard J.
1969. THE ROLE OF THE ECONOMIST IN DEVELOPING A CONIFEROUS FOREST SYSTEMS ANALYSIS. Univ. Mont. Found., Center Natur. Resources, Proc. 1968. Symp. Coniferous Forest of the Rocky Mountains. pp. 373-388.

Outdoor Recreation Resources Review Commission (ORRRC)
1962. OUTDOOR RECREATION LITERATURE: A SURVEY. ORRRC Study Report 27. 137 pp

Seckler, David W.
1966. ON THE USES AND ABUSES OF ECONOMIC SCIENCE IN EVALUATING PUBLIC OUTDOOR RECREATION. Land Economics. 42:485-494.

Stankey, George H. and David W. Lime.
1973. RECREATIONAL CARRYING CAPACITY: AN ANNOTATED BIBLIOGRAPHY. USDA Forest Serv. Gen. Techn. Rpt. INT-3, 45 pp.

Wagar, J. Alan.
1969. NONCONSUMPTIVE USES OF CONIFEROUS FOREST, WITH SPECIAL RELATION TO CONSUMPTIVE USES. *In* Univ. Mont. Found., Center Natur. Resources, Proc. 1968 Symp. Coniferous Forests of the Rocky Mountains. pp. 255-270.

U.S. Department of the Interior National Park Service

Yellowstone National Park April 1975

NORTHERN ROCKY MOUNTAIN COOPERATIVE PARK STUDIES PROGRAM

The Northern Rocky Mountain Cooperative Studies Program (NRCP) is funded and administered jointly by the National Park Service and the University of Wyoming. The studies program sponsors research in the National Park Service areas of Wyoming, Montana, Idaho, and South Dakota.

NRCP will consider proposals dealing with the geology, climatology, biology, and human ecology of Park Service areas. Preference is given those projects which require a park environment and that aid the management and interpretation of an area. Research procedures must not cause departures from natural conditions or otherwise detract from esthetic or scientific values in natural areas.

The program is currently headquartered at the University of Wyoming. Proposals should be submitted to NRCP, c/o Dr. R. S. Houston, Department of Geology, University of Wyoming, Laramie, WY 82070, and to the Superintendent of the area. Proposals should contain a brief outline of the study objectives, methods, location within the area, duration, review of pertinent literature, and budget. Applicants need not be associated with the University of Wyoming. Funds for the program are limited, and applicants are encouraged to seek partial funding from other sources for large scale research efforts. Equipment purchased with NRCP funds will become the property of NRCP. A report of progress and copies of publications will be requested annually.

INFORMATION PAPER No. 26
Yellowstone National Park
National Park Service
U.S. Department of the Interior

Glen F. Cole
Supv. Research Biologist
May 1975

NATURAL VS. MAN-CAUSED DEATHS OF WILD ANIMALS IN NATIONAL PARKS

> For everything there is a season, . . . a time
> to be born and a time to die.
>
> --- Ecclesiastes 3; 1-2

All populations have birth and death rates. Population numbers remain stable when deaths equal births. Characteristically, more young are born each year than are needed to maintain stable numbers.

Deaths due to natural causes are highly age-specific and are mostly the oldest adults and weakest young in a population. The strongest young and middle-age adults consistently survive conditions that cause the weakest young and oldest adults to die. The primary cause of most adult deaths is physiological old age or senescence. Deaths of young are mainly due to competition with adults for space or food, and the effects of periodic severe weather. Deaths finally occur from secondary causes. Carnivores regularly die from a lack of food (starvation). Herbivores may finally die from undernutrition, from illnesses, or by being too weak to escape from predators. Diagnosing these final causes of death is difficult and usually it is only possible to state that an animal died from natural causes. Herbivores rarely die from an absence of food, and attributing their deaths to starvation is usually an incorrect diagnosis.

No living creature escapes death, but it is possible to have man-caused deaths occur in advance of deaths that would otherwise occur from natural causes. A complete substitution of man-caused for natural deaths is rarely attainable because the density-independent effects of severe weather continue to cause the deaths of both young and old animals.

Whether a natural or man-caused death is "best" for wild animals can be a matter of personal feeling. However, a more definitive basis exists for assessing whether natural or man-caused deaths of wildlife are more appropriate within national parks such as Yellowstone. Here it is necessary to consider first the purpose of a national park, and second, the ecological consequences of substituting man-caused for natural deaths in parks.

The purpose of Yellowstone Park is to preserve nature and provide for the public enjoyment of same in ways that retain natural conditions. Here nature is a collective term for native plant and animal life and natural environments as an integrated whole, or ecosystem. Natural conditions can be defined as those where modern man is not changing the flow of energy or cycling of nutrients within an ecosystem; or altering the distributions, behavior, or population dynamics of wild animals.

About 1% of the park's 2.2 million acres is taken up by roads, facilities for visitors, and administrative units. The remaining 99% is undeveloped wild land. With the possible exception of the gray wolf, representative populations of all native wildlife species occur as yearlong residents. The park additionally serves as summer range for elk and mule deer that spend the winter and are hunted on adjoining state lands. Because man's influences on the park's resident wildlife have been greatly reduced in recent years it is possible to conclude that Yellowstone Park is presently one of the most complete natural ecosystems remaining in the United States.

Figure 1 shows an ecological system where nutrients cycle through plants, wild animals, and an environment, and deaths only occur from natural causes. Such systems become unnatural to the extent that modern man adds or takes away nutrients, or manipulates the deaths of animals or plants. This diagram also shows that death is necessary to recycle nutrients, transfer nutrients from herbivores to carnivores, and more fundamentally, to sustain and renew life. Obviously the concept that something is wasted if it is not eaten or used by man is inappropriate in a natural ecosystem.

Figure 2 illustrates the relative proportions of plants, herbivores, and carnivores within natural ecosystems. The system becomes unnatural if man reduces plants that sustain wild herbivores; reduces the numbers of herbivores that sustain native predators and scavengers; or directly reduces carnivores. Unnatural conditions also occur if supplemental food is provided to wild animals. This practice changes the natural distributions and behavior of fed species, the way their populations are regulated (artificially high densities increase deaths from competition and other social interactions), and increases parasite loads and the incidence of communicable diseases.

Additionally, substituting man-caused for natural deaths in parks changes the behavior of an exploited species to the extent that they become more wary and less visible to park visitors and may not use all available space or food. There are also indications that reducing natural deaths of less fit young from competition can cause a population of wild animals to be less adapted to its environment than it would otherwise be.

In summary, individual animals die, but populations persist over time because births replace deaths. Deaths from natural causes are characteristic of natural ecological systems. Substituting man-caused for natural deaths in parks changes the behavior of exploited species, changes the relationships between herbivores and carnivores, and more fundamentally changes natural ecosystems to man-modified systems. Such changes are inconsistent with the fundamental reasons for establishing national parks. Substitutions of man-caused for natural deaths would be consistent with an objective of managing wild animal populations to provide recreational hunting and food for humans, and this is the usual objective in areas other than national parks.

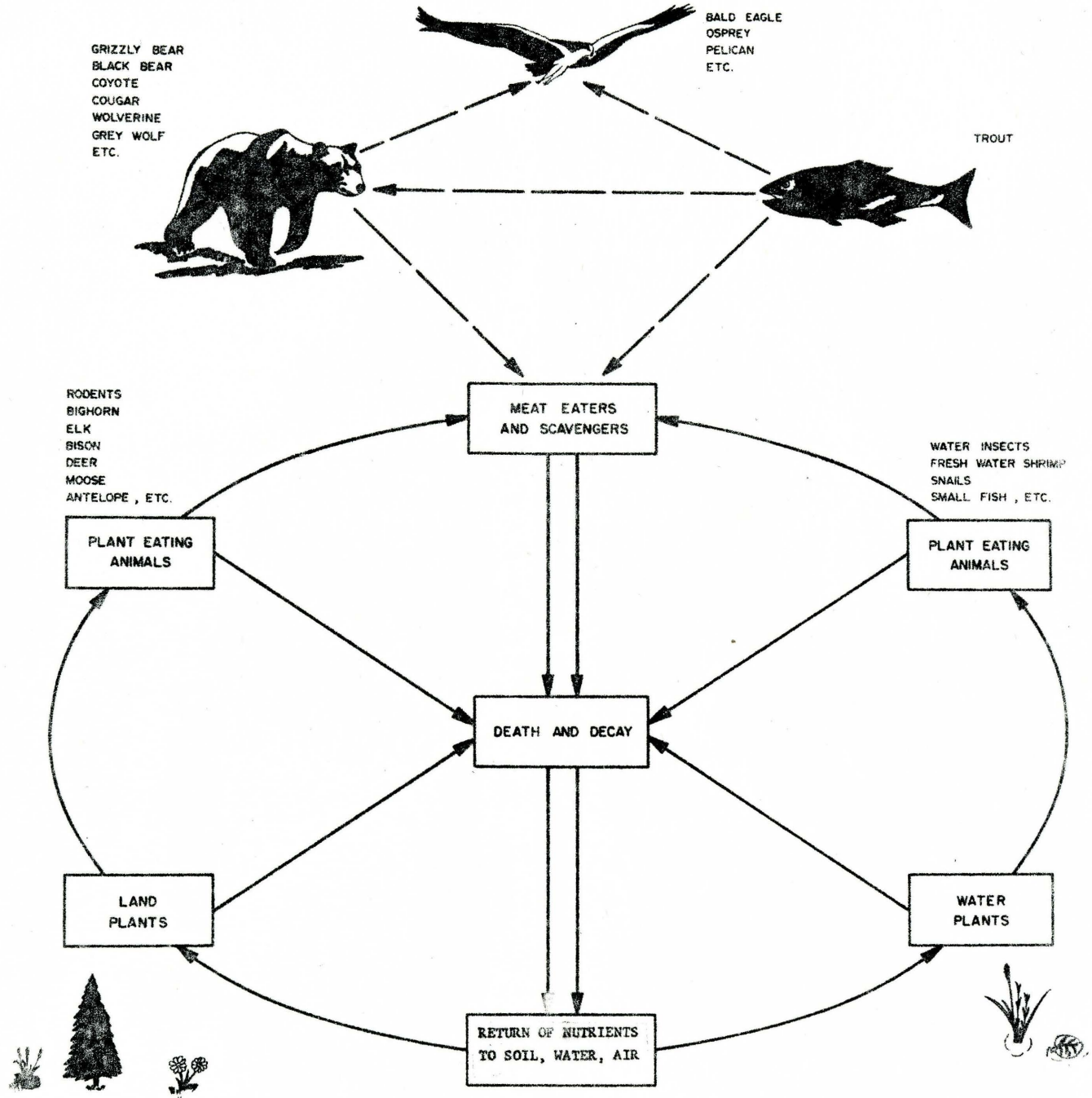


Figure 1 — YELLOWSTONE ECOSYSTEM

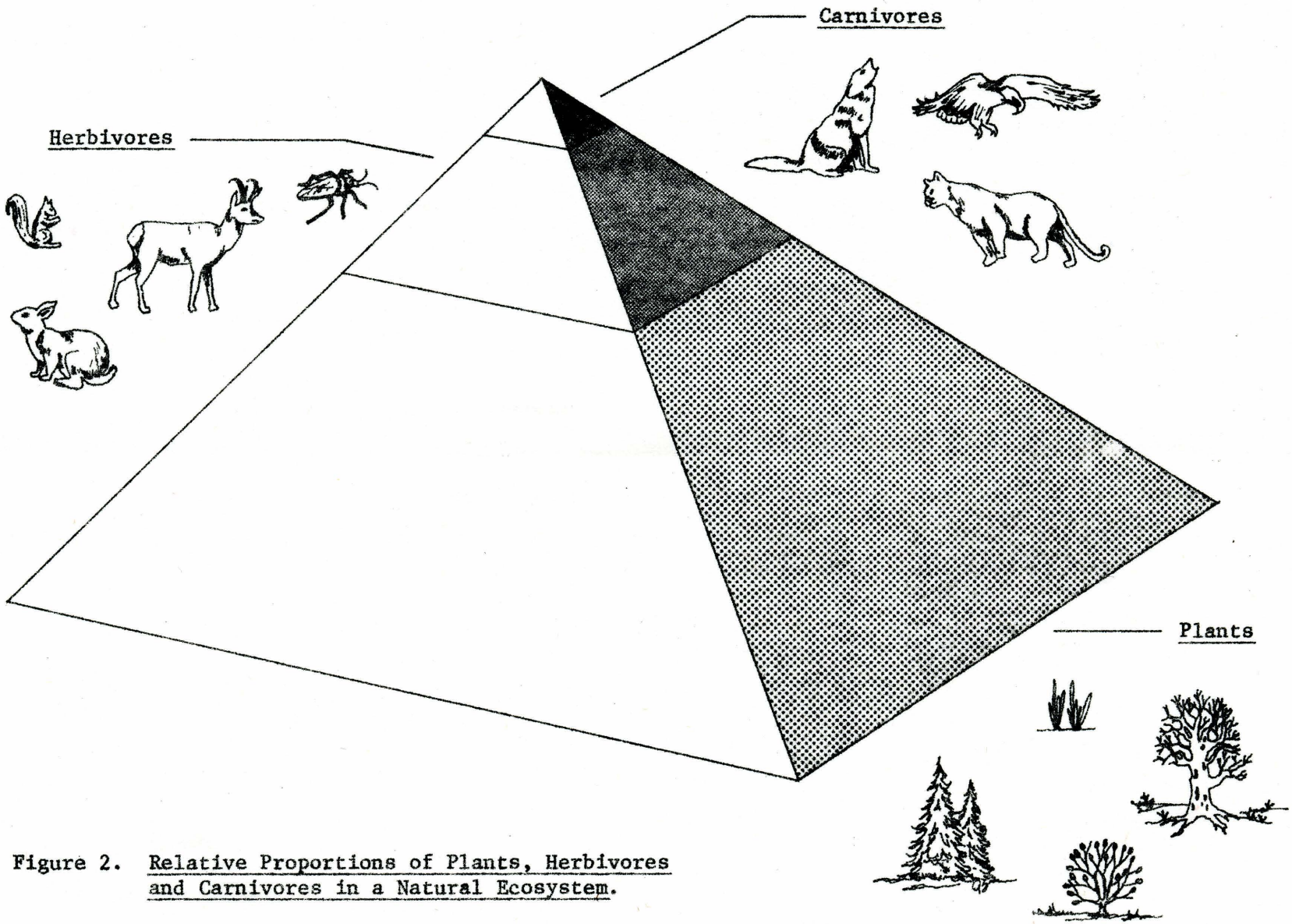


Figure 2. Relative Proportions of Plants, Herbivores and Carnivores in a Natural Ecosystem.

