

106

Alaska Department of Fish and Game
Division of Wildlife Conservation
Federal Aid in Wildlife Restoration
Research Progress Report

106

**LIBRARY
COPY**

Effects of Harvest Rates on Grizzly Bear Population Dynamics in the Northcentral Alaska Range



by
Harry V. Reynolds
Toby A. Boudreau
Project W-23-4
Study 4.19
December 1991

STATE OF ALASKA
Walter J. Hickel, Governor

DEPARTMENT OF FISH AND GAME
Carl L. Rosier, Commissioner

DIVISION OF WILDLIFE CONSERVATION
David G. Kelleyhouse, Director
Wayne L. Regelin, Deputy Director

Persons intending to cite this material should obtain permission from the author(s) and/or the Alaska Department of Fish and Game. Because most reports deal with preliminary results of continuing studies, conclusions are tentative and should be identified as such. Due credit will be appreciated.

Additional copies of this report and other Division of Wildlife Conservation publications may be obtained from:

Publications Specialist
ADF&G, Wildlife Conservation
P.O. Box 22526
Juneau, AK 99802
(907) 465-4190

The Alaska Department of Fish and Game operates all of its public programs and activities free from discrimination on the basis of race, color, national origin, age, or handicap. Because the department receives federal funding, any person who believes she or he has been discriminated against should write to: O.E.O., U.S. Department of the Interior, Washington, DC 20240.

PROGRESS REPORT (RESEARCH)

State: Alaska

Cooperators: U.S. Army 6th Infantry Division (Light) Alaska, Ft. Wainwright, 6th Combat Aviation Brigade, Natural Resources Office of the Facilities Engineers, and the Veterinary Activity

Project No.: W-23-4 Project Title: Wildlife Research and Management

Study No.: 4.19R Study Title: Effects of Harvest Rates on Grizzly Bear Population Dynamics in the Northcentral Alaska Range

Period Covered: 1 July 1990-30 June 1991

SUMMARY

Analysis of changes in population density and harvest rates for the grizzly bear (*Ursus arctos*) population in the northcentral Alaska Range continued during 1990-91. Baseline population status and reproductive biology were determined from 1981 through 1985; the effects of increased harvest on this population was the focus of investigations from 1986 through 1991. Because in-depth analysis of the research will be presented in the final report for this project within 2 months, this progress report will primarily include only data collected during the 1990-91 report period, with little analysis.

During spring 1991, research emphasis was placed on monitoring reproductive performance, mortality, and movement of radio-collared bears in the study area. Twenty-two grizzly bears were captured, including 11 to replace aging radio collars, 5 to replace radio collars which had been shed, 3 to fit radio collars on offspring of marked bears prior to weaning, and 3 to place radio collars on previously uncaptured bears. During 1991, only 12 adult females were observed in the study area, compared with 16 in 1990 and 18-21 during 1981-89. Although those adult females present in the area during 1991 were productive -- 5 were accompanied by 10 cubs and 6 by 15 yearlings -- production in 1992 will be low because only 1 adult female and 2 subadult females were observed breeding in 1991. Litter size of cubs emerging from natal dens was 2.0 in 1991, compared to the mean litter size of 2.17 for the 1982-90 period. Two confirmed mortalities of females occurred during 1990-91. There was also one suspected female bear mortality during this time. One 2-year-old male was killed at a residence near Gold King airstrip within 3 weeks of being weaned. At least 10 young bears remained within

or adjacent to their maternal home ranges for 1-2 years following weaning; 3 others could not be located, probably because of emigration or radio collar failure.

Key Words: grizzly bear, Interior Alaska, mortality, movement, population dynamics, reproductive biology, *Ursus arctos*.

CONTENTS

SUMMARY	i
BACKGROUND	1
OBJECTIVES	2
STUDY AREA	2
METHODS	4
RESULTS AND DISCUSSION	4
Bears Captured and Radio-collared	4
Reproductive Biology	4
Reproductive Capacity	4
Litter Size	5
Mortality	5
Movement	5
ACKNOWLEDGMENTS	6
LITERATURE CITED	6

BACKGROUND

An understanding of the effects of hunter harvest on grizzly bear (*Ursus arctos*) population dynamics is necessary for effective management. To accomplish this, we need to determine (1) the effects of differing levels of harvest on population status, (2) how populations respond to hunter-caused mortality, and (3) whether hunting harvest constitutes additive or compensatory mortality in grizzly bear populations.

