

Q U A R T E R L Y R E P O R T

Of The

MONTANA COOPERATIVE WILDLIFE RESEARCH UNIT
University of Montana
Missoula, Montana

to

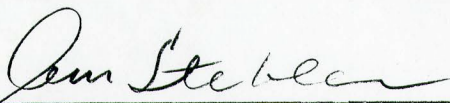
UNIVERSITY OF MONTANA
MONTANA FISH AND GAME COMMISSION
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FISH AND WILDLIFE SERVICE, DEPARTMENT OF THE INTERIOR

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Unit Leader


Assistant Unit Leader

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MONTANA UNIT PERSONNEL

Coordinating Committee:

Frank Dunkle, Director, State Fish and Game Department, Helena
P. L. Wright, University of Montana, Missoula
Adolph M. Stebler, U. S. Fish and Wildlife Service, Missoula

Unit Staff:

Adolph M. Stebler, Unit Leader
Gerry Atwell, Administrative Assistant Leader
Wynn Freeman, Assistant Leader, Game Management Division, Fish and Game Department
R. S. Hoffmann, Assistant Leader, Zoology Department
W. L. Pengelly, Assistant Leader, Forestry School
Richard D. Taber, Assistant Leader, Forestry School
Philip L. Wright, Assistant Leader, Zoology Department
Frank C. Craighead, Jr., Biologist, National Geographic Society, Research Associate, University of Montana
Henry McCutchen, Research Associate, University of Montana
Alvina K. Barclay, Unit Secretary

Dr. John J. Craighead went on sabbatical leave January 1, 1967. He will devote much of his time to preparing technical manuscripts on the ecology of the grizzly bear in Yellowstone National Park. He will continue to supervise and administer National Science Foundation and Atomic Energy Commission grants for biotelemetry work and act in an advisory capacity to Unit Personnel. Dr. Adolph Stebler, who has been Leader of the Oklahoma Unit for fifteen years, is replacing Dr. Craighead during the period. Dr. Stebler commenced his new assignment in January, 1967.

Graduate Students:

Steve Berwick, Graduate Fellow
Harry Reynolds, Graduate Research Associate
Jack Seidensticker, Graduate Research Associate
Merlin Shoesmith, Graduate Fellow
Roy Snyder, Graduate Fellow

COOPERATING AGENCIES

University of Montana
Montana Fish and Game Department
Montana State University
U. S. Fish and Wildlife Service
U. S. Forest Service
U. S. National Park Service
U. S. Public Health Service
Wildlife Management Institute
Wyoming Department of Game and Fish

SUMMARY OF WORK ACCOMPLISHED

Project 1. Population Dynamics

Sub-project 1.14 Bighorn Sheep Population Study - Wildhorse Island. Project Leader: John J. Craighead. Cooperator: Montana Fish and Game Department.

Objectives: 1. To bring bighorn population information up to date on Wildhorse Island. 2. To attempt to develop satisfactory capturing and marking techniques. 3. To obtain the information on breeding and reproductive success of the various age classes by use of marked individuals. 4. To determine relationship with mule deer.

Results: Inactive this quarter.

Sub-project 1.16 Ecology of the Golden Eagle. Project Leader: John J. Craighead. Student Investigator: Harry Reynolds. Co-operators: National Audubon Society and Fish and Wildlife Service.

Phase II

Objectives: 1. To determine nesting density, productivity, and food habits of the golden eagle (*Accipiter chrysaetos canadensis*) within a study area in the vicinity of Livingston, Montana, for comparison with similar information collected earlier by McGahan (Phase I) in the same study area. 2. To study predation by observing what relationship age, number, weight of the eaglets have to the biomass and number of prey items brought to the nest by adult eagles. 3. To explore relationships between pesticide residue levels of prey species on the study area and levels found in the golden eagle population.

Results: The student investigator took course work at the University of Montana this quarter.

Sub-project 1.19 Nestling Raptor Pesticide Relations. Project Leader: John J. Craighead. Student Investigator: Jack Seidensticker. Cooperator: U. S. Fish and Wildlife Service.

