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ALASKA RANGE GRIZZLY BEAR STUDIES

By

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VOLUME I

Project Progress Report
Federal Aid in Wildlife Restoration
Project W-21-2, Job 4.16R

(Printed November 1982)

JOB PROGRESS REPORT (RESEARCH)

State: Alaska

Cooperators: Harry V. Reynolds

Project No.: W-21-2 Project Title: Big Game Investigations

Job No.: 4.16R Job Title: Population Structure, Reproductive Biology, and Movement Patterns of Grizzly Bears in the Northcentral Alaska Range

Period Covered: July 1, 1980 through June 30, 1981

SUMMARY

In 1981, the 1st phase of a study was begun to determine the status and reproductive biology of a grizzly bear population in the northcentral Alaska Range. During May and June 1981, 5 bears were captured and radio-collared. The nutritional condition of all captured bears was poor, based on the protrusion of vertebrae and pelvis beneath the hides. Bear No. 1301, a 6.5-year-old male, was found dead the day after capture. Necropsy showed no external or internal fatty tissue; pulmonary edema was evident.

Of the bears captured, 2 were young adult males, 2 were subadult females, and 1 was an adult female with 2 yearling offspring. During aerial searches, 4 other solitary bears were observed but not captured.

Historical sport hunting records of grizzly bears in the study area during 1961-81 were reported. Analysis of the effects of present harvest on the population will await determination of population structure and reproductive biology.

Key words: grizzly bear, harvest rates, Interior Alaska, population biology, Ursus arctos

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BACKGROUND

As problems concerning the management of Alaska's wildlife become more complex, there is a growing need for specific biological information on wild species. Human populations are rapidly increasing in Alaska; consequently, user demands on wildlife (including hunting) are also increasing. Concurrently, the amount of public land available for wildlife habitat and accessible to wildlife consumers has declined due to resource development and changes in land status resulting from Alaskan lands legislation. In Alaska, because of their requirements for large home ranges and their low reproductive potential, grizzly bears (Ursus arctos) are among the most susceptible of the large mammals to these forces of change.

Few research studies have addressed those aspects of grizzly bear biology which are necessary to answer these management problems. Specifically, no population data are available for Interior Alaska north of the Alaska Range except for 2 studies which took place in Denali National Park (Dean 1976, Valkenburg 1976). Elsewhere in Alaska, baseline biological information has been determined for brown/grizzly bear populations on the south side of the Alaska Range (Miller and Ballard 1982), on the Alaska Peninsula (Lentfer et al. 1969, Glenn et al. 1976), and in the Brooks Range (Crook 1971, 1972; Reynolds 1976, 1978, 1981). However, there is no evidence that data from these areas are applicable to the northcentral Alaska Range.

In order to assess the impacts of changes in user pressure or changes in availability of habitat, it is first necessary to know bear population status. In the past, management decisions have been based on the number, sex, and age of bears killed and reported by hunters. Other than the use of these parameters and general estimations of the status of grizzly populations, no data are available to use as a basis for regulating harvest rates. Even though use of these data as a basis for management has been adequate in many cases, more precise information is needed for present and future management. Management strategies for any area must consider the relative numbers of, and relationships between, wildlife species. Management goals for grizzly bears may require increasing, decreasing, or maintaining populations to

reach desired densities that are compatible with population levels of ungulates.

Although safe harvest rates of 2-4% of the grizzly population have been proposed for areas of similar habitat in Canada (Lortie 1978), and rates of 2-3% have been used as a basis for harvest in the Brooks Range (Reynolds 1976), additional information is necessary before appropriate harvest rates can be estimated for the Alaska Range. The following baseline information must be known in order to accurately predict the effects of various levels of harvest: population density and structure, movement and home range patterns, mortality and survival rates, and reproductive capacity including age at 1st breeding, litter size, and interval between litters (Craighead et al. 1974, Reynolds 1978, Bunnell and Tait 1980).

OBJECTIVE

To determine population density, structure, reproductive potential, and movements of grizzly bears in the northcentral Alaska Range.

PROCEDURES

The 3,900-sq km (1,500 sq mi) area of intensive study lies in the mountains and foothills of the northcentral Alaska Range. The study area boundaries are the Wood River and Gold King Creek drainages to the west, the crest of the Alaska Range to the south, the Delta Creek drainage to the east, and the southern edge of the Tanana Flats (approx. 64°N latitude) to the north.

Elevations in the area range from 500 to 3,700 m (1,600 to 12,000 ft), although searches were only conducted where elevations were under 1,800 m (6,000 ft). Most rivers in the area flow through U-shaped, glacially formed valleys and are fed by active glaciers. Treeline occurs at approximately 900 m (3,000 ft) and dense patches of willow (Salix spp.) or alder (Alnus crispa) which bears use for cover may be present to about 1,200 m (4,000 ft).