This study began in 1981 to address these information needs (Reynolds 1982). Baseline population status and reproductive biology were determined from 1981 through 1985. The effects of increased harvest on this population were to be the focus of investigations from 1986 through 1991. The background and rationale for this long-term study have been described in previous reports (Reynolds and Hechtel 1983, 1984, 1985, 1986, 1988; Reynolds et al. 1987; Reynolds 1989, 1990; Reynolds and Boudreau 1990).

Before the effects of various harvest rates can be assessed, the following information should be available: (1) population density or size, (2) population structure, (3) movement patterns, (4) home range size, (5) mortality and survival rates, and (6) reproductive potential including age at first breeding, litter size, and interval between litters (Craighead et al. 1974, Reynolds 1976, Bunnell and Tait 1980). The approach taken in this study is to monitor these characteristics annually so that harvest can be related to potential population responses.

During 1991, both an annual progress report and a final report for the second phase of the project are due. This progress report documents accomplishments completed during

1991, with minimal data analysis. The final report, which will be completed within 2 months, will present in-depth analysis and discussion of findings as well as recommended direction of any future investigation.

OBJECTIVES

Quantitatively relate changes in the harvest rate of grizzly bears to their population dynamics, especially population size, structure, productivity, survival, emigration, and immigration; and more specifically

1. Determine the size, density, and sex and age structure of the grizzly bear population.
2. Determine measures of reproductive biology, including the age at first production of young, reproductive interval, and mean litter size.
3. Determine natural mortality rates for sex and age classes within the population.
4. Determine harvest rates for sex and age classes within the population.
5. Determine movement patterns and home range sizes for grizzly bears of various sex and age classes within the population.

STUDY AREA

The 3,900-km² (1,500-mi²) study area is located in the mountains and foothills of the northcentral Alaska Range within Game Management Subunit 20A. The boundaries are the Wood River drainages between St. George Creek and Virginia Creek 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) to the north. It includes portions of 2 U.S. Army reservations, Ft. Wainwright and Ft. Greely.

Elevation in the area ranges from 500 to 3,700 m (1,500 to 12,000 ft). Most rivers flow through U-shaped, glacially formed valleys and are fed by active glaciers. Treeline occurs at approximately 900 m (3,000 ft). Dense patches of willow (*Salix* spp.) or alder (*Alnus crispa*), which bears use for cover, may be present up to an elevation of approximately 1,200 m (4,000 ft).

METHODS

I continued to use the same methods described in past reports to capture bears and measure population variables (Reynolds 1982, 1989, 1990; Reynolds and Hechtel 1983, 1984, 1985, 1986, 1988; Reynolds et al. 1987; Reynolds and Boudreau 1990).

RESULTS AND DISCUSSION

Bears Captured and Radio-collared

During the 1990-91 field season, 22 bears were captured and radio-collared in the study area. Of the 16 which were captured previously, functional radio collars were replaced on 11 and radio collars were placed on 5 which had shed radio collars 1-5 years earlier. Of the 6 new captures, 3 were offspring of a radio-collared female, and 3 were young males captured on the periphery of the study area.

During May-June 1991, shed collars of bear no. 1346, 1379, 1392, 1394, and 1602 were recovered; bear no. 1346 was subsequently recaptured and radio-collared. In addition, 4 other bears which had previously shed their collars were recaptured and radio-collared (no. 1303, 1304, 1375, and 1601). One of these bears, no. 1303, was captured on the edge of the study area and had not been located since 1985. Two adult females (no. 1318 and 1331) were found dead.

During the 1981-91 period, 115 individual bears were captured in the study area. In addition, 89 bears were recaptured to replace radio collars. From 1981 to 1983, initial captures were made of bears of all sex and age classes. Since then, most initial captures were of offspring of previously captured bears. Radio collars have been placed on 103 bears: 36 on young-age males (≤ 5 years), 19 on adult males (≥ 6 years), 25 on young-age females, and 23 on adult females. By mid-June 1991, 30 bears carried functioning radiocollars, 16 bears had shed collars, 58 bears were dead, 1 was presumed dead, and 10 bears could not be located, presumably because of long-range movements or radio collar failure.