Introduction: During the last six years some population norms of a golden eagle population in the vicinity of Livingston, Montana, have been established. In addition, a survey of the persistent toxic chemicals, principally the chlorinated hydrocarbons, present in the major eagle prey species and in the large raptors on the study area has been conducted. The purpose of this survey has been to establish the amount of persisting toxic chemicals present in relation to the population norms that have been established.

Research emphasis during the eagle study was placed on the breeding ecology. Prey samples collected for chlorinated hydrocarbon analysis were taken during the nesting season. The next step was to design some toxicity experiments relating to some aspect of the breeding cycle.

There are many approaches in designing a toxicology study pertaining to this segment of the life cycle of a bird of prey. I chose to study the

nestling from the time it hatched until it would have been independent of its parents.

During the 1966 field season, preliminary field techniques were developed and time schedules worked out for conducting toxicology studies with nestling raptors. With this preliminary field work as a background, it was possible to conduct a series of feeding experiments in the field using sub-lethal dietary levels of DDT. These experiments were designed to measure the growth and behavior, together with the storage and loss, of DDT in experimental nestling golden eagles and red-tailed hawks. The information obtained from this series of experiments will be of value in assessing the immediate effect of a pesticide-contaminated environment on nestling birds of prey.

Objectives: 1. To determine through feeding trials the effect, if any, of feeding different levels of DDT on the growth, development and behavior of nestling golden eagles and red-tailed hawks. 2. To study the kinetics of DDT in the same nestling raptors and relate it to their growth, development and behavior.

Results: The student investigator took course work at the University of Montana this quarter.

Project 2. Big Game Investigations

Sub-project 2.9 An Ecological Study of the Grizzly Bear. Project Leaders; John J. Craighead and Frank C. Craighead, Jr., Assistants: Jay Sumner, Jim Claar. Cooperators: Environmental Research Institute, National Park Service, U. S. Fish and Wildlife Service, Montana Fish and Game Department, National Science Foundation, National Geographic Society, Wildlife Management Institute, Philco Corporation, Boone and Crockett Club, Atomic Energy Commission, and the New York Zoological Society.

General Objectives: 1. To develop and perfect methods and techniques of capturing, handling, marking and immobilizing grizzly bears. 2. To study the population dynamics of grizzlies, and with the aid of marked animals determine population size, density, sex and age composition, breeding age, reproductive capacity, growth rate, mortality rate, and population turnover. 3. To study population behavior, family composition and activities, breeding behavior, and relationships between various units in the population. 4. To determine home ranges, daily and seasonal movements, and distances traveled to food, to hibernation sites, and for breeding purposes. 5. To determine carrying capacity and habitat requirements and relate these to existing conditions of food abundance, habitat types and hibernation sites. 6. To collaborate with specialists in conducting physiological, hematological, and pathological studies. 7. To adapt and utilize electronic equipment in obtaining ecological data.

Procedure: This long-term study of the grizzly bear in Yellowstone National Park is designed to investigate all important aspects of grizzly bear ecology. The general as well as many of the specific objectives are dependent upon observations of marked, known-age animals either in the wild or when captured and placed under sedation. The procedures of capturing, marking and then recapturing and observing identifiable individuals in the population must of necessity be carried on from year to year. The time and effort devoted to this is considerable.

Quarterly and Annual reports of the Montana Cooperative Wildlife Research Unit have reported on previous work accomplished in the field. Findings and conclusions will be presented in technical papers as the study progresses.

Financial Support: This study is a cooperative effort between the Montana Cooperative Wildlife Research Unit and the Environmental Research Institute. The National Geographic Society Committee for Research and Exploration, the National Science Foundation, and the Philco Corporation's Western Development Laboratory have supplied major support. The U. S. Fish and Wildlife Service, the National Park Service, the Atomic Energy Commission, University of Montana, University of Montana Foundation, Montana Fish and Game Department, the Boone and Crockett Club, the New York Zoological Society, American Museum of Natural History, Yellowstone Park Company and the Wildlife Management Institute have also contributed.

Results: Since the study began in 1959, 235 individual grizzlies have been captured and individually marked for field identification. Initial captures and subsequent recaptures of these 235 grizzlies total 476, with 303 captures made in culvert traps and 169 made by shooting free-roaming grizzlies with propulsive syringe darts containing immobilizing drugs (Table 1). Capture data for the years 1965 through 1967 appear in Table 2.