Recommended Reading

Buffington, J. D. 1971. Predation, competition, and Pleistocene megafauna extinction. BioScience 21(4): 167-170.

Caughley, G. 1966. Mortality patterns in mammals. Ecology 47: 906-918.

Cole, G. F. 1971. An ecological rationale for the natural or artificial regulation of native ungulates in parks. Trans. North Amer. Wildlife Conf. 36: 417-425.

_____. 1972. Grizzly bear-elk relationships in Yellowstone National Park. J. Wildl. Mgmt. 36(2): 557-561.

_____. 1974. Population regulation in relation to K. Montana Chapter of Wildlife Society. 17 pp. (mimeo)

Geist, V. 1970. A behavioral approach to the management of wild ungulates. 11th Symposium of British Ecol. Soc., U. of East Anglia, Norwich. 7-9 July. Blackwell Sc. Publ., Oxford, London, Edinburgh, Melborne.

Horn, H. S. 1968. Regulation of animal numbers: a model counter-example. Ecology 49: 776-778.

Houston, D. B. 1971. Ecosystems of national parks. Science 172: 648-651.

_____. 1974. History of the northern Yellowstone elk. Parts I and II: History and Demography. Res. Rpt., YELL-N-29b, Yellowstone Nat. Park. 99 pp. + appendix.

McLaren, I. A. (ed.) 1971. Natural regulation of animal populations. Atherton Press, New York. 188 pp.

Meagher, Mary. 1971. Winter weather as a population-regulating influence on free-ranging bison in Yellowstone National Park. AAAS Symposium on Research in National Parks. 17 pp. (mimeo)

Pimentel, D. 1968. Population regulation and genetic feedback. Science 159: 1432-1437.

Tanner, J. T. 1966. Effects of population density on growth rates of animal populations. Ecology 47: 734-740.

Watson, Adam and Robert Moss. 1969. Dominance, spacing behavior, and aggression in relation to population limitation in vertebrates. pp. 167-218 in Animal populations in relation to their food resources, a symposium of the British Ecological Society, March 1969. Adam Watson (ed.) 1970. Blackwell Scientific Publications, Oxford and Edinburgh. 477 pp.

Wilson, E. O. and W. H. Bossert. 1971. A primer of population biology. Sinauer Assoc., Inc., Sanford, Conn. 192 pp.

INFORMATION PAPER No. 27
Yellowstone National Park
National Park Service
U.S. Department of the Interior

Glen F. Cole
Supv. Research Biologist
June 1975

POPULATION REGULATION AND THE CONSEQUENCES OF ARTIFICIALLY FEEDING WILD ANIMALS

Populations of wild animals regulate their own size by the processes of competition and reproduction, as diagrammed on Fig. 1. Competition is greatest between animals of the same species, intensifies as population size increases, and causes deaths to equal births when populations are as high as they can be in a particular environment. Births of young routinely replace deaths due to competition and other influences, such as periodic harsh weather. The size of populations fluctuate because deaths and births usually occur in different seasons, and because more than one year's reproduction may be required to fully compensate for the effects of harsh weather.

Populations regularly produce more young than are needed to replace deaths due to old age or than can be supported by an environment. Competition between population numbers over space and food predispose the weakest young and oldest adults to die from a variety of secondary causes, such as under-nutrition, disease, or predation. Competition among males over females or a breeding territory similarly predispose the oldest males to die from secondary causes.

Harsh weather also causes age-specific deaths of the weakest young and oldest adults, either by its effects alone or by concentrating animals on smaller areas where competition for space and food is intensified. The strongest young and adults of prime breeding age survive the effects of competition and periodic harsh weather that regularly remove less fit young and old animals from a population.

Wild animals have social systems where individuals and groups use different portions of an environment according to their sex, age, and social rank. Such systems are the results of long periods of natural selection for what works best in the wild. The practice of artificially feeding populations of wild animals collapses these social systems by concentrating (crowding) animals that would otherwise be separated or occur in smaller groups. Such crowding increases competition for space and food to the extent that both the production and survival of young and the mean size of populations are reduced from what they would otherwise be. An additional effect of crowding is that it increases the incidence of communicable diseases. These various relationships are recognized by livestock raisers who feed mature males, females, and weaned young separately and in the smallest groups possible over winter periods.

Contrary to commonly held beliefs, artificial feeding does not reduce death rates in wild animal populations. This is because feeding intensifies competition between weak and strong animals for space and food above what it would otherwise be. Thus feeding adds an additional regulatory effect on a wild animal population. As shown by domestic animals, some species that were originally wild eventually adapt to crowding and being artificially fed, but this results in a loss of adaptions for living in the wild and a continuous need to be fed and treated to control diseases.

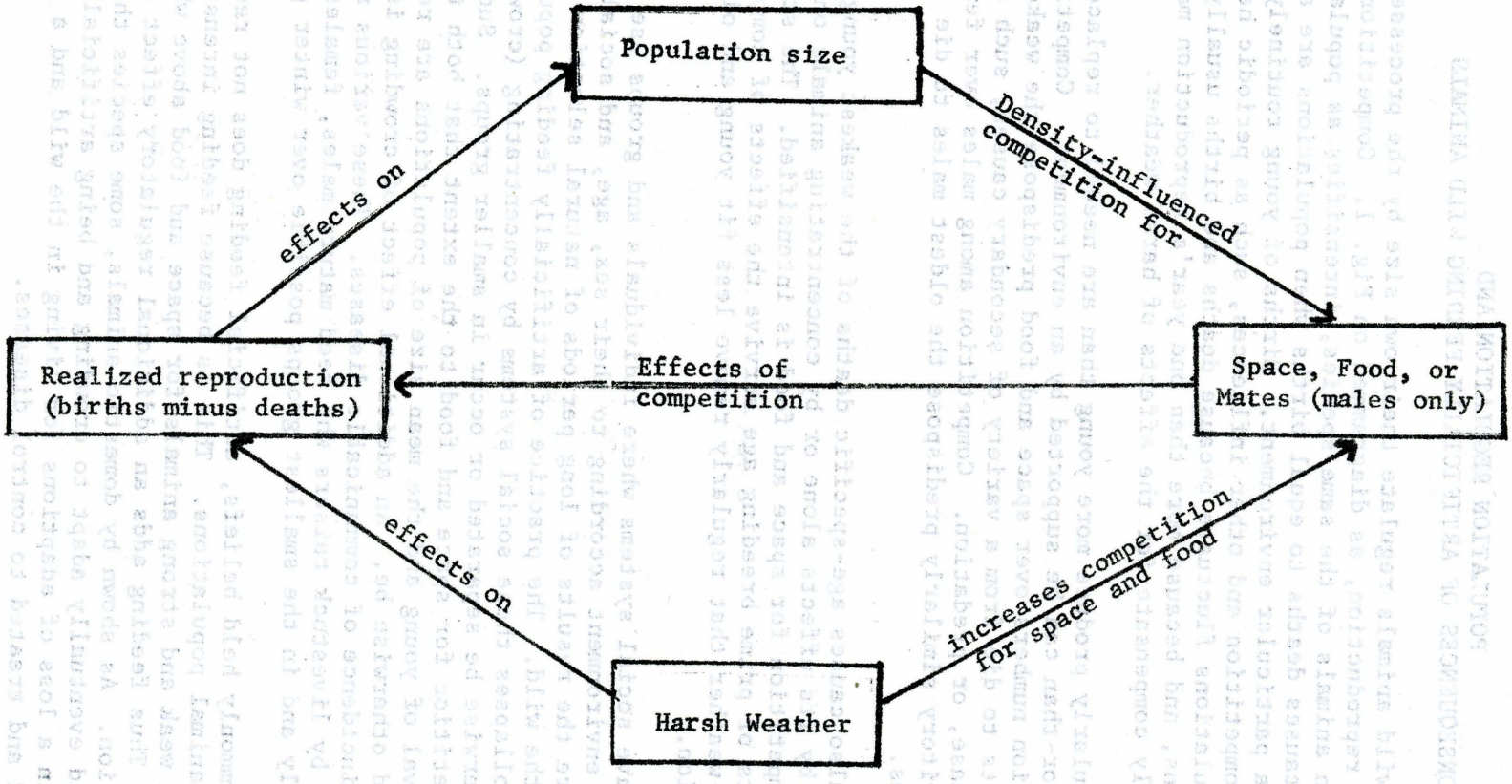


Fig. 1. Regulation of population size by the natural processes of competition and reproduction.

MANAGEMENT INVOLVING GRIZZLY BEARS IN YELLOWSTONE NATIONAL PARK, 1970-74

Glen F. Cole

Yellowstone National Park, Wyoming 82190

Contributed Paper

26th Annual AIBS Meeting of Biological Sciences

Oregon State University, Corvallis, Oregon, August 1975

ABSTRACT

Management to maintain a population of grizzly bears (Ursus arctos) under natural conditions and reduce grizzly injuries to humans in Yellowstone National Park is evaluated by testing hypotheses that could be rejected by inconsistent data. The elimination of unnatural sources of food (garbage or improperly stored camp groceries) and changes in bear control procedures from 1970 to 1974 had the following results: The numbers of grizzly injuries to humans in the park's developed areas were significantly reduced from previous levels. A more natural grizzly population was restored, as evidenced by spaced distributions on natural foods in summer and a reduced need to control bears to protect humans. Yearly removals of bears that persisted in seeking food in park campgrounds or other developed areas, as well as other sources of mortality, temporarily lowered population numbers and emigration rates. Removals did not appear to be of sufficient magnitude to prevent the park grizzly population from establishing its numbers at natural carrying-capacity levels.

INTRODUCTION

A management program to reduce grizzly bear injuries to humans and maintain this species under natural conditions has been carried out in Yellowstone National Park since 1970. This is the fifth in a series of papers that document the results of this program (Cole 1970a, 1971, 1973, 1974a). The program was proposed to the Director of the National Park Service by a Natural Sciences Advisory Committee[1] after a review of park records and other information on grizzly bears. Much of this reviewed material has been published (Cole 1970b, Martinka 1971, Craighead and Craighead 1971).

Briefly, park records showed 60 persons had been injured by grizzlies in developed areas during the 40 years before 1970. Developed areas have overnight and/or day-use facilities for park visitors, are accessible by auto, and comprise less than 1% of Yellowstone's 2.2 million acres. Only three persons had been injured by grizzlies in the wild during this same period. Comparatively few injuries occurred from 1930 through 1962, averaging less than one per year and less than one for each million visitors. Injuries occurred more frequently from 1963 through 1969, averaging over four per year and one for each 500 thousand visitors.

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[1] "A Bear Management Policy and Program for Yellowstone National Park," report to the Director by the Natural Sciences Advisory Committee, 1969, 7 p., typewritten.

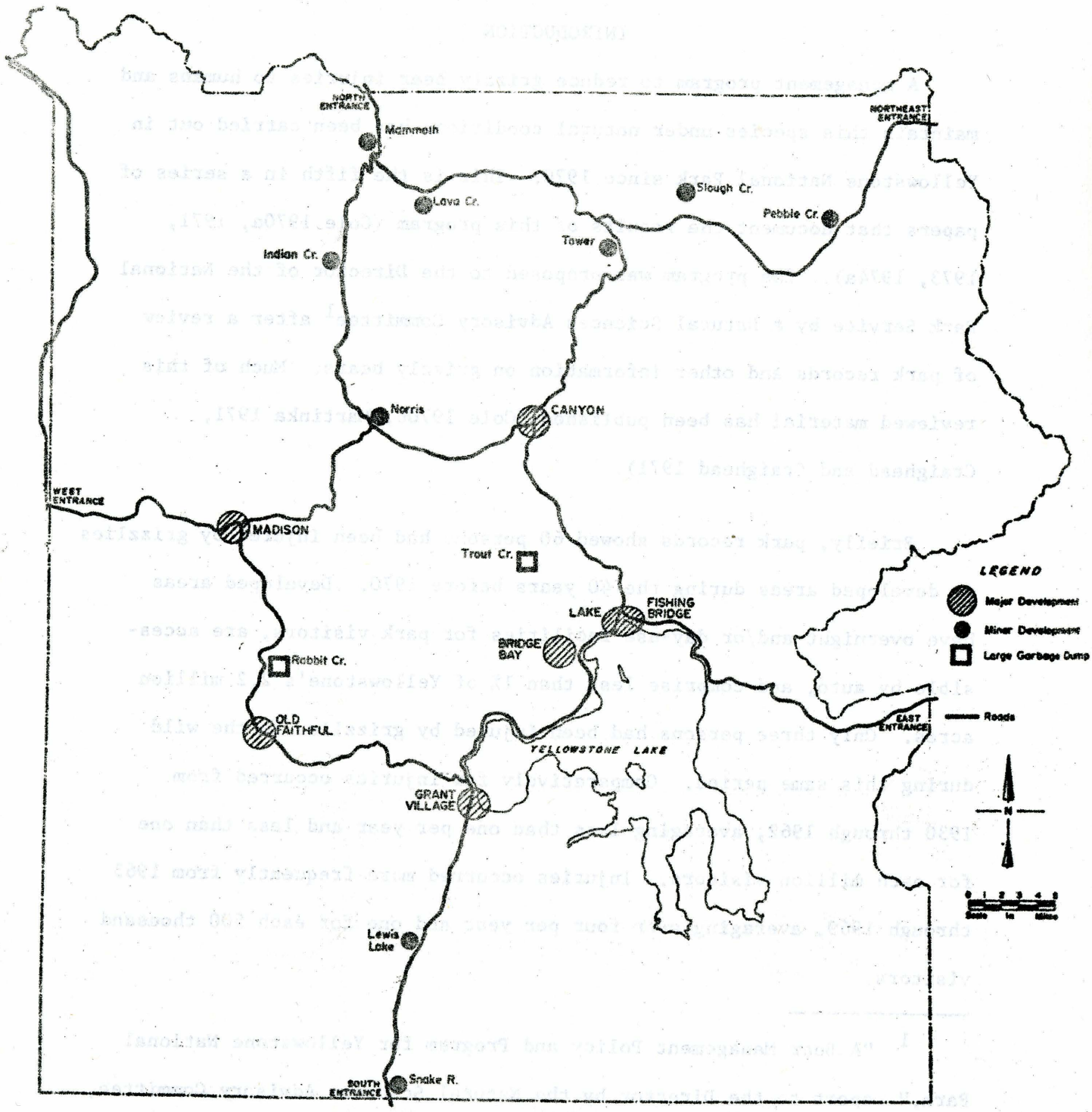


Fig. 1. Location of park developed areas and garbage disposal sites.