Capture procedures followed standard helicopter immobilization techniques used on grizzly bears in the Brooks Range (Reynolds 1974, 1976, 1978). Both Bell 206B and Hughes 500D helicopters were used. In the area's precipitous terrain, the Hughes helicopter was preferred due to its maneuverability and climbing power. Bears were immobilized with Sernylan (100 mg phencyclidine hydrochloride/ml; Bio-Ceutic Laboratories, St. Joseph, Mo.) and acepromozine maleate (10 mg/ml; Ayerst Labs, New York, N.Y.) injected into the rump using Cap-Chur equipment (Palmer Chemical and Equipment Co., Douglasville, Ga.). All animals were measured, weighed, tattooed for permanent identification, ear-tagged, and marked with individually coded visual ear

flags as described by Reynolds (1974). In addition, bears were fitted with radio collars (Telonics, Inc., Mesa, Ariz.).

A 1st premolar tooth was extracted for determination of age based on cementum layering (Mundy and Fuller 1964, Stoneburg and Jonkel 1966, Craighead et al. 1970). The techniques used to section, stain, and mount teeth for age determination were described by Glenn (1972). Whole blood was collected from femoral arteries using 10-cc Vacutainers (Bection-Dickinson, Rutherford, N.J.). Blood was centrifuged and sera frozen for blood chemistry studies being conducted by Robert Brannon of the University of Alaska as master's degree research. Saliva swabs were collected for identification of aerobic and anaerobic bacteria present in bear mouths. Richard G. Parry, M.D., of the Eye, Ear, Nose, and Throat Clinic in Fairbanks is analyzing the results from these collections to facilitate treatment of bear attacks on humans. Fecal samples were collected to aid in determining seasonal food habits and are being analyzed by John Hechtel.

Information on breeding biology was obtained by (1) recording data on the size, coloration, and lactating condition of the mammae, condition of the vulva, baculum size, and position of the testes; (2) observing male-female pairing; and (3) recording the number of cubs and age structure of family groups.

Movements and home range sizes will be determined from resightings of marked grizzlies during aerial surveys and from relocating animals fitted with radio transmitters. Radio-collared bears will be relocated using a Super Cub equipped with a radio receiver-scanner and 4-element, high-gain Yagi antennas.

A population estimate will be made using the direct count method (Reynolds 1974, 1976, 1978; Pearson 1976) and will be compared with results from a Lincoln Index estimate (Overton 1969).

Once the grizzly bear population size, status, structure, and movement patterns are determined, the effects of different harvest rates will be examined. Hunting pressure will be increased by regulatory changes or by directing hunting effort to the area by using the news media and contact with hunters at Alaska Department of Fish and Game offices. Changes in population size and productivity will be monitored and analyzed following a period of increased harvest rate.

RESULTS AND DISCUSSION

The sample size of weights and measurements (Table 1) was too small for comparison with brown/grizzly bear populations from other areas of Alaska. The nutritional condition of all bears captured was poor, based on the protrusion of the pelvis and vertebrae beneath the hide. Bear No. 1301 did not recover from immobilization. The day after capture, a necropsy showed very

Table 1. Sex, age, weights (kg), and measurements (cm) of grizzly bears captured in the northcentral Alaska Range, 1981.

Bear no.	Date of capture	Sex	Age cem[1] (yrs)	Measured weight	Total length	Shoulder height	Hind foot	Neck	Girth	Body length	Head width	Head length	Left upper canine	Left lower canine
1301	5/18/81	M	6.5	120	180	119	31	61	114	101	21.0	36.8	3.4	3.0
1302	5/19/81	F	3.5	75	165	102	26	55	100	90	16.7	30.5	3.0	2.7
1303	6/17/81	F	2.5	57	122	87	23	53	89	78	15.1	27.7	2.5	2.7
1304	6/18/81	M	5.5	136	196	121	30	63	108	109	20.0	36.0	3.9	3.5
1305	6/18/81	F	24.5	113	174	103	28	60	100	96	20.1	32.6	3.0	3.3

[1] Age determined from cementum layering.

little external or internal fatty tissue; pulmonary edema was evident. Whether the edema was present prior to immobilization was unknown; drug dosage was light (1.5 mg Sernylan/kg body wt), but the immobilization effect was heavy.

Only 5 bears were captured and radio-collared during May and June 1981 (Table 2). Of these, 2 were young adult males, 2 were subadult females, and 1 was an adult female with 2 yearling offspring which were not captured. During aerial searches, 4 additional solitary bears were observed but not captured.

