

IDAHO
DEPARTMENT OF FISH AND GAME

Jerry Mallet, Interim Director

Project W-168-C-16

Progress Report



WILDLIFE RESTORATION COORDINATION

Study I, Job 1: Wildlife Research Coordination

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July 1, 1998 to June 30, 1999

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Boise, Idaho

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**PROGRESS REPORT
STATEWIDE WILDLIFE RESEARCH**

STATE: Idaho **PROJECT TITLE:** Wildlife Research Coordination
PROJECT NO.: W-168-C-16
STUDY NO.: I
JOB: 1

PERIOD COVERED: July 1, 1998 to June 30, 1999

ABSTRACT

Project supervision was maintained for all wildlife research projects including study plan development, document preparation, report editing, submitting project reports, and budget preparation. Federal Aid coordination was provided for all wildlife research, management, and land development projects.

OBJECTIVES

To plan project work and to provide supervision and administrative support for all P-R funded projects.

FINDINGS

Project documentation, budgets, reports, and personnel evaluations were completed for each field project. A general summary of the activities of the research biologists during the year follows.

STUDY NO. IV: FACTORS INFLUENCING ELK CALF RECRUITMENT

Job No. 1: Pregnancy rates and condition of cow elk.

As part of a larger effort to determine the factors responsible for poor or declining elk recruitment, we evaluated the body condition and pregnancy status of adult (> 2 years old) cow elk on contrasting study areas in north-central Idaho. Funding was inadequate to capture and evaluate cow elk as was done in 1997 and 1998. Therefore, we relied on samples collected by hunters during the 1997 and 1998 hunting seasons. The pregnancy rate in the Elk City Zone (GMUs 14, 15, 16) was about 10% lower than in 1997, whereas the pregnancy rate increased in GMU 23. Pregnant cows tended to exhibit better condition than cows that were not pregnant.

During 1998 the Department did not offer cow permits in the Lolo Zone. To collect pregnancy information, we collected fecal pellets from free-ranging cow elk in February and March. The steroid metabolite levels will be evaluated to determine pregnancy rates. These data are not yet available.

The research of Rachel Ash, a University of Idaho graduate student, is also part of this project and is presented in Appendix A. Her effort has 2 major aspects:

Assessing body condition and nutritional status thorough morphometric and physiological indices.

Elk reproductive endocrinology and behavior across nutritional planes.

Job No. 2: Calf mortality causes and rates.

From July 1997 through May 1998, we continued to monitor survival and determine causes of death of radio-collared elk calves captured in 1997 in GMUs 10, 12 (Lochsa/North Fork study area), and 15 (South Fork study area). We captured, radio collared, and monitored 20 additional neonates on the Lochsa/North Fork and 28 neonates on the South Fork in spring 1998. Predicted day-old weights for both male and female calves were significantly heavier in 1998 than in 1997 ($P < 0.001$), but there was no significant difference ($P > 0.05$) between study areas. There were significant differences ($P < 0.05$) in levels of a number of blood trace elements and serum parameters in neonates between 1997 and 1998, but only selenium ($P < 0.001$) and serum total protein ($P < 0.05$) were significantly higher in South Fork calves and only serum creatinine ($P < 0.001$), urea nitrogen ($P < 0.005$), cortisol ($P < 0.005$), and potassium ($P < 0.05$) were significantly higher in Lochsa/North Fork calves across both years. Survival rates of neonates between capture and 15 August 1998 on the Lochsa/North Fork (0.27 ± 0.10 SE) was significantly lower ($P < 0.01$) than the South Fork (0.58 ± 0.10), similar to the pattern in 1997. The annual survival rate of Lochsa/North Fork calves captured in 1997 (0.06 ± 0.06) was significantly lower ($P < 0.01$) than South Fork calves (0.54 ± 0.14). Tentative proximate cause of deaths of neonate calves in 1998 included abandonment by the cow and subsequent malnourishment, particularly on the South Fork; unknown nonpredation cause; predation by black bears (*Ursus americanus*) and mountain lions (*Puma concolor*); and predation by either black bear or mountain lion. These were similar to 1997, but there may have