The reviewed information also showed that sources of unnatural food changed the habits and behavior of a substantial portion of the park's grizzly population, were the primary cause of most injuries to humans, and maintained a need to control (capture, transplant, or destroy) bears to protect humans. Briefly, garbage at open-pit dumps and unfenced incinerator sites concentrated large numbers of socially interacting grizzlies close (8 miles or less) to certain developed areas during the summer. As an apparent consequence of competition for space and food at dump and incinerator sites, some bears also visited developed areas to use garbage in cans without bearproof lids and improperly stored camp groceries. These bears became increasingly habituated to humans and dangerous.

Seven garbage dumps were closed between 1936 and 1968. Two dumps were still being used by grizzlies during 1968 and 1969. Bearproof garbage cans were progressively installed in all developed areas between 1965 and 1969, but portions of two areas that had concessioner-owned facilities did not have such cans until 1970. Figure 1 shows the locations of places mentioned later.

MANAGEMENT PROGRAM

Initial Assumptions

The following was assumed in designing the management program: The desired number of grizzlies within Yellowstone National Park was the number that would occur under natural conditions (i.e., without

human alterations of bear habits, behavior, or population dynamics). Management that eliminated sources of unnatural food and selectively removed incorrigible animals from the population (bears that could not be discouraged from using developed areas) would allow young bears with natural habits or behavior to replace incorrigible animals and eventually reduce the need to control bears in developed areas. The number of years it took to eliminate sources of unnatural food would determine the number of generations of young that either had their habits and behavior altered by such food or were raised under natural conditions. The park's population of 250-300 grizzlies could compensate for anticipated removals of incorrigible animals.

Procedures

The management program was designed as a series of scheduled and contingency procedures (Appendix I). Briefly, these provided for closing the two remaining garbage dumps in 1970 and 1971, or over a longer period of time if necessary; enclosing incinerators within fences; completing installations of bearproof garbage cans; assigning personnel to patrol campgrounds and control bears; changing control procedures so as to reduce risks to visitors; regulating or restricting humans so as to reduce the need to control bears; and finally, monitoring and evaluating the results of the management program.

The management program followed the recommendations of the Natural Sciences Advisory Committee with the exception that the contingency of

using the Trout Creek dump beyond its scheduled closing date was an alternative to the committee's recommendation that bears be fed park ungulates as a substitute for garbage. The scheduled procedures were followed as outlined, except that fenced sanitary landfills were employed as an alternative to hauling garbage out of the park, and the adjacent states were unable to accept grizzlies for reestablishing populations elsewhere. The contingency of using the Trout Creek dump beyond its scheduled closure was not used, but those involving manipulations of campground opening or closing dates and other restrictions on camping were routinely applied to reduce risks to visitors and the need to control bears. Additionally, the system for monitoring sightings of grizzlies throughout the park was used to regulate hiking, camping, and party sizes in backcountry areas; or to close areas with high densities of bears or female grizzlies with young.

EVALUATION PROCEDURES

Hypotheses

To evaluate the results of management in the most objective manner possible, the general objectives of reducing injuries and maintaining grizzlies under natural conditions were more specifically stated as hypotheses that could be rejected by inconsistent data (Poore 1962), or by appropriate statistical tests. Because the different procedures that eliminated unnatural foods and changed bear control practices (discussed later) were applied simultaneously, the hypotheses were

stated as follows: The management to eliminate unnatural food sources and the bear control procedures applied in the 1970s will:

1. Reduce the number of grizzly injuries to humans in park developed areas from 1963-69 levels (4.4 average; 2-8 range).
2. Restore a more natural grizzly population than existed in the 1960s, as evidenced by scattered distributions in summer, fewer bears using developed areas, and progressive reductions in the numbers of bears being controlled.
3. Not prevent the grizzly population from maintaining or reestablishing its numbers at natural carrying-capacity levels.

Collection of Data

Sightings of grizzlies and incidents of bear injuries to humans or bears being controlled to protect humans were reported to the park's research office on a daily basis. One control action was recorded each time a bear was captured for transplanting, shipped to a zoo, or destroyed. Destroyed animals were salvaged as scientific specimens for educational institutions. The information obtained from sightings is illustrated by a sample report form (Fig. 2). Most sightings of grizzlies were by park employees, but those of other persons were accepted if their descriptions of a bear(s) permitted a judgment as to species.

From 1972-74, all sightings of female grizzlies with cubs or yearlings by research personnel and park employees that were considered

BEAR SIGHTING AND/OR IDENTIFICATION REPORT

I. Sighted by_____ Address_____

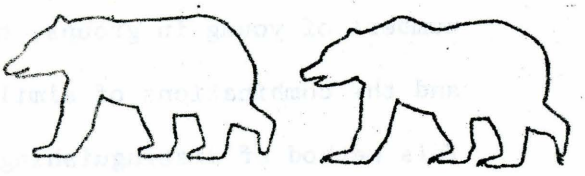
II. Sighting date_____ Time_____

III. Sighting location_____
(check one) Within development[1/] ____ Along road____ In the wild____

IV. Description of bear(s):

A. Species:

	As reported	As verified by[2/] _____
Grizzly	☐	☐
Black	☐	☐
Unknown	☐	☐



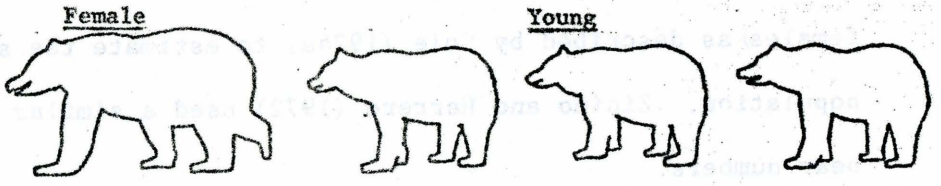
B. Number of bears seen by size and coat color:
(also describe any identifying eartags or markers)

Predominant coat color: Weight in pounds[3/]

	10-50	50-100	100-200	200-400	Over 400
1 - black					
2 - reddish-brown					
3 - gray					
4 - dark brown (chocolate)					
5 - light brown (tan)					
6 - blonde (white-yellow)					
7 -					

C. Diagram coat color pattern of female/young groups only, using colors 1 to 7 above.

Female Young



D. Activities of bear(s): Preying on_____ Scavenging on_____
Digging____ Grazing____ Other_____
See Case Incident Record No._____[4/]

V. Report filled out by_____
at (location)_____ on (date/time)_____
Notified Com. Center (date/time)_____
Rec'd. in Com. Center by_____ (date/time)_____
Notified (date/time):
Subdist. Ofc._____ Biologists Ofc._____
Dist. Ofc._____ Griz.Bear Team_____

1/ Overnite or day-use facilities for people, accessible by vehicle.

2/ Corrected where description by observer is not adequate to identify bear species, or indicates a different species from that reported.

3/ Cubs-of-year are usually less than 1/4 of female size, or 10-50 lbs;
Yearlings, 1/4-1/2 of female size, or 50-100 lbs.
2-year-olds, 1/2-3/4 of female size, or 100-200 lbs.
Small adult bears are 100-200 lbs; medium adults, 200-400 lbs; large adults, 400+ lbs.

4/ Refer to Case Incident Record No. if bear is involved in control action or other incidents.

Fig. 2--Form for reporting grizzly sightings.

qualified observers were tabulated separately. I examined these and attempted to distinguish different family groups by comparing the locations and dates of sightings, the relative sizes and different numbers of young in groups, the presence or absence of marked individuals, and the combinations of similar and different coat colors in groups. This method of distinguishing different groups was refined during 1973 and 1974 by comparing color photographs of family groups that were taken by Knight et al. (1975). A darkening of coat colors, as described by Pearson (1975), occurred during the late summer.

I used the counts of different family groups, the mean size of cub litters, and life history features (age of sexual maturity, mean interval between production of cubs, ratio of adult males to adult females) as described by Cole (1974a) to estimate the size of the grizzly population. Zinino and Herrero (1972) used a similar method to estimate bear numbers.

Additional data were collected on the seasonal distributions and food habits of grizzlies under natural conditions (Houston 1971, Cole 1973, Knight et al. 1975, Mealey ms) and bear-human relationships in backcountry areas (Chester ms). Independent studies to estimate grizzly numbers within the park and an adjacent 3,600 mi^2 area were also carried out by Knight et al. (1975).

MANAGEMENT RESULTS

Injuries to Humans

Park records show that 68 persons have been injured by grizzlies during the 45 years between 1930 and 1974. Nineteen of these were attributed to grizzlies by circumstantial evidence. Fifty were minor to the extent that they required only first aid, sutures, or lesser treatment. The other 18 entailed overnight or longer periods of hospitalization. Sixty-three, or 93%, of the total occurred in developed areas, and were caused by bears that were attracted to such areas by unnatural foods. Five, or 7%, of the total injuries occurred when persons hiking in backcountry areas approached too close to female grizzlies with young. Tabulations of injuries for a 1959-70 period by Craighead and Craighead (1971) are 18 less than those in park files for this same period (Cole 1970b).

Table 1 shows the numbers of injuries by decades from 1930 through 1969, and each year since 1970. No consistent relationship is shown with the numbers of park visitors, which progressively increased from an average of about 0.3 million persons per year in the 1930s to over 2 million per year in the 1970s. The comparatively low numbers of injuries during the 1950s were associated with control procedures similar to those used in the 1970s (Appendix 1).

The 1970-74 mean of 0.6 injuries per year in developed areas was significantly different ($P = 0.05$) from the 1963-69 mean of 4.4 injuries

Table 1.--Numbers of injuries to humans from grizzly bears by periods and years, Yellowstone National Park, 1930-74.

Years	No. grizzly-caused injuries per year[a]		No. of visitors per injury
	Developed area	Backcountry	
1930's	0.6 (0-3)	0	800,000
1940's	1.2 (0-7)	0	600,000
1950's	0.6 (0-2)	0	2,700,000
1960's	3.6 (1-8)	0.3 (0-2)	500,000
1970	2	1	700,000
1971	0	0	0
1972	1	1	1,000,000
1973	0	0	0
1974	0	0	0

[a] Averages of known and probable injuries due to grizzlies by decades from Cole (1970b). The one injury in a developed area in 1972 was also a probable case.

per year by the Sum Test (Wilcoxan and Wilcox 1964). The absence of injuries in 1971 was the first such occurrence in 15 years.

Injuries in backcountry areas between 1970 and 1974 remained low in number, despite progressive yearly increases of up to 400% in the numbers of hikers and campers using such areas. Some injuries were probably prevented by using monitored sightings of grizzlies to regulate backcountry hiking and camping.

Fatalities

The third known fatality from a grizzly in the park's history occurred in June of 1972. This occurred when a man returned to an illegally established camp at night and approached to within about 50 feet of a grizzly that was apparently feeding on food or garbage that had been left on the ground. The other fatalities occurred in 1907 when a man was attacked by a female grizzly after he had prodded her cub with an umbrella; and in 1916, when a man attempted to chase a grizzly away from a wagon loaded with food.

Grizzly Distributions

The system for monitoring sightings of grizzlies in developed areas and in the wild was established in 1968 (Table 2). Only the 1970-74 sightings in developed areas were obtained under comparable conditions. These indicate that the number of daily visits to developed areas by grizzlies progressively declined. As reported in previous papers (Cole 1969, 1973, 1974a), differences in natural food conditions between

Table 2.--Yearly totals of the numbers of grizzly bears observed on a daily basis in developed areas and in the wild within Yellowstone National Park, 1968-74.

Locations:	1968	1969	1970	1971	1972	1973	1974
No. in developments	293	99	178	146	105	54	26
No. in wild	414	315	614	320	349	348	426

years and seasons influenced the distributions of grizzlies in the wild and the relative numbers seen. Increased research effort inflated the numbers seen in 1973 and 1974. The spaced distributions of bears on natural foods after 1970 (Cole 1974a, Knight 1974, Knight et al. 1975) contrasted markedly with previous aggregations at garbage dumps (Murie 1961, Hornocker 1962, Craighead and Craighead 1967).

Bear Control

Grizzlies were controlled by capturing them for transplanting or shipment to a zoo, or by destroying them. Records of the numbers of bears destroyed or shipped to zoos date from 1930 (Cole 1970b), but those for transplants have only been complete since 1968. The comparable data on the number of times grizzly bears were controlled in different developed areas by one method or another (a control action) is shown in Table 3.

The 59 and 57 control actions in 1968 and 1969 were probably higher than most previous years because increased numbers of grizzlies were habitually using developed areas during these years, and because manipulations of garbage caused additional bears to visit certain developed areas. As recommended by Craighead and Craighead (1967), only "edible" garbage, which had previously been mixed with a much larger volume of paper and cans, was taken to the Trout Creek dump during these years. This practice apparently increased competition for space and food to the extent that some bears, which were probably less dominant than

Table 3.--Records of grizzly bear control actions in developed areas, Yellowstone National Park, 1968-74.

	Control actions[a]						
	1968	1969	1970	1971	1972	1973	1974
Old Faithful	1[b]	0[b]	22	1	0	0	1
Canyon	14	16	9	11	10	3	6
Lake Outlet	16	25	11	20	13	4	5
Bridge Bay	8	9	0	1	3	3	2
Grant Village . . .	20	5	15	5	0	0	0
Eleven other units .	0	2	13	1	0	0	0
Total control actions	59	57	70	39	26	10	14
No. different bears[c]	?	?	50	33	21	7	11
Pct. successful transplants . . .	33[d]		60	80	74	70	77
No. bears destroyed	5(3)[e]	10(5)	12(6)	6(2)	6(4)	0	2(1)
No. bears to zoos	0	0	8	0	1	0	0

[a] Number of times a bear was captured for transplanting, shipped to a zoo, or destroyed.