A report, Management of Bears in Yellowstone National Park, was completed and distributed to all agencies supporting the research work. Copies are not available for general distribution.

Table I

SUMMARY, METHODS OF CAPTURE

1959-1967

<u>Year</u>	<u>Total No. Bears Handled (Initial Captures and Recaptures)</u>	<u>Total No. Trapped</u>	<u>Total Number Shot Free Roaming</u>
1959	33	27	6
1960	64	56	8
1961	95	74	21
1962	35	29	6
1963	55	33	22
1964	66	29	37
1965	43	24	19
1966	25	18	7
1967	60	113	43
Totals	476*	303	169

* 4 cubs were noosed.

Table 2

SUMMARY OF CAPTURES AND RECAPTURES OF GRIZZLY BEARS
1965 through 1967

	1965	1966	1967	Total
New bears captured and marked	13	5	19	37
Number of recaptures	30	20	41	91
Total bears handled (Captured and Recaptured)	43	25	60	128
Bear captured Free-roaming	19	7	43	69
Bears Captured in Culvert Traps	24	18	13	55
Bears captured by National Park Service (Control operation)	7	12	9	28
Bears captured by Wildlife Research Unit	36	13	51	100
Number of individual bears captured	35	20	48	103
Individual bears captured two or more times.	6	4	11	21

Radiotracking Grizzlies: Radiotracking of grizzly bears began in 1961 and continued through the field season of 1967. During this seven-year period there have been 40 instrumentations of grizzly bears with 31 different grizzlies involved for a total of over thirteen hundred tracking days. One grizzly bear, No. 40, has been instrumented and monitored for seven consecutive years. Seven other bears have been instrumented and monitored for two consecutive years each. Seasonal ranges and home ranges have been determined for most of the instrumented bears. In addition the radios have provided information on daily and seasonal movements, pre-hibernation movements to areas for the purpose of digging dens, and hibernation treks to denning sites. The winter dens of seven different grizzlies have been located and twelve active dens have been found and information obtained on size and construction of these dens. The winter den of one grizzly has been located for three consecutive years and two others for two consecutive years. Behavior of bears prior to hibernation has been studied in considerable detail and environmental stimuli correlated with the movement of bears to dens and with the onset of lethargy. During the 1966 season four grizzlies and two black bears were tracked to their dens; during 1967, two grizzlies and one black bear were tracked to dens. Improvements were made in the radio collars and in the portable directional receivers. Equipment for obtaining E.K.G.'s was further perfected and tested. Totalizing printers for automatically recording E.K.G.'s and body temperature were constructed and will be field tested during the winter of 1967-1968.

SUMMARY OF WORK
GRIZZLY BEAR PROJECT
1965

New bears captured and marked 13

Number of recaptures	30
Total bears handled (captured or recaptured)	43
Bears captured free-roaming.	19
Bears captured in culvert trap	24
Bears captured by National Park Service.	7
Bears captured by Wildlife Research Unit	36
Number of individual bears captured.	35
Individual bears captured two or more times.	6

Sub-project 2.14 Distribution, Movement, and Behavior of Elk in Yellowstone National Park. Project Leader: John J. Craighead. Assistant Leader: Gerry Atwell. Cooperators: National Park Service, Montana State Fish and Game Department, U.S. Forest Service, and Wyoming Department of Game and Fish.

Introduction: This project was initiated in the winter of 1962-1963. It is a cooperative venture with the National Park Service, entered into under Contract No. 14-10-0243-258.

Objectives: 1. To record movement of individually marked elk over a two-year period. 2. To determine the pattern of dispersal from the winter to summer range. 3. To determine the number of herd or population units on the summer range. 4. To relate population units to general range conditions. 5. To determine the pattern of movement from the summer range to the winter range. 6. To locate and plot major migration routes both inside and outside the boundaries of the Park and relate the routes to summer and winter range conditions.

Results: A final report is in preparation.