been a higher proportion of early season kills by mountain lions on the South Fork in 1998 (0.44) than in 1997 (0.11). There were no significant differences in condition indices (weights and blood parameters, $P > 0.05$) of bear-killed calves compared to other calves. However, only 14% of captured male calves were killed by bears whereas 34% of captured female calves were killed by bears for a sex ratio (M:F) of bear-killed calves of 0.3 compared with a ratio of 0.8 for all captured calves. We observed 107 black bears on the Lochsa/North Fork study area during calf capture operations in 1998 and 6 bears on the South Fork; these were similar to the number of bear observations in 1997. A range of 31-47% of tetracycline-laced baits, depending on whether they were on trail, closed road, or open road routes, were visited by bears on the Lochsa/North Fork and 37-49% on the South Fork. We did not conduct winter aerial surveys for mountain lions during winter 1997-98 due to funding and weather constraints, but aerial sightability surveys were conducted for elk in GMUs 10 (North Fork) and 15 (South Fork). The point estimate of the calf:cow ratio in GMU 10 was the lowest documented since sightability surveys began in 1987. The calf:cow ratio for GMU 15 was similar to estimates for this GMU during the last few surveys. An aerial survey of deer was conducted in GMU 15 in winter 1997-98. A total of 803 white-tailed deer (*Odocoileus virginianus*) and 10 mule deer (*O. hemonius*) were observed, for a relative white-tailed deer abundance index of 1554 ± 229 (90% CI) using the mule deer sightability model to reduce detection bias.

Job No. 3: Predation Effects On Elk Calf Recruitment.

The objective of this study is to determine the effects of predation and the abundance of predators on elk calf recruitment in north-central Idaho. In 1998, we further developed a working experimental design in which we will manipulate black bear and mountain lion densities compared to unmanipulated control areas and monitor calf survival and condition; causes of mortality; elk, predator, and alternate prey abundance; and habitat condition.

TECHNICAL MEETINGS AND TRAINING (M. W. GRATSON)

Purpose	Location	Date
Biologists' Meeting	Island Park	Aug
Statewide GIS Analyses	Moscow	Sep
Adaptive Management, Natural Resources	Ontario	Oct
Statewide GIS Analyses	Moscow	Dec
Sportsmen's Group	Moscow	Dec
US Fish and Wildlife Cooperative	Moscow	Oct
Helicopter Safety/Sightability Training	Lewiston	Dec
Predator Symposium	Boise	Jan
Clearwater Region Big Game Regulations	Lewiston	Jan
Idaho/Clearwater Region Big Game Regulations	Lewiston	Jan
Sensitivity Trng	Lewiston	Jan
Public Meeting	Moscow	Feb
Purpose	Location	Date

Public Meeting	Lewiston	Feb
Western States Deer and Elk Workshop	Salt Lake City	Mar
Nonenforcement Trng	Myrtle	Apr
Physical Fitness Testing	Lewiston	Apr
Serengeti Ungulate-Predator Presentation	Moscow	Apr
Predation Meeting	Lewiston	Apr
Clearwater Elk Initiative	Moscow	Apr
Washington State University, Elk Browse Survey	Lowell	Apr
Clearwater Elk Initiative	North Fork	May
Wash./Idaho/Oregon Elk Meeting	Lewiston	June

REPORTS, PUBLICATIONS, AND PRESENTATIONS

Gratson, M. W. et al. (in review). Modifying aerial survey models for other aircraft. *Journal of Wildlife Management* 00:000-000.

Gratson, M. W. et al. (in review). Density and success of elk hunters in relation to road closures in north-central Idaho. *Wildlife Society Bulletin* 00:000-000.

Gratson, M. W. et al. (in review). Demographics, behaviors, and opinions of north-central Idaho elk hunters in relation to road closures during hunting seasons. *Human Dimensions of Wildlife* 0:000-000.

Gratson, M. W. 1999. Managing cow elk harvest rates by experiment in Idaho: preliminary results, practical considerations, and challenges. Pages 21-22 in G. B. MacDonald, J. Fraser, and P. Gray, editors. Adaptive management forum: linking management and science to achieve ecological sustainability. Proceedings of the 1998 Provincial Sciences Forum, October 13-16, 1998, Dorset, Ontario, Canada.

Gratson, M. W., and P. Zager. 1999. Elk ecology. Study IV. Factors influencing elk calf recruitment. Job No. 1: Pregnancy rates and condition of cow elk. Job No. 2: Calf mortality causes and rates. Job No. 3. Predation effects on elk calf recruitment. Federal Aid in Wildlife Restoration, Job Progress Report, Project W-160-R-25. Idaho Department of Fish and Game, Boise.

Gratson, M. W., and P. Zager. 1999. Elk ecology. Study II. Optimum yield of elk. Job No. 1: The effect of harvest on elk population size and composition in Idaho. Federal Aid in Wildlife Restoration, Job Progress Report, Project W-160-R-25. Idaho Department of Fish and Game, Boise.

Gratson, M. W., and P. Zager. 1998 (research proposal). Lion population estimation by aerial survey using network sampling. Cost share grant. Bureau of Land Management, Idaho Department of Fish and Game.