[b] Grizzlies present until Rabbit Creek dump opened each year.

[c] Numbers in 1968 and 1969 unknown due to unmarked animals; 4 of 33 were 1970 transplants, 4 of 21 were 1970 or 1971 transplants; 4 of 11 were 1970-73 transplants.

[d] Sample of 20 marked and 1 recognizable bear handled during 1968 and 1969.

[e] Yearly totals with the 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.

those that remained, visited the adjacent (7-8 miles) Canyon, Bridge Bay, and Lake Outlet developed areas. Closing a small dump in 1968 may have also increased the need to control bears in the adjacent (6 miles) Grant Village area during this year.

The comparatively high number of control actions in 1970 and the sharp decline in these over subsequent years were associated with greatly increased efforts to promptly capture, individually tag, and transplant bears that visited developed areas, as well as other aspects of the management program. About 70% of the 124 transplants made were successful, as compared to 33% during 1968 and 1969 and earlier years (Craighead and Craighead 1971). The numbers of different bears controlled in developed areas during each of the 5 years since 1970 were 50, 29, 17, 7, and 7. Five other bears and one previously transplanted animal were controlled in other areas of the park.

Closing the Rabbit Creek dump in 1970 apparently increased the need to control bears in the adjacent (4 miles) Old Faithful developed area for one year. Closing the Trout Creek dump in 1971 did not increase the need to control bears in the adjacent (7-8 miles) Canyon, Bridge Bay, and Lake Outlet areas (32 control actions) above the levels associated with the partial reductions in garbage at this site during 1968 or 1969 (38 and 50 control actions, respectively). Apparently both complete closures of dumps and partial reductions of garbage at such sites will cause some bears to visit adjacent developed areas.

However, partial reductions will probably cause a greater total number of bears to visit developed areas over time, because they prolong concentrations and competition.

A total of 35 bears was removed from the population by control within developed areas; 2 by control in other park areas. Fourteen of these were accidental or unintended removals that occurred because bears charged personnel that were attempting to capture them, came out of the effects of drugs while they were being handled, injured themselves in traps, or failed to recover from drugs.

EFFECTS ON BEAR POPULATION

The effects of management on Yellowstone Park's grizzly population are assessed from known removals, data on reproduction, and calculations of population numbers and trends. Grizzlies that had home ranges entirely within the park, as well as others with home ranges that overlapped park boundaries, are considered the park population. Additional grizzlies occurred in adjacent Montana, Wyoming, and Idaho areas (Cole 1973, Knight et al. 1975).

Removals

Between 1930 and 1969, removals by control within Yellowstone Park averaged about three grizzlies per year. Additional removals resulted from animals being hit by cars and illegal hunting, but the actual numbers are unknown. The records for adjacent state areas (about 4300 mi^2) are not complete, but those since 1967 (Winters and DeShon, pers.

comm., Greer 1972, Roop 1975) indicate that legal and illegal kills by hunters and kills to protect property or livestock averaged at least 15 grizzlies per year. The average kill before 1967 was probably higher because of less restrictive regulations on hunting or kills to protect livestock. An estimate that removals from both the park and adjacent state areas averaged at least 20 grizzlies per year over the 40 years before 1970 seems possible.

The removals from both park and adjacent areas since 1970 (Table 4) averaged 28 grizzlies per year and generally declined. Those associated with the park program were 26% of total removals. The State of Montana program was similar to the park's and involved closing a dump that was on adjacent lands in 1971. The general decline in kills within adjacent state areas after 1971 coincided with increased restrictions on hunting in Montana and on control to protect property or livestock in all three states. Grizzlies were not legally hunted in Idaho, and the declines in kills could be due to changed attitudes toward the species or less complete reports of kills.

Removals from the park grizzly population alone were calculated to be about 26 bears each in 1970 and 1971, 12 in 1972, 3 in 1973, and 8 in 1974. These include the yearly removals due to the park and Montana control programs, kills by vehicles, and a calculated portion of the kills outside the park. The calculations used ratios of marked and unmarked animals, as described by Cole (1973). Allowances for

Table 4.--Numbers of grizzlies removed by park and state control programs and other known deaths of marked and unmarked bears in adjacent state areas, 1970-74.

Year	Removals due to control programs		Killed by vehicles	Other known kills[a]			Yearly totals
	Park[b]	Mont.		Wyo.	Mont.	Idaho	
1970	20	0	2	12(1)	7(1)	7(1)	48
1971	6	14	1	12	6(3)	5	44
1972	9[c]	2	1	7	0	4	23
1973	0	1	0	7	2	3	13
1974	2	1[d]	0	10(3)	1	0	14
Totals	37	18	4	48(5)	16(4)	19(1)	142

[a] Legal and illegal kills from hunting or to protect livestock or property, with those marked inside Yellowstone Park prior to or since 1970 in parentheses. Changes from previous reports due to delayed confirmation of kills, and "adjacent areas" expanded from 2000 mi^2 to 4300 mi^2. Wyoming data from Roop (1975).

[b] Includes 9 animals donated to zoos, 14 unintentional, and 14 intentional deaths.

[c] Includes 1 unintentional and 1 intentional death due to control actions that were not in developed areas.

[d] Bear transplanted from West Yellowstone Montana, to Wyoming where it died.

additional natural mortality and for emigrations from the park are made in subsequent sections on population numbers and trends.

Reproduction

The numbers of different female grizzlies with young in a population segment that used garbage dumps from 1959 to 1966 (Craighead and Craighead 1967) were tabulated with those seen in and adjacent (1 mile) to the park after dumps were closed (Table 5). The latter are considered samples because some female-young groups could not be distinguished from others and all of those present were not observed. The small yearly samples limit interpretations to the differences between the periods when bears did and did not concentrate at garbage dumps.

My tentative interpretations of the data in Table 5 with that on female reproductive histories (Craighead et al. 1969) are as follows: In the population segment that concentrated at dumps the production of young was mainly by older dominant females. These had large litters, but cub survival to yearling age was low. Stokes (1970) postulated that the behavioral interactions among grizzlies that concentrated at dumps reduced the breeding success of females and the survival of young. Part of this reduced survival occurred because females were unable to protect their young from other bears.

With more spaced distributions and slightly lower population densities as a result of the 1970-71 removals (discussed later), some

Table 5.--Numbers and ratios of female grizzlies and young seen in different family groups in and adjacent (1 mi) to Yellowstone Park during a 1959-66 period[a] and subsequent years.

	Numbers			Numbers			Pct. surviving to
Years	Females	Cubs	Ratios	Females	Yearlings	Ratios	yearling age
1959-66 average	15	33	2.2	15	20	1.3	61
1972	11	22	2.0	9	18	2.0	?
1973	15	27	1.8	16	24	1.5	75
1974[b]	14	22	1.6	16	27	1.7	93

[a] Average female-cub figures from Craighead and Craighead (1967) with female-yearling figures calculated from a reported 39% mortality rate in a population segment that used garbage dumps.

[b] From Knight et al. (1975).

less dominant younger females also contributed to population reproduction. These either produced one young or smaller litters (Conturier 1954, as cited in Mundy and Flook 1973) and depressed the mean size of litters. A greater portion of the cubs born each year also survived to yearling age under these conditions.

In the present population the rare occurrence of family groups containing 2-year-olds after the late spring-early summer breeding period suggested most female grizzlies were producing cubs at about 3-year intervals. The mean reproductive interval in a sample of 30 females that used garbage dumps was 3.4 years, and the reproductive rate averaged 0.658 (Craighead et al. 1974). By assuming the mean interval for all females in the present population was between 3 and 3.4 years and averaged 3.2 years, the average of 1.8 cubs in litters from 1972-74 reflects a 0.59 reproductive rate. It is not possible to compare the numbers of young produced with these different reproductive intervals and rates because the total numbers of adult females in both the previous and present populations are unknown.

The probable increase in the total numbers of productive females (younger females depressed mean size of litters) and cub-to-yearling survival rates were probably population responses to the higher-than-usual 1970-71 removals and closing dumps. The latter assumes that the regulatory effects of competition for space, food, or mates (Cole 1974b)

within the population segment that concentrated at dumps during the breeding season and the rest of the summer were relieved with less dense distributions on natural foods.

My interpretations differ from Craighead et al. (1974). They concluded, from the smaller mean size of cub litters after 1970, that reproductive rates--and therefore population numbers--declined and that this was due to a "decreased opportunity to breed" at lower population densities and "stresses" from abruptly closing garbage dumps. These conclusions seem inconsistent with the numbers of different females with young observed in recent years (Knight et al. 1975), the associated increased survival rates for young bears, and the usual responses of animal populations to reduced densities (Tanner 1966).

Population Numbers

Estimates of grizzly numbers have been made for Yellowstone Park since 1930, and for the park and adjacent areas as a whole since 1971 (Table 6). Most estimates for the park alone range between 200-300 grizzlies. The more recent figures derived by using marked animals and demographic methods range between 250-300.

The figures for the park and adjacent areas of different size are somewhat confusing because two point estimates are lower than those for the park alone. However, all other estimates accommodate a minimum estimate of about 250 bears for the park, and allow for additional bears within adjacent areas. Continuing studies will undoubtedly further refine these estimates.

Table 6.--Estimates of the numbers of grizzly bears within Yellowstone National Park or within the park and adjacent areas between 1930 and 1974.

Source:	Estimated number of grizzlies: YNP	Estimated number of grizzlies: YNP and adjacent area	Derived from:
Cole (1970b)	200-300		General range of most estimates in park's annual wildlife reports 1930-69.
Craighead and Craighead (1971)		175[a]	Yearly counts of marked and unmarked bears that used garbage dumps 1959-66.
Cole (1973)	250-300	300-400[a]	Counts at dumps reported by Craighead and Craighead (1967), counts in park developed areas, counts in park back-country areas by Barnes and Bray (1967) and records of bears killed outside the park since 1967.
Cole (1974)	254-290	319-364[a]	Counts of 35 different females with cubs or yearlings and demographic calculations with life history data.
Craighead et al. (1974)		136[b]	Mean of 1959-70 counts at dumps, calculations of uncounted bears from proportions of marked and unmarked bears killed outside the park and model projections to 1974.
Cowan (pers. comm. 1975)		301[c]	Same data as Craighead et al. (1974) with adjustments for proportions of marked bears not subject to hunting mortality and not projected beyond 1970.
Knight et al. (1975)		237-540	Calculations using sample of cubs and yearlings from park and adjacent area of about 3600 mi^2 and age structure data from Craighead et al. (1974).

[a] Adjacent area about 2000 mi^2.

[b] Selected instead of other calculated estimates of 84 or 233 bears and adjacent area about 4300 mi^2.

[c] Estimate corrected from Cowan, et al. (1974).

During 1974 I distinguished 12 different grizzly family groups with cubs and 17 with yearlings from 86 sightings of such groups in the park. The mean size of cub and yearling litters was 1.7 and 1.5, respectively. Knight, et al. (1975) independently distinguished 14 different females with cubs and 16 with yearlings in the park by methods that included using time-lapse and aerial photographs. The mean size of cub and yearling litters was 1.6 and 1.7, respectively.

Columns I, II, and III in Table 7 show the numbers of grizzlies that could occur in populations with different numbers of females with young, but similar life history features. Because all of the females with cubs or yearlings were not seen or distinguished from other groups in 1974, Column I probably underestimates the park population. If the 30 groups sampled by Knight, et al. (1975) were 75% of those present, a minimum of at least 250 grizzlies could have been present, as shown in Column II. If only 60% were sampled, a minimum of at least 320 could have been present, as shown in Column III. These minimum figures allow for mortality and emigrations equal to cub production. A conservative estimate from the 1974 sample of 30 different family groups and demographic calculations would seem to be that at least 250 grizzlies occur within Yellowstone Park.

Population Trends

My analyses of trends are restricted to the park population. These assume viable populations of several hundred bears can compensate for

Table 7.--Calculated sizes of grizzly populations with different numbers of females with young (Columns I, II, III), but similar life history features.[a]

	Nos. in classes		
Classes:	Column I	II	III
Adult females w/cubs	15	20	25
Adult females w/yearlings	15	20	25
Other adult females	16	21	26
Adult males	39	52	64
Cubs[b]	27	36	45
Yearlings	27	36	45
2-year-olds	27	36	45
3-year-olds	27	36	45
4-year-olds	27	36	45
Potential population size	220	293	365
Mortality and emigration	27	36	45
Minimum population size	193	257	320

[a] Mean reproductive interval for females is 3.2 years. Females first produce cubs at 5 years of age, and the ratio of males to females in adults is 0.8521 (Craighead and Craighead 1971).

[b] Observed 1972-74 ratio of 1.8 cubs per female from Table 5 carried through the yearling to 4-year-old class to give a potential population size that is adjusted to a minimum population size by allowing for mortality and emigrations equal to the yearly production of cubs.

5% removals, as suggested by Pearson (1970) and Cowan (1970) and a portion of additional deaths could also be compensated for to the extent that the production and survival of young increased or emigrations decreased. I also assume, from the sex and ages of the bears removed from the park population, that only adult males were removed in greater proportions than their occurrence.

Considering numbers alone, the man-caused removals of 26 bears in 1970 could have approximated 10% of the park population. If only 13 of these were compensated for (5% of 250), the population could have decreased by 13 animals. This could have made the 1971 removals of 26 bears slightly greater than 10%.

If younger females contributed to population reproduction and the survival of young increased, as indicated in Table 5, the yearly removals of 12, 3, and 8 bears respectively from 1972-74 were probably 5% or less of population numbers. A decline in the proportions of marked park bears in the kills within adjacent state areas from 24% between 1959-70 (Cowan, et al. 1974) to 15% between 1971-74, while 89 of the 115 bears handled in the park control operations were marked, suggests that emigration rates decreased.

The suggested trends from considerations of numbers alone are that population numbers were depressed in 1970 and 1971, either stable or slightly increased in 1972, and probably restored by 1974.