Reproductive Biology

Reproductive Capacity: During 1981-89, the annual number of adult females present in the study area was relatively stable and varied from 18 to 21 (Reynolds 1990). However, by 1990, an apparent decline began and 16 were observed present; in 1991, only 12 were observed.

During 1991, those adult females remaining in the study area were productive: 5 females were accompanied by a total of 10 cubs, 6 females had a total of 15 yearlings, and 1 female had 3 2-year-olds (prior to weaning). During 1991, only 1 adult (≥ 6 years)

female was observed breeding. In addition, no. 1391, a 4-year-old, and no. 1603, a 3-year-old, were observed accompanied by adult males; in contrast, no. 1385, a 5-year-old, did not display any breeding behavior.

Litter Size: The mean observed litter size of cubs emerging from natal dens was 2.0 during 1991, slightly lower than the 1982-90 mean of 2.17. The 1991 cub production in the area included 1 female which produced 3 cubs, 3 which produced 2 cubs each, and 1 which produced a single cub. All cubs survived until at least 5-8 June. For comparison, during 1990, 4 females produced litters of 3 cubs and 2 had litters of 2 cubs. Two of the females with litters of 3 cubs lost a single cub or yearling by May 1991. Similarly, in 1989, 3 females produced litters of 3, 2, and 1 cubs, respectively; only the litter with a single cub did not survive until 1990. However, another female and presumably her 2 cubs also died in summer 1989. All 4 litters of yearlings or 2-year-olds observed in 1989 survived until May-June 1990.

For the entire study period, mean litter size was 2.14 for 41 litters first observed as cubs, 2.05 for 38 litters of yearlings, and 2.04 for 25 litters of 2-year-olds.

Mortality

During 1991, 3 mortalities of grizzlies were confirmed in the study area and a fourth was suspected.

Bear no. 1611, a 2-year-old male, was weaned on 7 May 1991 near Threemile Creek and killed by a hunter at a residence near Gold King airstrip on 27 May.

Two adult females were found dead during 1991; both apparently died between June and October 1990. Bear no. 1318 was found dead in the upper drainages of the West Fork of the Little Delta River, about 0.5 km from an airstrip heavily used by hunters in fall. Similarly, bear no. 1331 was found dead on the eastern moraine of Hayes Glacier, about 0.3 km from a campsite commonly used by sheep hunters, and 0.5 km from the site where bear no. 1320 was found dead in 1990.

Circumstantial evidence indicates that bear no. 1387, a 4-year-old female, was killed within 100 m of a cabin used for sheep hunting in the Rogers Creek drainage. The signal from her radio collar was pinpointed at the cabin during fall 1990, but by May 1991 the signal ceased and a ground search for sign of the bear or radio collar was not successful.

Movement

Patterns of emigration from, or fidelity to, maternal home ranges were similar to those reported previously (Reynolds 1990). During 1991, 1 year following weaning, 2 males (no. 1393 and 1606) and 2 females (no. 1603 and 1609) remained within their maternal

home ranges, while 2 sibling females (no. 1604 and 1605) were observed 8 km and 15 km, respectively, southwest of their maternal home range. Two years after weaning, 3 females (no. 1385, 1387, and 1391) and 1 male (no. 1386) also remained within their maternal home ranges. In addition, 2 young males (no. 1388 and 1392) and 1 young female (no. 1394) were not located after the year in which they were weaned, probably because of emigration or radio collar failure.

ACKNOWLEDGMENTS

This study was a cooperative effort between the U.S. Army 6th Infantry Division (Light) Alaska and the Department of Fish and Game. Portions of Ft. Wainwright and Ft. Greely were included in the study area. Army units from Ft. Wainwright that provided support during 1983-90 were unable to assist during 1991 because of war in the Middle East. The past cooperation and assistance provided by the 6th Combat Aviation Brigade, the Natural Resources Office of the Facilities Engineers, and the Veterinary Activity (VETACT) greatly contributed to the study. The special long-term contributions of Junior Kerns, Natural Resources Office, are gratefully acknowledged.

During 1991, able and experienced field assistance was provided by Bill Martin, USFWS Federal Aid Coordinator, Dave and Stacey Beaty, Telonics Inc., John Blake, University of Alaska-Fairbanks, and members of the regional office staff of the Alaska Department of Fish and Game in Fairbanks.