Sub-project 2.20 Radiotracking and Telemetering System for Large Western Mammals. Project Leaders: John J. Craighead and Frank C. Craighead, Jr. Cooperator: U. S. Atomic Energy Commission.

This study is financed by a \$19,000 grant from the Environmental Science Branch, Division of Biology and Medicine, U. S. Atomic Energy Commission.

Objectives: 1. To develop and perfect a radiotracking and telemetering system for big game animals. 2. To instrument and track a minimum of 10 free-roaming elk and to telemeter certain physiological parameters from free-roaming animals. 3. By using the radiotracking system developed, to obtain information on the migration pattern, diurnal and nocturnal movements, summer distribution, habitat preference, and general behavior and activity of instrumented elk on both summer and winter ranges.

Procedure: Biotelemetry has proved to be an effective tool for gathering certain ecological data. The research is designed to perfect further a bio-

telemetry system for western big game animals. This should result in obtaining more refined data and in securing some types of ecological and behavioral data that cannot be obtained with the use of conventional research methods.

Results: Data from the summer's field work are being tabulated.

Sub-project 2.22 An Intensive Study of Elk Behavior on the Mirror Plateau Summer Range, Yellowstone National Park. Project Leader: John J. Craighead. Student Investigator: Merlin Shoemsmith. Cooperator: National Park Service.

Objectives: 1. To acquire individual, band, and herd movement information on elk using the Mirror Plateau Summer Range. 2. To obtain information on group interactions, social structure, and relate these to the use of specific range areas and the vegetative conditions of such areas. 3. To determine what portion of the Mirror Plateau elk herd is being removed from the total Park population in the annual reduction program. 4. To determine the pattern of removal as reflected in the composition of elk bands on the Mirror Plateau.

Results: The student investigator remained in Yellowstone National Park during the fall and early winter to collect data on the rutting activity and fall migration of Mirror Plateau elk. Assistance was given to Yellowstone Park personnel with the elk reduction and marking program which began on December 6.

Many marked cows and some marked bulls returned to the same breeding areas in both 1966 and 1967. Three general breeding areas have been arbitrarily assigned to Mirror Plateau elk, two of which are located on the Plateau itself. The data indicate that individuals are strongly traditional in the use of these breeding areas. The rut lasted from around September 1 until about November 20. Mirror elk were last seen in harems on November 8.

Elk from Mirror Plateau generally move to the winter range via Specimen Ridge, Amethyst Creek, or the Opal Creek area. Few are believed to travel down the upper Lamar River area above Opal Creek

Elk trapping began on December 6 at the new Soda Butte trap; a total of three subsequent drives were made at the Crystal Creek, Frog Pit, and Soda Butte traps. These four December drives yielded 350 animals, about 10 percent of which had been previously marked. Of the 33 marked elk, 9 were Mirror Plateau animals and all were trapped at Soda Butte.

Sub-project 2.24 Competition Between Big Game and Cattle in the Gird Creek Area of Montana. Project Leader: Melvin S. Morris. Student Investigator: Roy O. Snyder.

Introduction: A large proportion of the areas that serve as winter range for elk and mule deer in the Western United States are also grazed by domestic livestock at some time during the year. This raises the question: "To what extent do these big game animals and the livestock compete for forage?" The increasing desire of sportsmen for more big game, and the concurrent desire of stockmen for increased livestock grazing makes this an important question. The Gird Creek area east of Hamilton, Montana, offers an excellent opportunity to study forage competition in that it is grazed by cattle during the summer, and also serves as winter range for approximately 200 head of elk and a sizable herd of mule deer.

Objectives: To determine the actual and potential forage competition among cattle, elk, and mule deer.

Results: The student investigator is writing his thesis.

Sub-project 2.25 Factors Limiting a Montana Population of Rocky Mountain Bighorn Sheep. Project Leader: Richard D. Taber. Student Investigator: Steve Berwick.

Objectives: To determine the factors limiting the population growth through range, population, and behavior studies.

Results: The student investigator took course work at the University of Montana this quarter.

Project 4. Waterfowl Investigations

Sub-project 4.4 A population study of Canada Geese in the Flathead Valley. Personnel: John J. Craighead. Cooperators: Montana Fish and Game Department, National Bison Range.