Similar trends were reflected for the 1970-72 period by a more detailed analysis of both the numbers and sex and ages of bears removed (Cole 1973). The minimum estimates of 250 grizzlies derived in 1973 (Cole 1974a) and again in 1974 are consistent with these interpretations, but it is also possible that more than 250 grizzlies were present in 1970.

My conclusions about the trends for the park population are different from those for the bears within both the park and adjacent areas by Craighead, et al. (1974). Their conclusion that the 1970-74 removals caused continuous declines in bear numbers are based on initial estimates of grizzly numbers that are lower than mine for the park alone, and model projections that assumed compensatory processes did not occur.

DISCUSSION AND CONCLUSIONS

Data will need to be collected over an additional series of years to fully evaluate the management program. Evidence of yearly emigrations by social subordinates (Martinka 1974) are considered necessary to show that the park population is at natural carrying capacity levels. Additional yearly samples of grizzly family groups and data on life history features under present conditions are needed to refine population estimates.

The tested hypotheses (see Evaluation Procedures) could be rejected if injuries from grizzlies in developed areas during the 1970-74 period were not reduced below 1963-69 levels, if grizzly visits to developed areas or the need to control bears had not declined through the 1970s,

and if removals were preventing the park population from reestablishing its numbers at natural carrying capacity levels. Because injuries, visits to developed areas, and the need for control were reduced and the park grizzly population appears to be in the process of establishing its numbers at natural levels the tested hypotheses could not be rejected.

My conclusions are that the management program carried out in Yellowstone Park from 1970-74 has made measurable progress toward accomplishing its objectives of reducing injuries from grizzlies and restoring more natural conditions for the species. Removals under this program and from other causes probably temporarily reduced population numbers and emigration rates. These removals apparently are being or have already been compensated for by population reproduction, increased survivals of young, and reduced emigrations.

ACKNOWLEDGMENTS

My evaluationsof the park management program were made possible by the cooperation of many persons. Personnel that carried out the program and others that worked in the park routinely reported essential information. Other researchers greatly helped in the attempts to distinguish different family groups of grizzlies and to document bear distributions. Park Service research biologists Douglas Houston, Mary Meagher, and Richard Knight are thanked for the use of data obtained in the course of their research and for helpful reviews of the paper.

APPENDIX I

The scheduled and contingency procedures of the management program were as follows:

I. Scheduled Procedures:

1. (a) Construct a substitute fenced sanitary landfill dump for the Rabbit Creek site, or haul garbage outside park boundaries.
   (b) Enclose the Grant Village and Bridge Bay incinerators within bearproof fences.
   (c) Complete the installation of bearproof garbage cans in concession facilities during 1970.

2. Continue to use the Trout Creek dump during 1970.

3. Employ sufficient seasonal Rangers to assist in regulating campground use and necessary bear control beginning in 1970.

4. Promptly remove bears from developed areas by the use of live traps, immobilization drugs, or, if necessary, lethal devices. Animals which return to developed areas after being transplanted inside the park during a successive 2-year period (initial plus repeated intrusion) may be donated, as requested, to zoos or to states to reestablish bear populations in remote areas outside the park, or utilized as scientific study specimens for educational institutions (exceptions made for young bears and animals that were passing through and not habitually using a developed area).

5. Construct a substitute fenced sanitary landfill dump for the Trout Creek site by the spring of 1971, or haul garbage outside the park.

6. Have the grizzly population foraging entirely on natural foods by 1972, or by the earliest possible later date.

7. Continue to monitor daily reports of grizzly sightings, property damage, incidents, and control actions to provide records for guiding and evaluating the management program.

8. Obtain records of the numbers, sex, and age of marked and unmarked grizzlies killed or sighted in areas outside Yellowstone boundaries to document emigrations from the park grizzly population, contributions to sport hunting, and conflicts with agriculture.

9. Carry out research to develop improved control methods, test aversive agents and other methods to discourage bears from using park developed areas, and assess program results in relation to park objectives of preserving a grizzly population under natural conditions and providing for the safety of visitors.

10. Expand public information programs so bears do not obtain food from park visitors.

11. Work with towns, private individuals, and other state and Federal agencies to encourage the proper sanitary disposal of garbage so as not to attract bears to places of human habitation outside park boundaries.

II. Contingency Procedures:

1. Continue to use the Trout Creek dump beyond the scheduled 1971 closure on a "phase-out" basis if grizzly intrusions into developed areas begin to exceed control capabilities, or lead to excessive numbers of animals being destroyed.

2. Manipulate opening or closing dates of campgrounds; restrict camping to enclosed trailer or pickup units; and/or initiate temporary closure of campgrounds, if necessary.

References Cited

Cole, G. F. 1969. Grizzly bear (Ursus horribilis). Res. Note, Yellowstone Nat. Park. 8 p. (mimeo).

_____. 1970a. Grizzly bear management in Yellowstone Park, 1970. 2nd. Int. Conf. on Bear Res. and Mgmt., U. of Calgary, Alberta, and Res. Note No. 3, Yellowstone Nat. Park. 11 p. + appendix. (mimeo).

_____. 1970b. Preservation and management of grizzly bears in Yellowstone National Park. 2nd Int. Conf. on Bear Res. and Mgmt., U. of Calgary, Alberta, and BioScience 21(16):858-864.

_____. 1971. Progress in restoring a natural grizzly bear population in Yellowstone National Park. AAAS Symposium on Research in National Parks, Philadelphia, 29 Dec. 21 p. (mimeo).

_____. 1972. Grizzly bear-elk relationships in Yellowstone National Park. J. Wildl. Mgmt. 36(2):556-561.

_____. 1973. Management involving grizzly bears in Yellowstone National Park, 1970-72. U.S. Dept. of Interior, Nat. Park Serv., Natur. Res. Rpt. No. 7. 10 p.

_____. 1974a. Management involving grizzly bears and humans in Yellowstone National Park, 1970-73. BioScience 24(6): 335-338.

_____. 1974b. Population regulation in relation to K. Pres. at Mont. Chapter of the Wildl. Soc., Bozeman, Feb. 22. 17 p. (mimeo).

Cowan, I. McT. 1970. The status and conservation of bears (Ursidae) of the world--1970. pp. 343-367. in S. Herrero (ed.) 1972. Bears: their biology and management. Int. Union for Conserv. of Nature and Natur. Res., Morges, Switzerland. 371 p.

Cowan, I. McT., et al. 1974. Report of committee on the Yellowstone grizzlies. Nat. Acad. of Science Rpt. 61 p. (multi).

Craighead, J. J. and F. C. Craighead, Jr. 1967. Management of bears in Yellowstone National Park. Environ. Res. Inst. and Mont. Coop. Wildl. Res. Unit Rpt., U. of Montana. 113 p. (multi).

Craighead, J. J., M. Hornocker, and F. C. Craighead, Jr. 1969. Reproductive biology of young female grizzly bears. J. Reprod. Fert. Suppl. 6:447-475.

Craighead, J. J. and F. C. Craighead, Jr. 1971. Grizzly bear-man relationships in Yellowstone National Park. BioScience 21(16): 845-857.

Craighead, J. J., J. R. Varney, and F. C. Craighead, Jr. 1974. A population analysis of the Yellowstone grizzly bears. Mont. Forest & Conserv. Expt. Sta. Bul. 40, U. of Montana. 20 p.

Greer, K. R. 1972. Grizzly bear mortality and management programs in Montana during 1971. Job Progress Rpt., Proj. W-120-R-3, Mont. Fish and Game Dept. 44 p.

Hornocker, M. G. 1962. Population characteristics and social and reproductive behavior of the grizzly bear in Yellowstone National Park. M.S. thesis, Mont. State Univ., Missoula. 94 p.

Houston, D. B. 1971. The status of research on ungulates in northern Yellowstone National Park. AAAS Symposium on Research in National Parks, 29 Dec. 21 p. (mimeo).

Knight, R. R. 1974. Grizzly bear study team - first interim report. Unpubl. rpt., Interagency Grizzly Bear Studies. 11 p. (typewritten).

Knight, R. R., et al. 1975. Annual report, Interagency Grizzly Bear Study Team, 1974. 44 p. + appendices. (multi).

Martinka, C. J. 1971. Status and management of grizzly bears in Glacier Nat. Park, Montana. Trans. No. Amer. Wildl. and Natur. Res. Conf. 36:312-322.

_____. 1974. Population characteristics of grizzly bears in Glacier National Park, Montana. J. Mammalogy 55(1):21-29.

Mundy, K. R. D. and D. R. Flook. 1973. Background for managing grizzly bears in the national parks of Canada. Canadian Wildl. Serv. Rpt. Ser. No. 22. 35 p.

Murie, A. 1961. A naturalist in Alaska. The Devin-Adair Co., New York. 302 p.

Pearson, A. M. 1970. Population characteristics of the northern interior grizzly in the Yukon Territory, Canada. pp. 32-35 In S. Herrero (ed.) 1972. Bears: their biology and management. Int. Union for Conserv. of Nature and Natur. Res., Morges, Switzerland. 371 p.

_____. 1975. The northern interior grizzly bear (Ursus arctos L.) (in press).

Poore, M. E. D. 1962. The method of successive approximation in descriptive ecology. pp. 35-68 in J. B. Cragg (ed.) 1962. Advances in ecological research. Vol. 1. Academic Press, New York.

Roop, L. 1975. Grizzly bear. Progress Rpt., Proj. W-87-R-1. Wyo. Game and Fish Dept. 60 p. (multi).

Stokes, A W. 1970. An ethologist's views on managing grizzly bears. BioScience 20(21):1154-1157.

Tanner, J. T. 1966. Effects of population density on growth rates of animal populations. Ecology 47(5):733-745.

Wilcoxan, F. and Roberta Wilcox. 1964. Some rapid approximate statistical procedures. Lederle Laboratories, Pearl River, New York. 59 p.

Zinino, F. and S. Herrero. 1972. The status of the brown bear (Ursus arctos) in Abruzzo National Park, Italy, 1971. Biol. Conserv. 4(4):263-272.

INFORMATION PAPER No. 28
Yellowstone National Park
National Park Service
U.S. Department of the Interior

Glen F. Cole
Supv. Research Biologist
June 1975

NATURE AND MAN IN YELLOWSTONE NATIONAL PARK

Yellowstone National Park is administered as a natural area. Such areas are to preserve natural environments and native biota as an integrated whole (i.e. ecosystem) and to provide for the public enjoyment of same in ways that maintain natural conditions. Natural conditions exist to the extent that man does not change things from what they would otherwise be. Obviously changes will occur from natural processes and these need to be distinguished from those due to man. Management in natural areas is restricted to protecting against, removing, or compensating for the activities of man that cause departures from natural conditions.

The retreat of glaciers about 30,000 years ago permitted vegetation and wild animals to occupy the region that became Yellowstone Park. Primitive man arrived about 10,000 years before present and subsisted in small numbers until about 100 years ago when the park was established. All other native species are still present. With the possible exception of the Rocky Mountain wolf, representative populations of all native wild animals are yearlong residents. Additional numbers of elk and mule deer use the park in summer and make annual migrations from and back to wintering areas in Wyoming, Montana, and Idaho.

The present effects of modern man on the park environment and its resident biota are diagrammed on Fig. 1. As shown, less than 1% of the park's 2.2 million acres is permanently altered as roads or facilities that presently accommodate over 2 million visitors each year. The disposal of effluents and wastes from existing facilities does not appear to be causing departures from natural conditions in the remainder of the park.

The remainder of the park represents an ecological system where natural conditions are to be maintained or restored. As indicated on Fig. 1, the extent to which man suppresses naturally-caused fires is causing this system to be different from what it would otherwise be. Departures from natural conditions are greatest in the park's grassland areas which burned on the average every 20-25 years, and least in forest habitats that burned every 100-200 years.

Other measurable departures from natural conditions occur from man's past and present exploitation of native fishes. Less easily corrected departures occur in some portions of the park from past introductions of exotic fishes and plants. Minor departures also persist from eras when native predators and herbivores were artificially controlled, but these are being erased with the passage of time.

Overall, Yellowstone National Park appears to be sufficiently large and ecologically intact to make the objective of preserving a natural ecosystem of mountain environments and native biota obtainable. The objective of providing for the public enjoyment of same in ways that maintain natural

conditions also seems feasible, but only with limits on the numbers of visitors and the kinds of activities that can be accommodated. Most present departures from natural conditions can be corrected by not interfering with natural processes, by the appropriate regulation of humans, or the passage of time. Obviously, the preservation of natural ecological systems requires a "let it be" philosophy. Human judgments of what is good or bad in such systems can only be appropriate within the context of what is or is not natural.

Man's effects on wild animals that are not yearlong residents of the park present some conflicts with the attempts to restore and maintain a natural ecosystem inside the park. A viable population of wolves may only be restored if this species is also adequately protected on certain adjoining state lands. Mountain lions and grizzly bears will also need to be protected on some adjacent lands to occur in natural densities within the border regions of the park. The hunting of elk and mule deer on adjacent lands does not cause serious conflicts, unless such activities restrict migrations from the park.

Recommended Reading

Anonymous. 1973. Yellowstone fishing. Information Paper, Yellowstone Nat. Park, 1 p. (mimeo)

Cole, G. F. 1971. An ecological rationale for the natural or artificial regulation of native ungulates in parks. Trans. North Amer. Wildl. Conf. 36: 417-425.

_____. 1975. Population regulation and the consequences of artificially feeding wild animals. Information Paper, Yellowstone Nat. Park. 2 p. (mimeo)

_____. 1975. Natural vs. man-caused deaths of wild animals in national parks. Information Paper, Yellowstone Nat. Park. 3 p. + figs. (mimeo)

Despain, D. G. 1972. Fire as an ecological force in Yellowstone ecosystems. Information Paper, Yellowstone Nat. Park. 3 p. (mimeo)

Houston, D. B. 1971. Ecosystems of national parks. Science. 172: 648-651.

_____. 1974. History of the northern Yellowstone elk. Parts I and II: history and demography. Res. Rpt., YELL-N-29b, Yellowstone Nat. Park. 99 p. + appendix.

Meagher, Mary. 1974. Yellowstone bison, a unique heritage. Nat. Parks and Conserv. Mag., (May) p. 9-14.