LITERATURE CITED

- Bunnell, F. L., and D. E. N. Tait. 1980. Bears in models and reality--Implications to management. *Int. Conf. Bear Res. and Manage.* 4:15-23.
- Craighead, J. J., J. R. Varney, and F. C. Craighead, Jr. 1974. A population analysis of Yellowstone grizzly bears. *Montana For. and Conserv. Stn. Bull.* 40. School of Forestry, Univ. Montana, Missoula. 20pp.
- Reynolds, H. 1976. North Slope grizzly bear studies. Alaska Dep. Fish and Game. Fed. Aid in Wildl. Restor. Final Rep. Proj. W-17-6 and W-17-7. Juneau. 20pp.
- _____. 1982. Alaska Range grizzly bear studies. Alaska Dep. Fish and Game. Fed. Aid in Wildl. Restor. Prog. Rep. Proj. W-21-2. Juneau. 10pp.
- _____. 1989. Population dynamics of a hunted grizzly bear population in the northcentral Alaska Range. Alaska Dep. Fish and Game. Fed. Aid in Wildl. Restor. Prog. Rep. Proj. W-23-1. Juneau. 63pp.

- _____. 1990. Population dynamics of a hunted grizzly bear population in the northcentral Alaska Range. Alaska Dep. Fish and Game. Fed. Aid in Wildl. Restor. Prog. Rep. Proj. W-23-2. Juneau. 63pp.
- _____, and T. A. Boudreau. 1990. Effects of harvest rates on grizzly bear population dynamics in the northcentral Alaska Range. Fed. Aid in Wildl. Restor. Prog. Rep. Proj. W-23-3. Juneau. 44pp.
- _____, and J. L. Hechtel. 1983. Population structure, reproductive biology, and movement patterns of grizzly bears in the northcentral Alaska Range. Alaska Dep. Fish and Game. Fed. Aid in Wildl. Restor. Prog. Rep. Proj. W-22-1. Juneau. 27pp.
- _____, and _____. 1984. Population structure, reproductive biology, and movement patterns of grizzly bears in the northcentral Alaska Range. Alaska Dep. Fish and Game. Fed. Aid in Wildl. Restor. Prog. Rep. Proj. W-22-2. Juneau. 30pp.
- _____, and _____. 1985. Population structure, reproductive biology, and movement patterns of grizzly bears in the northcentral Alaska Range. Alaska Dep. Fish and Game. Fed. Aid in Wildl. Restor. Prog. Rep. Proj. W-22-3. Juneau. 29pp.
- _____, and _____. 1986. Population structure, reproductive biology, and movement patterns of grizzly bears in the northcentral Alaska Range. Alaska Dep. Fish and Game. Fed. Aid in Wildl. Restor. Final Rep. Proj. W-21-2, W-22-2, W-22-3, and W-22-4. Juneau. 53pp.
- _____, and _____. 1988. Population dynamics of a hunted grizzly bear population in the northcentral Alaska Range. Alaska Dep. Fish and Game. Fed. Aid in Wildl. Restor. Prog. Rep. Proj. W-22-6. Juneau. 52pp.
- _____, _____, and D. J. Reed. 1987. Population dynamics of a hunted grizzly bear population in the northcentral Alaska Range. Alaska Dep. Fish and Game. Fed. Aid in Wildl. Restor. Prog. Rep. Proj. W-22-5. Juneau. 59pp.

Prepared by:

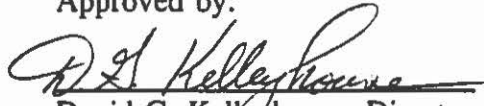
Harry V. Reynolds, III
Wildlife Biologist III

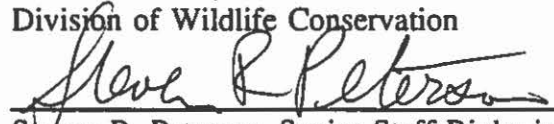
Toby A. Boudreau
Wildlife Biologist I

Submitted by:

Daniel J. Reed
Regional Research Coordinator

Approved by:


David G. Kelleyhouse, Director
Division of Wildlife Conservation


Steven R. Peterson, Senior Staff Biologist
Division of Wildlife Conservation