Although capture of 15 bears was planned for 1981, light winter snowfall and unseasonably warm weather resulted in poor sighting conditions and fewer bears captured. Aerial searches were most successful between 0600 and 1100 hours. From 1100 until 1900 hours, turbulence from high winds or thunderstorms made aerial observations difficult. Although weather conditions usually improved after 1900 hours, lighting conditions then began to deteriorate.

Population densities of grizzly bears reported in other areas of Interior and northern Alaska vary between 1 bear/24-38 km^2 in selected areas of Denali National Park (Dean 1976), 1/41 km^2 in the Susitna drainage south of the Alaska Range (Miller and Ballard 1982), 1/148 km^2 in the eastern Brooks Range (Reynolds 1976), and 1/42 km^2 in the western Brooks Range (Reynolds 1980). Based on my subjective evaluation of the occurrence of habitat preferred by bears, of bear diggings, and other signs, I estimate that the area grizzly density is 1 bear/40-50 km^2. Total estimated grizzly population is 80-100 in the 3,900-km^2 area. These estimates are preliminary and subject to change as additional data are collected.

The greatest source of mortality in this population is probably hunting. The number of grizzly bears reported killed by hunters annually in the area has ranged from 1 to 14 during 1961-81 (Table 3). Prior to 1981, when the high annual reported kill of 14 occurred, the mean annual take was 4.6. Females compose 32% of the annual kill, but only 11% of these are taken during spring hunts. If the population has remained relatively stable during the 1961-81 period and future research confirms a density estimate of 1 bear/40 km^2, the overall harvest rate has been between 4.5-5.0% of the population. However, before a usable sustained harvest rate can be calculated, sex- and age-specific mortality and population structure, productivity, and survival must be determined (Bunnell and Tait 1978, 1980).

RECOMMENDATIONS

Research should continue to focus on learning the status and structure of this population, so accurate models of sustained yield can be calculated and tested.

Table 2. Capture and marking characteristics of 5 bears captured in the northcentral Alaska Range, 1981.

Bear no. and sex	Cem. age	Date of capture	Weight kg (lb)	Location	Drug dosage[1]	Ear tags[2]	Marking[3]
1301 M	6.5	5/18/81	120(265)	Buchanan Cr.	1.8/1.2H	373/374	G/G 0070
1302 F	3.5	5/19/81	75(165)	E. Fork Delta	1.0/1.00	368/367	R/G 0190
1303 F	2.5	6/17/81	57(125)	Mystic Mtn.	1.4/1.40	524/523	R/R 0240
1304 M	5.5	6/19/81	136(300)	W. Fork Delta	2.4/2.00	451/452	lB/R 0080
1305 F	24.5	6/19/81	113(250)	Slate Cr.	M 0	453/454	O/R 0070

[1] Dosage in ml of phencyclidine hydrochloride/acepromazine maleate; M denotes multiple injections with unknown effective dosage. Drug effects were as follows:
L = light, O = optimum, H = heavy.
[2] left/right
[3] Marking designations:
Colors: R, red; G, light green; O, orange; lB, light blue
Marker types:
One or two color combinations were used for ear flags, e.g., O/W is orange in left ear, white in right ear; -/G is no flag, left; green, right. Numbers, such as 0070, designate a radio collar with a frequency of 150.070 MHz.

Table 3. Historic grizzly bear harvest within the study area, 1961-81.

Year	Drainage of reported harvest				Total
	Delta Creek	Little Delta River	Dry Creek	Wood River	
1961	0	2	2	3	7
1962	0	2	1	1	4
1963	0	1	1	5	7
1964	3	3	1	2	9
1965	0	0	1	1	2
1966	2	5	2	3	12
1967	0	1	0	0	1
1968	1	1	1	1	4
1969	0	1	0	1	2
1970	1	0	0	1	2
1971	0	1	0	1	2
1972	0	1	0	0	1
1973	1	1	1	5	8
1974	1	0	0	4	5
1975	0	0	0	1	1
1976	0	0	0	1	1
1977	0	1	2	1	4
1978	0	0	0	2	2
1979	1	3	0	6	10
1980	1	3	0	3	7
1981	0	4	1	9	14
Totals	11	30	13	51	105

ACKNOWLEDGMENTS

Although few bears were captured during this phase of the study, many Alaska Department of Fish and Game personnel assisted in the capture effort. Pat Valkenburg, James Davis, John Coady, Larry Jennings, Ed Crain, John Hechtel, Pam Bruce, and Tim Osborne flew as pilots or observers to search for bears. Once bears were located, helicopter pilots Jim Ackels, Bill Murphy, and Paul Morris safely maneuvered their aircraft into position for darting. Bob Brannon and Randall Zarnke assisted with radio collaring. Wayne Regelin, Steve Peterson, and Joann Barnett edited the manuscript.

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