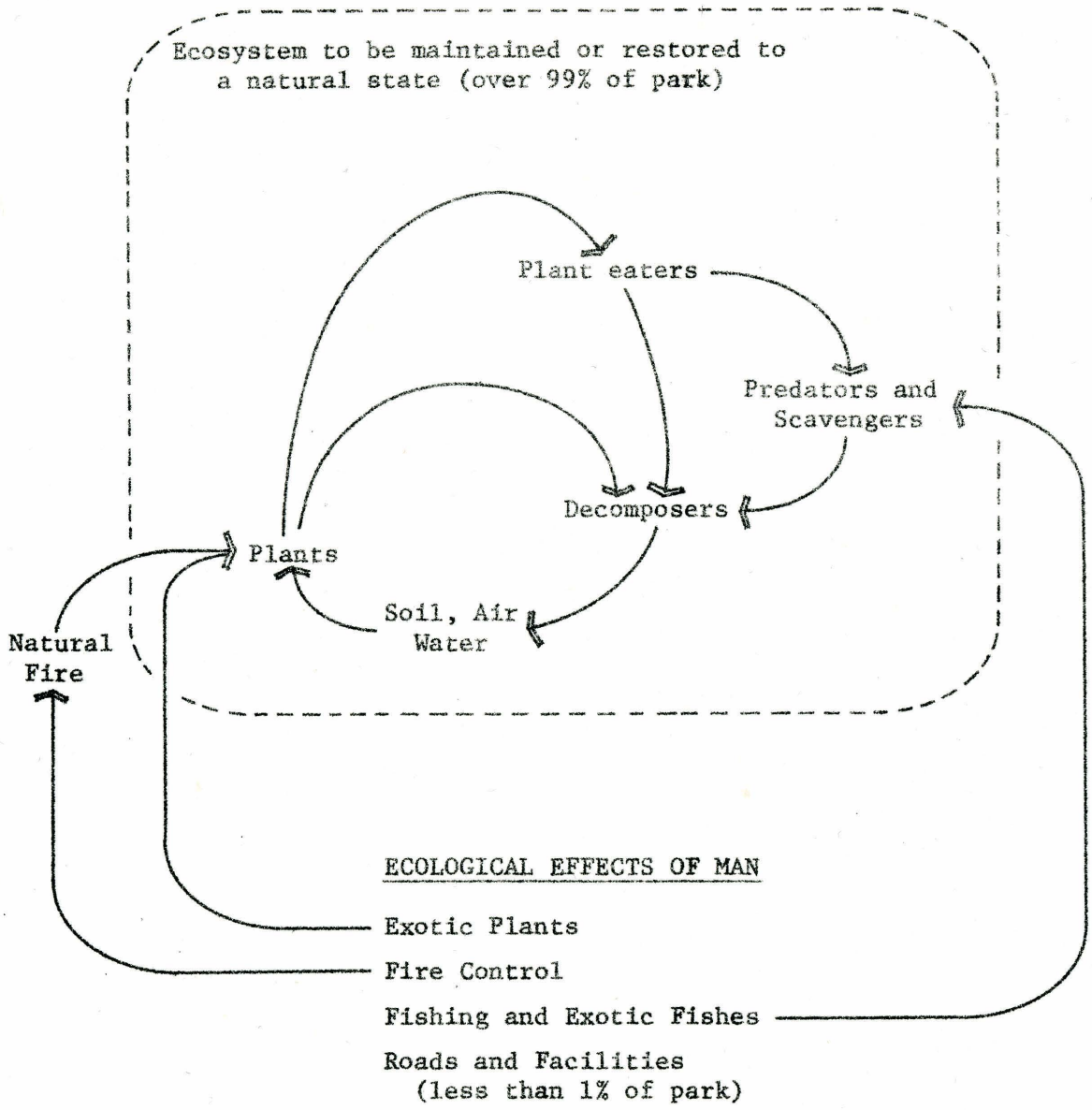


Figure 1. Present ecological effects of man on the cycling of nutrients in the park ecosystem.

National Park Service Yellowstone National Park

BRIEFING SCHEDULE--BIOLOGISTS

Yellowstone National Park is administered as a natural area. The objective in such areas is to preserve natural environments and native biota as integrated wholes (i.e., ecosystems) for their scenic, educational, cultural, and scientific values. The preservation of nature for esthetic and scientific reasons is aided by research which (1) produces basic reference information on the park environment, its biota, and natural ecological relationships (2) identifies problems (i.e., departures from natural conditions); and (3) documents the results of management to preserve or restore natural conditions.

Research is carried out in Yellowstone Park by five Park Service and two Fish and Wildlife Service biologists on a full-time basis, and by more than 100 researchers from other agencies or universities on a seasonal basis. This research ranges from basic studies on the park's geology, plant and animal life, to applied evaluations of management. The working documents for this research program are available from the Superintendent, Yellowstone National Park. Research publications and other related material that may be obtained from the Biologists' Office in Yellowstone Park are listed on the following pages.

8/14/74
Rev. 6/75

1967

Anon. Information for cooperating researchers. Information Paper, Yellowstone Nat. Park. 1 p. (mimeo.) Rev. 1973.

1968

Houston, D. B. Moose in Jackson Hole, Wyoming. Tech. Bull. No. 1, Grand Teton Nat. Park. 110 p.

1969

Cole, G. F. Mission-oriented research in natural areas of the National Park Service. Research Note, Yellowstone Nat. Park. 6 p. (mimeo.)

_____. Elk of Grand Teton and Southern Yellowstone National Parks. Research Report, GRTE-1. 192 p. (mimeo) -- out of print, library copies only.

1970

Anon. Habitat research. Information Paper, Yellowstone Nat. Park. 2 pp. (mimeo)

Cole, G. F. Grizzly bear management in Yellowstone Park, 1970. Research Note #3, 14 pp. (mimeo)

1971

Cole, G. F. Some considerations in the use of exclosures to assess the biotic effects of herbivores and departures from natural conditions in Yellowstone National Park. Information Paper, Yellowstone Nat. Park. 2 pp. (mimeo)

_____. An ecological rationale for the natural or artificial regulation of native ungulates in parks. Trans. of 36th North Amer. Wildl. and Natur. Res. pp. 417-425.

_____. Progress in restoring a natural grizzly bear population in Yellowstone National Park. AAAS Research in National Parks Symposium. 21 pp. (mimeo)

_____. Preservation and management of grizzly bears in Yellowstone National Park. BioScience 21(16):858-865.

_____. Yellowstone wolves (Canis lupus irremotus). Research Note No. 4, Yellowstone Nat. Park. 6 pp. (mimeo)

Houston, D. B. The status of research on ungulates in northern Yellowstone National Park. AAAS Research in National Parks Symposium. 21 pp. (mimeo)

_____. Ecosystems of national parks. Science 172:648-651.

Meagher, Mary. Winter weather as a population regulating influence on free-ranging bison in Yellowstone National Park. AAAS Research in National Parks Symposium. 17 pp. (mimeo)

_____. Snow as a factor influencing bison distributions and numbers in Pelican Valley, Yellowstone National Park. Snow and Ice Symposium, Ames, Ia. pp. 63-67.

_____. Yellowstone bison. Information Paper, Yellowstone Nat. Park. 2 pp. (mimeo.) Rev. 1974

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Cole, G. F. Grizzly bear-elk relationships in Yellowstone National Park. J. Wildl. Mgmt. 36(2):557-561.

_____. Restoration of a natural grizzly bear population in Yellowstone National Park. Information Paper, Yellowstone Nat. Park. 1 p. (mimeo)

Despain, D. G. Fire as an ecological force in Yellowstone ecosystems. Information Paper, Yellowstone Nat. Park. 3 pp. (mimeo)

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Houston, D. B. Cougar and wolverine in Yellowstone National Park. Research Note, Yellowstone Nat. Park. 2 pp. (mimeo) Rev. 1973.

Meagher, Mary. Brucellosis and the Yellowstone bison. Information Paper, Yellowstone Nat. Park. 3 pp. (mimeo)

1973

Anon. Yellowstone fishing. Information Paper, Yellowstone Nat. Park. 1 p. (mimeo)

Cole, G. F. Management involving grizzly bears in Yellowstone National Park, 1970-72. Nat. Res. Rpt. No. 7, National Park Service. Govt. Printing Office. 10 pp.

Despain, D. G. Vegetation of the Big Horn Mountains, Wyoming, in relation to substrate and climate. Ecol. Monogr. 43:329-355.

_____. Major vegetation zones of Yellowstone National Park. Information Paper, Yellowstone Nat. Park. 4 pp. (mimeo)

_____. Information for plant collectors. Information Paper, Yellowstone Nat. Park. 1 p. (mimeo)

Houston, D. B. Wildfires in northern Yellowstone National Park. Ecology 54(5):1111-1117.

Meagher, Mary. Brucellosis in Yellowstone bison--the controversy. Information Paper, Yellowstone Nat. Park. 2 pp. (mimeo)

_____. The bison of Yellowstone National Park. Scien. Monogr. Series, No. 1. Nat. Park Serv., Govt. Printing Office. 156 pp. + appendix.

1974

Anon. Yellowstone black bears. Information Paper, Yellowstone Nat. Park. 1 p. (mimeo)

Cole, G. F. Management involving grizzly bears and humans in Yellowstone National Park, 1970-73. BioScience 24(6):335-338.

_____. Population regulation in relation to K. Montana Chapter of Wildlife Society. 17 pp. (mimeo)

Houston, D. B. History of the northern Yellowstone elk. Parts I and II: History and Demography. Research report, YELL-N-29b, Yellowstone Nat. Park. 99 pp. + appendix.

Meagher, Mary. Yellowstone's bison--a unique wild heritage. Nat. Parks & Conserv. Mag. (May):9-14.

1975

Anon. Northern Rocky Mountain cooperative park studies program. Inform. Paper, Yellowstone Nat. Park. 1 p. (mimeo)

Cole, G. F. Natural vs. man-caused deaths of wild animals in national parks. Inform. Paper, Yellowstone Nat. Park. 5 pp.

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National Park Service Yellowstone National Park

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1969

Cole, G. F. Mission-oriented research in natural areas of the National Park Service. Research Note, Yellowstone Nat. Park. 6 p. (mimeo.)

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1971

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1972

Cole, G. F. Grizzly bear-elk relationships in Yellowstone National Park. J. Wildl. Mgmt. 36(2):557-561.

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_____. Forest insects and diseases. Information Paper, Yellowstone Nat. Park. 1 p. (mimeo)

Houston, D. B. Cougar and wolverine in Yellowstone National Park. Research Note, Yellowstone Nat. Park. 2 pp. (mimeo) Rev. 1973.

Meagher, Mary. Brucellosis and the Yellowstone bison. Information Paper, Yellowstone Nat. Park. 3 pp. (mimeo)

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Cole, G. F. Management involving grizzly bears in Yellowstone National Park, 1970-72. Nat. Res. Rpt. No. 7, National Park Service. Govt. Printing Office. 10 pp.

Despain, D. G. Vegetation of the Big Horn Mountains, Wyoming, in relation to substrate and climate. Ecol. Monogr. 43:329-355.

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Cole, G. F. Management involving grizzly bears and humans in Yellowstone National Park, 1970-73. BioScience 24(6):335-338.

_____. Population regulation in relation to K. Montana Chapter of Wildlife Society. 17 pp. (mimeo)

Houston, D. B. History of the northern Yellowstone elk. Parts I and II: History and Demography. Research report, YELL-N-29b, Yellowstone Nat. Park. 99 pp. + appendix.

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1975

Anon. Northern Rocky Mountain cooperative park studies program. Inform. Paper, Yellowstone Nat. Park. 1 p. (mimeo)

Cole, G. F. Natural vs. man-caused deaths of wild animals in national parks. Inform. Paper, Yellowstone Nat. Park. 5 pp.

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PROPOSED REGULATION - DRAFT COPY

WYOMING GAME AND FISH COMMISSION

CHAPTER XXXVII

REGULATION GOVERNING OUTFITTERS

Section 1. Authority. Sections 23.1-10, 23.1-32 and 23.1-53, Chapter 249, Session Laws of Wyoming 1973.

Section 2. Regulation and Effective Date. The Wyoming Game and Fish Commission hereby adopts the following regulations governing outfitters. These regulations shall become effective upon filing pursuant to Section 23.1-11, Chapter 249, Session Laws of Wyoming 1973 and shall remain in effect until modified or rescinded by the Commission action.

Section 3. Definitions. Game district shall be defined as a hunt-management area, as described in the official copy of Big Game Hunting orders; "outfitter", "state", "Commission", "Department", "take", "license" and "person" are interpreted to be as defined in Section 23.1-1, 23.1-2 and 23.1-52 of Chapter 249, Session Laws of Wyoming 1973.

Section 4. Application for and Issuance of Outfitter Licenses. Any person desiring to operate in the state of Wyoming as an outfitter and who qualifies as set forth in Section 23.1-52, Chapter 249, Session Laws of Wyoming 1973, shall make application for an outfitter's license on a form as provided by the Department. Said application will include game districts or areas in which the applicant desires to operate and the species of wildlife to be taken.

Prior to issuance of a license, the applicant shall secure written approval from game warden(s) in game districts or areas shown on the application.

Outfitter licenses will be issued by the game warden of the game district or area in which the outfitter's principal place of operation occurs.

Section 5. Examinations for Outfitters.

a. Examinations will be given on the third Saturday in December, the third Saturday in March and the third Saturday in August of each year. The sites where examinations will be given shall be established by the District Game Supervisors.

b. Any person who fails to pass the outfitter examination may again take an examination at the next scheduled examination date, as described in this Section.

c. After an outfitter candidate has successfully passed the examination, he will not be required to take the examination annually except under the following circumstances:

1. His outfitter's license has been revoked by the Commission.

2. The outfitter discontinues his business and desires to re-establish his outfitting business at a later date.

d. Passing the examination will constitute receiving a score of at least 70%.

Section 6. Regulation of Number of Outfitters. The game warden, with the approval of the District Supervisor, may regulate the number of outfitters operating in a game district or area. Outfitters may operate only in those areas approved on the outfitters application.