- Gratson, M. W. 1998. (oral presentation). Managing cow elk harvest rates by experiment in Idaho: preliminary results, practical considerations, and challenges. Adaptive management forum. Dorset, Ontario, Canada.
- Gratson, M. W. 1998. (oral presentation). Bull elk survival, hunter densities and success, and hunter demographics, behaviors, and opinions in relation to road closures in north-central Idaho. Adaptive management forum. Dorset, Ontario, Canada.
- Gratson, M. W. and P. Zager. 1998. (oral presentation). Update on elk recruitment research in north-central Idaho. Biologists' Meeting, Island Park, Idaho.
- Gratson, M. W. 1998. (oral presentation). Update on elk recruitment research in north-central Idaho. Sportsmen's Group, Moscow, Idaho.
- Gratson, M. W. 1999. (oral presentation). Adaptive management of cow elk harvest rates in Idaho. Wildlife Management Class Lecture, University of Idaho, Moscow.
- Gratson, M. W. (manuscript review). Ruffed grouse survival and habitat use in Michigan. Journal of Wildlife Management.
- Gratson, M. W. (manuscript review). Sage grouse forage, diet, and fire in southeast Idaho. Journal of Range Management.

MEETINGS AND PRESENTATIONS (PETE ZAGER)

Date	Purpose	Location
July	KRLC radio program	Lewiston
	Region/BOW meeting re monitoring elk	Lewiston
	“Stand down”	Lewiston
August	GAO meeting re caribou project	Spokane
	Biologists' meeting	Island Park
	Predator manipulation meeting with UI	Moscow
September	GAO meeting re caribou project	Coeur d'Alene
	Clearwater Elk Initiative meeting	Moscow
	KRLC radio program	Lewiston
October	Statewide data analysis meeting	Moscow
	Class presentation for Pat Heglund (UI)	Moscow
	ICWRU coordination meeting	Moscow
November	Caribou Recovery Team meeting	Spokane

	Predator manipulation meeting	Lewiston
	Predator manipulation meeting	Lewiston
December	Met with COs re predator manipulation	Kamiah
	Met with Director's office re legislation	Myrtle
	Flight safety training	Asotin
	Clearwater Elk Initiative meeting	Moscow
	Scott Tomson thesis defense	Missoula
	Sportmen's Breakfast – elk project	Grangeville
January	BOW/R-2 meeting re regulations	Myrtle
	Steve Hayes thesis defense	Moscow
	Predator Symposium	Boise
	Presentation for RMEF re elk project	Boise
	Class presentation for Dick Shew (WSU)	Pullman
	Presentation at Commission meeting	Boise
	Public meeting – elk recruitment project	Kamiah
	Public meeting – elk recruitment project	Grangeville
	ARC View mini-course (UI)	Moscow
February	Statewide data analysis meeting	Moscow
	Open house for deer/elk regulations	Orofino
	Open house for deer/elk regulations	Grangeville
	Public meeting – elk recruitment project	Elk City
	CERT meeting	Orofino
	Wildlife Ecology class (WSU) re elk project	Pullman
March	Clearwater Elk Initiative meeting	Moscow
	CPR and 1 st aid training	Lewiston
	Western States Deer and Elk Workshop	Salt Lake City
April	Met with A.R.E. Sinclair re elk and BHS projects	Moscow
	Clearwater Elk Initiative meeting	Moscow

MANUSCRIPTS REVIEWED

Journal of Wildlife Management
Northwest Science
Southeast Association of Fish and Wildlife Agencies
International Association for Bear Research and Management

Also served as an Associate Editor for the 10th International Association for Bear Research and Management proceedings. Chair of the Association's publications committee.