Objectives: 1. To make a long term study of the population levels and productivity of Canada Geese. 2. To analyze the effect of hunting pressure on the local goose population. 3. To compare ground counts with aerial counts and determine reliability of the two census methods.

Results: Inactive this quarter.

CONSERVATION EDUCATION AND PUBLIC RELATIONS

October 10:

Spoke to a senior science class at Missoula County High School about, "Moose Management and Research". Atwell.

_____ 12:

Presented a seminar entitled, "Zoogeography and Systematics of Some Holarctic Mammals" at Yale University, New Haven, Connecticut. Hoffmann.

_____ 16:

Talked about, "Conducting a Scientific Study" to a senior science class at Hellgate High School, Missoula. Atwell.

_____ 18:

Presented a talk about "Moose Ecology" to the Men's Fellowship at the University Congregational Church, Missoula. Atwell.

Unit graduate students Jack Seidensticker and Harry Reynolds presented talks at the Senior Wildlife Seminar on the progress of their golden eagle studies.

October 20:

Gave a talk to the University of Montana Rocky Mountaineers' Club on, "Sheep Hunting in Alberta". Pengelly.

_____ 31:

Showed the "Wild Rivers" film and commented on the Wild and Scenic Rivers Act to the Missoula Kiwanis Club. Atwell.

November 1:

The National Geographic Society film, "Grizzly" appeared nationwide as the lead off production for the Geographic's annual television series. The film depicted research conducted by John and Frank Craighead on the grizzly bear in Yellowstone National Park and emphasized the close family ties of the researchers.

_____ 20:

Unit graduate students Jack Seidensticker and Harry Reynolds presented talks at the Zoology Seminar on the progress of their golden eagle studies.

December 1:

Attended the Idaho Governor's Conservation Award Banquet as a guest. Coeur d'Alene, Idaho. Pengelly.

_____ 4:

Presented a seminar on, "Ecology and History of Alpine Tundra Ecosystems" at the University of Kansas, Lawrence, Kansas. Hoffmann.

_____ :

Attended two meetings of the Montana Wilderness Association's program committee to prepare for the annual conference. Pengelly.

SCIENTIFIC MEETINGS ATTENDED

October 1:

Gave a paper on, "Wilderness Values and Economic Theory" at the Fourth Open Space Conference at Estes Park, Colorado. Pengelly.

November 26:

Presented the main talk at the Canadian Institute of Forestry (Rocky Mountain Section) at Edmonton, Alberta. The subject was, "Logging and Fires as Game Management Tools". Pengelly.

PUBLICATIONS

Hoffmann, Robert S. 1967. The international biological program and the university biologist. Trans. North American Wildlife Conference, 32:286-291.

McGahan, Jerome. 1967. Quantified estimates of predation by a golden eagle population. J. Wildl. Mgmt. 31(3):496-501.

VISITORS

October 6:

Mr. Faye Couey, District Game Manager, Montana Department of Fish and Game, Kalispell, Montana.

_____ 13:

Mr. Joseph Mazzoni, Refuge Manager, National Bison Range, Moiese, Montana.

_____ 16:

Mr. Wesley Woodgerd, Chief, Recreation and Parks Division, Montana Department of Fish and Game, Helena, Montana.

_____ 20-26:

Dr. Joseph J. Hickey, Professor of Wildlife Ecology, University of Wisconsin, Madison, Wisconsin.

_____ 22-25:

Dr. A. Starker Leopold, Assistant to the Chancellor, University of California, Berkeley, California.

November 15:

Mr. Russell E. Miller, Personnel Officer, Bureau of Sport Fisheries and Wildlife, Portland, Oregon.

_____ 27 & 28:

Mr. Robert Brown, Game Biologist, Montana Department of Fish and Game, Bozeman, Montana.

December 5:

Mr. Cliff Martinka, Wildlife Biologist, National Park Service, U. S. Dept. of the Interior, Glacier National Park.

_____ 11:

Dr. Eddie W. Schodt, U. S. Department of State, Missoula.

_____ 20:

Mr. W. Ashton Brann, Bureau of Sport Fisheries and Wildlife, Helena.