Section 7. Outfitters to Make Written Reports. Each outfitter will make a written report on a form provided by the Department and said report will be submitted to the Game Warden from whom the outfitter license was secured, on or before December 31 of each year. For licensees outfitting spring bear hunters, a written report must be submitted to the Game Warden issuing the license on or before July 15 of each year. The outfitter report will provide information which includes name and address of hunters or fishermen, name and address of guides employed, number and kind of wildlife taken, the game district or area in which wildlife was taken and any other information requested by the Department for wildlife management purposes.

WYOMING GAME AND FISH COMMISSION

By:

Dated:

Proposed Regulation - Draft Copy

WYOMING GAME AND FISH COMMISSION

CHAPTER X

REGULATION FOR IMPORTATATION, POSSESSION, SALE AND DISPOSITION OF LIVE WILDLIFE AND EXOTIC SPECIES

Section 1. Authority. Sections 23.1-3, 23.1-10 (x-bb), 23.1-75 and 23.1-87 of Chapter 249, Session Laws of Wyoming, amended 1975.

Section 2. Regulation and Effective Date. The Wyoming Game and Fish Commission hereby adopts the following regulations governing importation, possession, sale and disposition of live wildlife and exotic species. These regulations shall become effective upon filing pursuant to Section 23.1-11, Chapter 249, Session Laws of Wyoming, 1973 and shall remain in effect until modified or rescinded by the Commission.

Section 3. Definitions. For the purpose of these regulations all terms used herein are referenced to and adopted from all the definitions contained in Sections 23.1-1 and 23.1-2, Chapter 249, Session Laws of Wyoming 1973.

"Endangered and Threatened Species" shall be construed to mean those species contained in the "official" list published in the Federal Register as promulgated by the Secretary of Interior pursuant to the Endangered Species Conservation Act of 1969.

For the purpose of this regulation the Commission regards the first cross-breeding progeny of exotic species or wildlife with domestic animals as true exotic species or wildlife. Blood lines of less than 50% exotic species or wildlife shall be regarded as domestic.

Section 4. Importation. No person shall import into Wyoming from any source any living small game animal, fur bearing animal, protected animal, game birds, migratory birds, protected birds, predatory animals, predacious birds, fish, exotic species, endangered or threatened species, or any living

wildlife except as hereinafter permitted.

a. Exempt Wildlife and Exotic Species. The following wildlife and exotic species are exempt from the provisions of this regulation:

(1) Tropical fish, goldfish, or fishes normally confined in aquariums. (These categories shall not include the following species of fish, the importation of which is prohibited: Lampreys (Petromyzontidae); Freswater stingray (Potamotrygonidae); Freshwater shark (Carcharhinidae) Genus Carcharhinus; Bowfin (Amia calva); Gars (Lepisosteidae); Gizzard shad (Dorosoma cepedianum); European whitefish (Cyprinidae) Genus Leuciscus; (Characidae) Banded tetra (Astyanax fasciatus): Piranha Subfamily: Serrasalminae, Genera Serrasalmus, Serrasalmo, Pygocentrus, Teddyella, Rooseveltiella & Pygopristus; Candiru or Carnero (Cetopsidae & Trichomycteridae); White Perch (Percichthyidae); Freshwater drum (Aplodinotus grunniens) Grass carp (Ctenopharyngodon idellus); Pike Top Minnow (Belonesox belizanus) Snakehead (Ophicephalidae) Genus; Ophicephalus and Channa; Walking catfish (Clariidae) Genus: Clarias, Heteropneustes, Dinotopterus; Tiger fish (Hoplias malabaricus).

(2) Non-indigenous reptiles and amphibians or mollusks [This category does not exempt the African giant snail (Pulmonata), Giant toad (Bufo marinus) and the African clawed frog (Xenopus laevis). The importation of these specific species is prohibited.]

(3) Canaries

(4) Non-Indigenous house finches

(5) Parakeets (The monk parakeet is not exempted under this category and its importation is prohibited).

(6) Toucans

(7) Peacocks and guinea hens

(8) Lovebirds

(9) Mynah birds

(10) Parrots

(11) Hamsters, chinchillas, guinea pigs

(12) White mice, rats or gerbils

(13) European ferrets (Mustela Furo)

(14) Monkeys and other primates

(15) Hawks or falcons, legally acquired, imported or held under terms of a current falconry regulation.

(16) Game birds imported and held under terms of Section 23.1-69 or 23.1-91 of Chapter 249, Session Laws of Wyoming 1973.

(17) Those species of wildlife or exotics legally possessed and in transit through the state.

(18) Those species of wildlife or exotics legally possessed and confined by circuses performing in the state on a temporary basis.

(19) Any wildlife or exotic species for the purpose of exhibition or research by governmental institutions or other programs of general public benefit or of significance to the wildlife resources as determined and permitted by the Wyoming Game and Fish Commission.

b. Permitted Species. Any person who desires to import into the state of Wyoming any big game animals, trophy game animals, game birds, migratory game birds, exotic species, fish or wildlife not exempt under subsection a. of this Section shall comply with the following provisions relating to importation:

(1) No person shall import into the state of Wyoming any of the species enumerated in subsection b. prior to obtaining an importation permit from the Wyoming Game and Fish Department. Said importation permits shall be granted by the Department subject to the following provisions:

(a) Health certificate: warm-blooded wildlife. All warm-blooded wildlife or exotic species imported into Wyoming shall be accompanied by an

official health certificate issued by an approved, accredited, licensed, graduate veterinarian or an approved inspector, and it shall be approved by the livestock and sanitary official of the state of origin or by the equivalent official of the Animal and Plant Health Inspection Service, Veterinary Services, United States Department of Agriculture. A copy shall be forwarded to the Wyoming Game and Fish Department, Chief Game Warden An official health certificate is a legible record covering the requirements of the Wyoming Game and Fish Department accomplished on an official form from the state of origin or an equivalent form from the United States Department of Agriculture. The health certificate shall contain the names and addresses of the consignor and the consignee, the origin of shipment, the final destination and an accurate description or identification of the animals. It shall indicate the health status of the animals involved, including dates of vaccinations, if any and other dates and results of any tests deemed necessary by the Wyoming Game and Fish Department or the veterinarian or inspector issuing the certificate.

(b) Any cold-blooded wildlife or exotic species, including their eggs and young, to be imported under a permit, must be certified to be free of the below listed diseases or pathogens inducing those diseases, by a pathologist accepted by the Department as being competent in the field of fish disease diagnosis:

aa. I.H.N. - Infectious Hematopoietic Necrosis of Salmonids

bb. I.P.N. - Infectious Pancreatic Cecrosis of Salmonids

cc. V.H.S. - Viral Hemorrhagic Septicemia of Salmonids

dd. C.C.V. - Channel Catfish Virus (Virus disease syndrome of channel catfish)

ee. Whirling Disease - Myxosoma cerebralis of Salmonids

ff. K.D. - Corynebacterial kidney disease of Salmonids

gg. Ceratomyxa shasta - Disease of Salmonids

hh. European Gill Rot - Branchiomycea sanguinis

ii. Blood Fluke - Cardicola (Sanguinicola sp.)

jj. Furunculosis (Aeromonas salmonicida)

kk. Red Mouth - (Hagerman Type)

ll. Any other communicable disease designated by the Department.

Copies of disease free certificates must be provided to the Department prior to entry into the state of any wildlife or exotic species to be imported. Unless otherwise exempted by the Department, the applicant shall apply to the Department for copies of inspection procedures to be followed or for recommendations by the Department to the applicant as to the type of disease free certification which must be obtained.

(c) Holding Facilities. Before a permit is issued to import or possess live wildlife or exotic species, Department personnel may inspect the applicant's facilities, to be used in confining said wildlife or exotic species to determine their adequacy.

Facilities for confinement of wildlife and exotic species shall be of such construction and size as to provide reasonable space and protection for the comfort of the species held and to prevent their escape. The type and size of facilities and/or fence structures used for confinement shall depend upon the species and number of animals. Provided further, any persons desiring to import species capable of climbing or burrowing will be required to install a mesh fence of sufficient design to prevent climbing and also a fence of mesh design including an apron to be buried to deter escape of such species.

(d) Identification Requirements. Before a permit is issued to import or possess live wildlife or exotic species; game and trophy species,

as permitted by these regulations, the applicant shall register with the Commission the type of tattoo or other permanent marking to be placed on the animals. The type of tattoo or marking shall depend upon the type of species to be imported and the Commission shall make the final determination as to the suitability of identification of the animals. All such imports shall be so identified ~~together with their get born in this state~~.

Section 5. Possession of Wildlife and Exotics. Any person who has received an importation permit may possess and confine permitted wildlife or exotic species. Any person who has possession of wildlife or exotic species on the effective date of these regulations shall abide by and comply with the hereinafter enumerated provisions:

a. Release of Wildlife or Exotic Species. No live wildlife or exotic species legally imported or possessed in the state pursuant to a permit issued prior under these regulations, may be abandoned or released from the holding facilities without written permission of the Department.

b. Inspection by Department Personnel. Any person issued a permit under these regulations shall, during the term of the permit, allow inspection of records, holding facilities, wildlife and exotic species by Department personnel during reasonable hours.

c. Animals Possessed Prior to Regulation. Any person legally possessing wildlife, big game, trophy game or exotic species in this state on the effective date of this regulation shall apply for a possession permit 30 days or more prior to expiration of his present permit authorizing possession. When an application for a permit for previously held wildlife or exotics is received, the Commission shall consider the present premises under which said species are held to determine if they are adequate under the confinement regulations hereinabove stated.

d. Exempted Fishes. Any person possessing any fish under the pro-

visions of Sections 23.1-71, 23.1-87, 23.1-88 or 23.1-100 of Chapter 249, Session Laws of Wyoming, 1973, are exempt from these possession regulations providing that all the restrictions on importation have been previously met and a permit has been granted.

e. Sale or Taking of Wildlife and Exotic Species. No person shall sell any living pronghorn antelope, black bear, grizzly bear, mule deer, whitetail deer, elk, moose, mountain goat, bighorn sheep, wolf, mountain lion, falcon or hawk, except that game farm operations existing on or before January 1, 1975 may sell, kill or conduct hunting seasons and harvest permitted wildlife and exotic species in accordance with regulations established below:

(1) Permitted wildlife and exotics may be taken from September 1 through December 31.

(2) Permitted wildlife and exotics taken by hunters may be removed from the permitted premises after the carcass has been inspected by a Wyoming Game and Fish Department representative and a Wyoming game tag or Wyoming Interstate game tag and affidavit issued.

(3) Permitted living wildlife or exotics may be removed from the permitted premises at any time after notification to a Department representative and upon receipt of written authorization issued after an on-site inspection of animals.

Section 6. Revocation of Permit. The Commission may revoke any permit hereunder issued for not complying with these regulations. Provided further that a revocation of the permit does not preclude a criminal prosecution in a competent court with proper jurisdiction for a violation of the Commission regulations.

Section 7. Permits. All permits issued under this regulation will expire on the last day of December of the year of issuance. Any person possessing wildlife or exotic species under a permit shall renew said permit

by making application to the Department at least thirty (30) days prior to the end of the year.

Section 8. Removal of State Wildlife. Before any permit for importation or possession will be issued, the applicant shall show proof that his confinement facilities do not contain any wildlife belonging to the state of Wyoming. ~~All~~ IF wildlife belonging to the state of Wyoming ~~shall~~ ARE Contained within Confinement FACILITIES they may be removed in a safe and orderly ~~be removed in a safe and orderly manner and under the supervision of the~~ MANNER as Determined By the Commission. ~~Wyoming Game and Fish Department.~~

Section 9. Repeal. Chapter X and supplements thereto pertinent to wildlife or exotics held in captivity previously adopted by the Wyoming Game and Fish Commission are hereby repealed and rescinded by the adoption of these regulations.

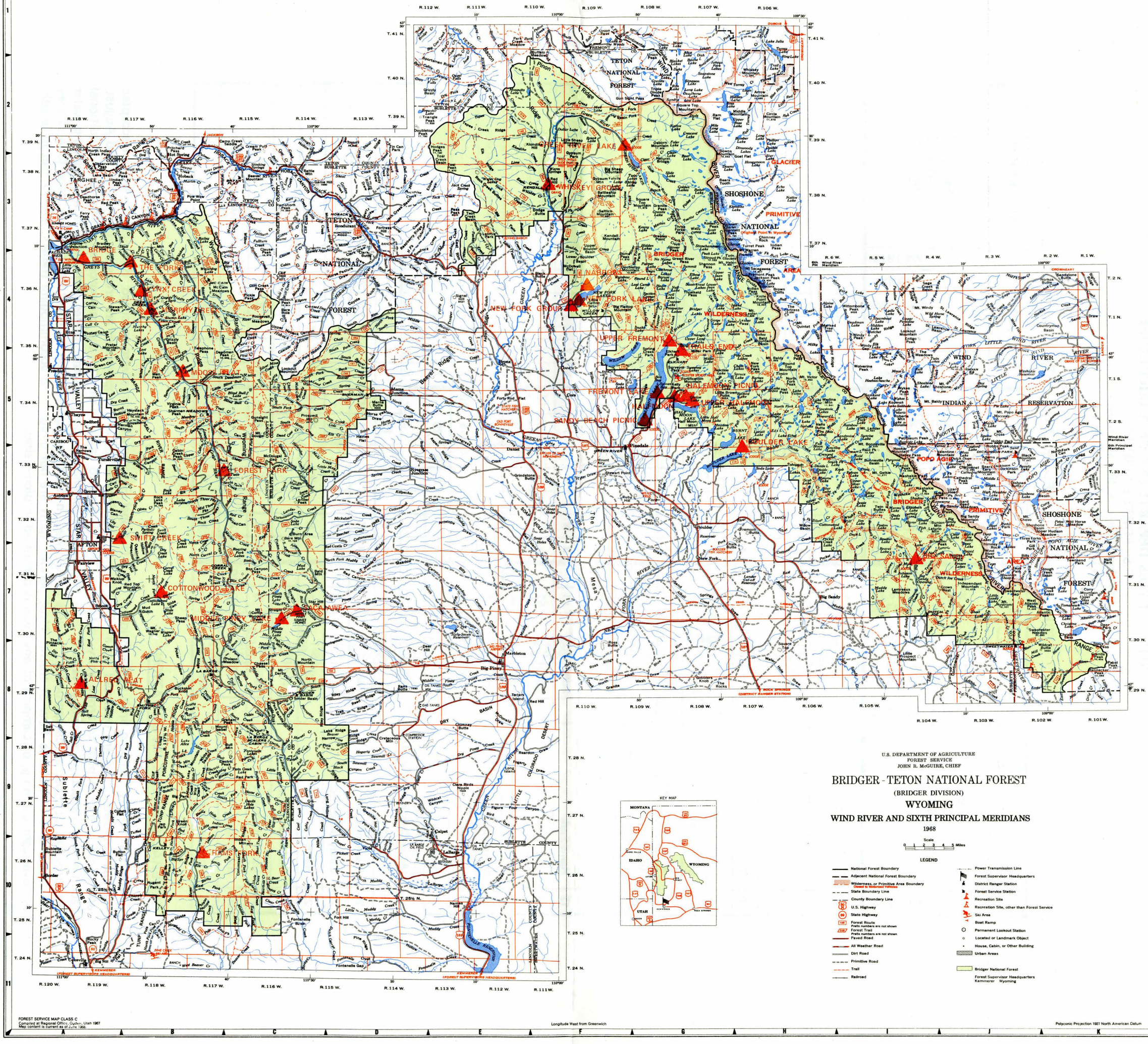
UNITED STATES DEPARTMENT OF AGRICULTURE
U.S. FOREST SERVICE
Bridger-Teton National Forest
Jackson, Wyoming 83001