REPORTS AND PUBLICATIONS

- Gove, N. E., J. R. Skalski, and P. Zager. 199x. Statistical models for population reconstruction using age-at-harvest data. (being revised)
- Gratson, M. W., and P. Zager. 1999. (Lochsa) elk ecology. Study II. Optimum yield of elk. The effect of harvest on elk population size and composition in Idaho. Fed. Aid Wildl. Restor., Job Prog. Rep., Proj. W-160-R-25. Idaho Dep. of Fish and Game, Boise.
- Gratson, M. W., and P. Zager. 1999. (Lochsa) elk ecology. Study IV. Factors influencing elk calf recruitment. Fed. Aid Wildl. Restor., Job Prog. Rep., Proj. W-160-R-25. Idaho Dep. of Fish and Game, Boise.
- Hayes, S. G., D. J. Leptich, E. O. Garton, and P. Zager. 199-. Sexual segregation and seasonal habitat selection of elk in northern Idaho. Draft.
- Hayes, S. G., Leptich, D. J., and P. Zager. 199-. Elk mortality in the Coeur d'Alene drainage on northern Idaho. Draft.
- Leptich, D. J., E. O. Garton, B. K Johnson, and P. Zager. 199-. Elk sightability model validation at the Starkey Experimental Forest and Range, Oregon. Draft.
- Secord, M., P. Zager, and D. Pletscher. 199-. The influence of temporal and spatial factors on clearcut use by white-tailed deer in northern Idaho. West. J. Appl. For. (in press).
- Skovlin, J., P. Zager, and B. Johnson. 199-. Habitat requirements and evaluations. *in* J. W. Thomas and D. Toweill (eds.). Elk of North America: ecology and management. 2nd ed. Stackpole Books, Harrisburg, Pa. (in review).
- Tomson, S., K. Foresman, and P. Zager. 1998. Pine marten ecology. Job Prog. Rep., Proj. W-160-R-25., Subproj. 46. Idaho Dept. Fish and Game, Boise.
- Wakkinen, W., P. Zager, D. Tallmon, and M. S. Mills. 199-. Evaluation of woodland caribou recovery efforts in the Selkirk Mountains. (submitted)

**PROGRESS REPORT
STATEWIDE WILDLIFE RESEARCH**

STATE: Idaho **SUBPROJECT:** Mule Deer Ecology
PROJECT NO.: W-160-R-26
SUBPROJECT NO.: 35
STUDY NO.: I-II

PERIOD COVERED: July 1, 1998 to June 30, 1999

ABSTRACTS

STUDY I: WINTER FAWN SURVIVAL

This research will result in improved monitoring of mule deer populations and will provide wildlife managers with the information needed to accurately communicate herd condition to sportsmen. It will also enable managers to detect population changes when they occur and make timely decisions regarding optimal rates of doe harvest.

STUDY II: STUDY PLAN IMPLEMENTATION

We captured and radio collared 226 mule deer fawns on 10 study areas in Idaho. With both sexes combined the mean mass was 37.4 kg. The overall mean survival rate was 0.64 (SE = 0.371). The mean survival rate for female fawns was 0.65 (SE = 0.055) and for male fawns 0.64 (SE = 0.055). Survival rates varied by study area, with the highest mean survival rate in the Boise area 0.88 (SE = 0.126) and the lowest near Challis 0.36 (SE = 0.109). Statewide the causes of mortality were coyote predation 31%, malnutrition 29%, mountain lion predation 21%, other predation 7%, and other causes 11%. Surviving fawns had greater mass 84.0 kg than fawns that died 78.8 kg ($P < 0.001$).

MEETINGS AND PRESENTATIONS

Month	Meeting	Location
July	Commission Meeting	Boise
Aug	Biologist Meeting	Island Park
Sept	Mule Deer Foundation Meeting	Boise
Oct	Presentation at Hunter Ed. Class	Caldwell
Nov	Graduate Student Defense	Moscow
Nov	Presentation Boise NF	Boise
Nov	Personnel Meeting	Nampa
Nov	Training Presentation	Nampa
Dec	Commission Presentation	Boise
Dec	Idaho Power Deer Planning Meeting	Boise
Jan	Predator/Prey Symposium	Boise

Month	Meeting	Location
Jan	Deer Presentation	Portland
Jan	Deer Presentation	Nampa
Mar	Deer Elk Workshop	Salt Lake
Mar	Deer Presentation	Nampa
Apr	Deer Presentation	Moscow
May	Drug Training	Nampa
Jun	Planning Meeting	Brownlee

REPORTS, PUBLICATIONS, ARTICLES

Cooper, A., and J. W. Unsworth. 1999. Study I: Harvest and Population Modeling. Job Completion Report, Project W-160-R-23. Idaho Dept. Fish and Game, Boise. 7 pp.

Unsworth, J. W. 1998. Mule Deer Ecology. Study IV: Mule Deer Harvest Estimation. Job Completion Report, Project W-160-R-23. Idaho Dept. Fish and Game, Boise.

Unsworth, J. W., L. Kuck, E. O. Garton, and B. R. Butterfield. 1998. Elk habitat selection on the Clearwater National Forest, Idaho. *Journal of Wildlife Management* 62:1255-1263.

Unsworth, J. W., D. F. Pac, G. C. White, and R. M. Bartmann. 1999. Mule deer survival in Colorado, Idaho, and Montana. *Journal of Wildlife Management* 63:315-326.