RECREATION SITE INFORMATION SHEET

MAP KEY	NAME OF RECREATION SITE	GENERAL INFORMATION					FACILITIES							ACTIVITIES AND ATTRACTIONS						
		CHARGE AREA	ELEVATION	SEASON OF USE	MILES FROM NEAREST TOWN	DAYS LIMIT	CAMPING	PICNICKING	GROUP	DRINKING WATER	BOAT LAUNCHING	NO. OF FAMILY CAMPING UNITS	TRAILERS	FISHING	HUNTING	SWIMMING	BOATING	LAKE	STREAM	SPECIAL FEATURES NEARBY
1	Bridge		5900	6/1-9/30	4		X	X		X		5	3	X	X				X	
2	The Forks		6000	6/1-9/30	10		X	X		X		6	6	X	X				X	
3	Lynx Creek		6200	6/15-9/30	15		X	X		X		14	12	X	X				X	
4	Murphy Creek		6300	6/15-9/30	17		X	X		X		10	7	X	X				X	
5	Moose Flat		6400	6/15 9/30	26		X	X		X		10	6	X	X				X	
6	Forest Park		7000	6/15-9/30	39		X	X		X		12	9	X	X				X	
7	Swift Creek		6300	5/15-10/15	2		X	X		X		16	4	X	X				X	
8	Cottonwood Lake		7600	6/15-9/30	7		X	X		X	X	6	5	X	X	X	X	X	X	
9	Allred Flat		7100	6/1-10/15	23		X	X		X		32	25	X	X				X	
10	Middle Piney Lake		8600	7/1-9/30	27		X	X		X	X	5	5	X	X	X	X	X		
11	Sacajawea		8300	6/15-9/30	25		X	X		X		26	19	X	X				X	
12	Hams Fork		8000	6/15-9/30	41		X	X		X		10	4	X	X	X			X	
13	Green River Lake		8000	7/1-9/30	52		X	X		X		23	18	X	X	X	X	X	X	Wilderness Entrance
14	Whiskey Grove		7600	6/1-10/1	36	10	X	X		X		9	9	X	X				X	
15	Narrows		7800	6/1-10/1	26		X	X		X	X	19	19	X	X	X	X	X		Wilderness Entrance
16	New Fork Lake		7800	6/1-10/1	24		X	X		X	X	15	10	X	X	X	X	X		
17	New Fork Group		7800	6/1-10/1	24				X	X	X	20	--	X	X	X	X	X		
18	Upper Fremont (Accessible by boat or Trail)		7400	6/1-9/30	16		X	X				3	--	X	X	X	X	X	X	Wilderness Entrance
19	Trails End		9100	6/15-9/30	16		X	X		X		11	9		X					Wilderness Entrance
20	Fremont Lake		7400	5/15-10/1	7	7	X	X		X	X	64	42	X		X	X	X		
21	Sandy Beach Picnic		7600	5/15-10/1	5			X		X		4	--	X		X		X		
22	Halfmoon		7600	6/1-10/15	10	10	X	X		X	X	8	8	X	X	X	X	X		
23	Halfmoon Picnic		7600	6/1-10/15	8			X		X		4	--	X	X	X	X	X		
24	Upper Halfmoon		7600	6/1-10/15	9		X	X		X	X	4	--	X	X	X	X	X		
25	Big Sandy		9100	6/1-10/1	60	10	X	X		X		12	11	X	X				X	Wilderness Entrance
26	Boulder Lake		8000	6/1-9/15	25		X	X		X		25	--	X	X		X	X		

GENERAL CAMPING INFORMATION

There is a 14-Day camping limit in the Bridger-Teton National Forest unless otherwise specified. Reservations are not accepted for any campsites, and are operated on a "First-Come, First-Served" basis. Campgrounds are crowded during July and August, and campers should plan to arrive early in the day if they plan to camp in any of the campgrounds in the area. Additional facilities are available in adjoining National Park Service and commercial campgrounds. Tables, grills, toilets, and drinking water are provided at most all campgrounds. Trailers are allowed in most campgrounds on an equal basis with tents as long as they do not interfere with the flow of traffic. Most parking spurs are not designed to accommodate trailers over 22 feet in length. No overnight camping, or camping of any type is permitted in picnic sites.



U.S. DEPARTMENT OF AGRICULTURE
FOREST SERVICE
JOHN R. McGUIRE, CHIEF

BRIDGER - TETON NATIONAL FOREST

(BRIDGER DIVISION)

WYOMING

WIND RIVER AND SIXTH PRINCIPAL MERIDIANS

1968

Scale
0 1 2 3 4 5 Miles

LEGEND

- National Forest Boundary
- Adjacent National Forest Boundary
- Wilderness, or Primitive Area Boundary (Closed to Motorized Vehicles)
- State Boundary Line
- County Boundary Line
- U.S. Highway
- State Highway
- Forest Route (Prefix numbers are not shown)
- Forest Trail (Prefix numbers are not shown)
- Paved Road
- All Weather Road
- Dirt Road
- Primitive Road
- Trail
- Railroad
- Power Transmission Line
- Forest Supervisor Headquarters
- District Ranger Station
- Forest Service Station
- Recreation Site
- Recreation Site, other than Forest Service
- Ski Area
- Boat Ramp
- Permanent Lookout Station
- Located or Landmark Object
- House, Cabin, or Other Building
- Urban Areas
- Bridger National Forest

Forest Supervisor Headquarters
Kemmerer Wyoming

FOREST SERVICE MAP CLASS C
Compiled at Regional Office, Ogden, Utah 1967
Map content is current as of June 1966.

Longitude West from Greenwich

Polyconic Projection 1927 North American Datum

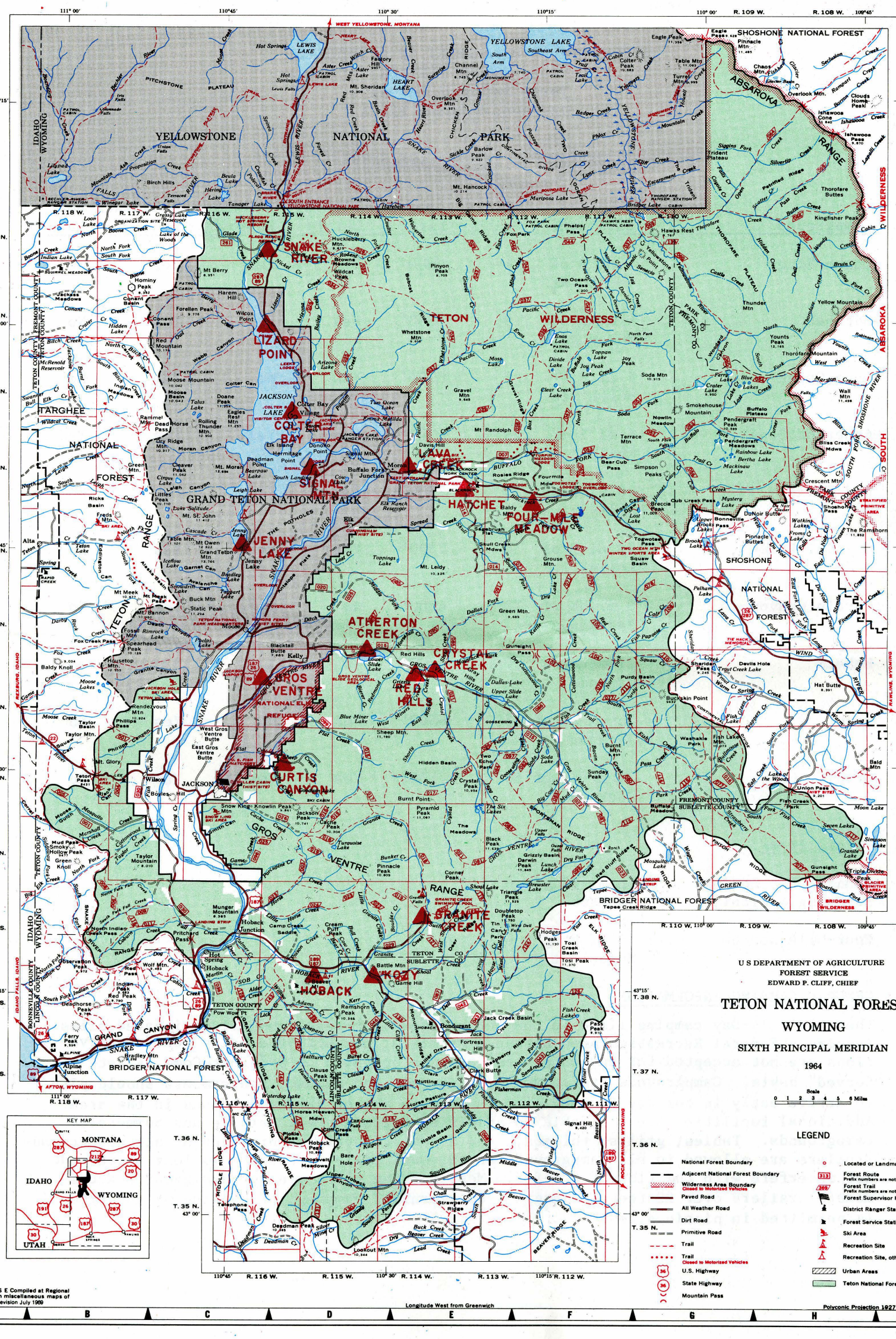
UNITED STATES DEPARTMENT OF AGRICULTURE
U.S. FOREST SERVICE
Teton National Forest
Jackson, Wyoming 83001

CAMPGROUND INFORMATION SHEET

Campground	Location	No. of Units	Approx. Elev.	Fishing Nearby	Swimming Nearby	Horseback Riding	Boat Launch
Snake River	2 mi S of YNP S Gate	24	6600'	Yes	Yes	Yes	No
Hatchet	9 mi E of Moran Jct.	9	7000'	Yes	No	Yes	No
Lava Creek	4 mi E of Moran Jct.	5	6700'	Yes	No	Yes	No
Atherton Creek	6 mi E of Kelly	20	7200'	Yes	Yes	Yes	Yes
Red Hills	10 mi E of Kelly	5	7300'	Yes	No	Yes	No
Crystal Creek	11 mi E of Kelly	6	7300'	Yes	No	Yes	No
Curtis Canyon	8 mi NE of Jackson	12	6800'	No	No	Yes	No
Hoback	21 mi SE of Jackson	20	6200'	Yes	No	Yes	No
Kozy	26 mi SE of Jackson	8	6500'	Yes	No	Yes	No
Granite Creek	35 mi SE of Jackson	53	7100'	Yes	Yes	Yes	No
Picnic Areas							
Granite Hot Springs Swimming & Picnic	35 mi SE of Jackson	6					
Four-Mile Meadow	14 mi E of Moran Jct.	6					

GENERAL CAMPING INFORMATION

There is a 14-Day camping limit in the Teton National Forest, and all designated sites require a Federal Recreation Area Entrance Permit or payment of a daily fee. Reservations are not accepted for any campsites, and are operated on a "First-Come, First-Served" basis. Campgrounds are crowded during July and August, and campers should plan to arrive early in the day if they plan to camp in any of the campgrounds in the area. Additional facilities are available in adjoining National Park Service and commercial campgrounds. Tables, grills, toilets, and drinking water are provided at all campgrounds. Trailers are allowed in all campgrounds on an equal basis with tents as long as they do not interfere with the flow of traffic. Most parking spurs are not designed to accommodate trailers over 22 feet in length. No overnight camping, or camping of any type is permitted in picnic sites.



U S DEPARTMENT OF AGRICULTURE
FOREST SERVICE
EDWARD P. CLIFF, CHIEF

TETON NATIONAL FOREST
WYOMING
SIXTH PRINCIPAL MERIDIAN
1964

Scale 0 1 2 3 4 5 6 Miles

KEY MAP

LEGEND

- National Forest Boundary
- Adjacent National Forest Boundary
- Wilderness Area Boundary — Closed to Motorized Vehicles
- Paved Road
- All Weather Road
- Dirt Road
- Primitive Road
- Trail
- Trail — Closed to Motorized Vehicles
- U.S. Highway
- State Highway
- Mountain Pass
- Located or Landmark Object
- Forest Route — Prefix numbers are not shown
- Forest Trail — Prefix numbers are not shown
- Forest Supervisor Headquarters
- District Ranger Station
- Forest Service Station
- Ski Area
- Recreation Site
- Recreation Site, other than Forest Service
- Urban Areas
- Teton National Forest Land

FOREST SERVICE MAP CLASS E Compiled at Regional Office, Ogden, Utah. 1964, from miscellaneous maps of unknown accuracy. Limited Revision July 1968

Longitude West from Greenwich

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