**PROGRESS REPORT
STATEWIDE WILDLIFE RESEARCH**

STATE: Idaho **SUBPROJECT:** Upland Game Ecology
PROJECT NO: W-160-R-26
SUBPROJECT NO.: 47
STUDY: I-III

PERIOD COVERED: July 1, 1998 to June 30, 1999

STUDY I: PHEASANT RESPONSE TO INTENSIVE HABITAT MANAGEMENT

ABSTRACT

The Principal Wildlife Research Biologist in charge of this project was changed on July 1, 1997. Field data collection efforts were confined to Gooding County for the 1997-1998 and 1998-1999 field seasons. The 1998-1999 field seasons were designed to gather base data on hen pheasant (*Phasianus colchicus*) survival, production, and habitat use. The 1999 field season included hen pheasant trapping and radio collar monitoring, and population monitoring. Twenty-four hens were captured and radio-marked during the 1999 field season. High mortality rates, 50% in 1998 and 60% in 1999, for hen pheasants captured in winter/spring and followed through summer were documented. Survival rates were similar in areas of habitat improvements (59%) and in control areas (63%). Breeding cock territory mapping suggests that breeding cock densities have declined 47% since 1994. Breeding cock territory mapping indicated generally higher breeding populations in control areas than in treatment areas. These data are currently being analyzed. Hen pheasants nesting in residual grass/weed patches were less likely to abandon their nest or to have their nest depredated (50%, $n = 10$) than hens nesting in alfalfa or sage/grass habitats (100%, $n = 11$).

RECOMMENDATIONS

1. Although pheasant trapping efforts were greatly increased during the 1998-1999 field season, the number of hen pheasants caught and radio-collared were not sufficient to accomplish the objectives of the intensive study designed to start in 1998-1999. Considering the consistent downward trend in territorial cocks, trapping success in the coming year may be below that of the current year. Future study objectives and/or study area decisions should consider the problem of potentially low sample sizes on the Gooding study area.
2. Continue to monitor territorial cock and brood trends to document future population trends on the Gooding study area.

STUDY II: PHEASANT RESPONSE TO PREDATOR MANAGEMENT

ABSTRACT

Field work was completed during FY 1998. This report will be submitted as a completion report in early FY 2000.

STUDY III: EFFECTIVENESS OF TRANSPLANTING PHEASANTS AS A MANAGEMENT TOOL

ABSTRACT

During 1999 we transplanted game farm-reared pheasants to 2 locations. Forty-four game farm birds were transplanted during late March and early April. Survival was low with only 3 (6.8%) surviving until 7/1/99. Four (9.0%) game farm birds attempted to nest but none were successful. Wild-caught pheasants released in January had lower survival rates (5.9%) than wild-caught pheasants released in early April (61%). Wild-caught and translocated pheasants survived at a higher rate (61%) than game farm birds (6.8%). The 18 wild-caught pheasants released at the Richfield site made 20 nesting attempts and laid 144 eggs, of which 57 (40%) hatched. In comparison, the 24 resident birds caught and radio-collared at the Gooding site produced 216 eggs, of which 47 hatched.

RECOMMENDATIONS

1. Continue to release wild-caught and game farm pheasants.
2. Continue monitoring pheasant breeding populations in treatment and control areas using territorial cock mapping.
3. Increase the number of study areas from 2 to 3.

PUBLICATIONS

Bodie, W. L. 1999. Upland Game Ecology. Job Prog.Rep., Proj. W-160-R-25., Subproj. 47. Idaho Dept. Fish and Game, Boise, ID. 17 pp.

**PROGRESS REPORT
STATEWIDE WILDLIFE RESEARCH**

STATE: Idaho **SUBPROJECT:** Southwest Region Big Game Modeling
PROJECT NO.: W-160-R-26
SUBPROJECT: 49
STUDY: I

PERIOD COVERED: July 1, 1998 to June 30, 1999

ABSTRACT

The previous reports by Cooper and Unsworth (1996, 1997, 1998) provided introductory information on the objectives, methods, and data requirements for the Southwest Region Big Game Modeling project. During the period of July 1, 1998 through June 30, 1998, I designed, compiled, and tested the various programs, formatted the available data, began applying the models to the data, and started to analyze the output of these models. During the next few months, I will complete the application of the data to the models, analyze the results, and combine the individual models into a comprehensive model to aid in big game management.

MEETINGS AND PRESENTATIONS

Presented the population dynamics model at the Joint Meeting of The Western North American Region of the International Biometric Society and the Institute of Mathematical Statistics on June 21, 1999 in Seattle, WA. Also gave presentations focusing on the model to the Seminar in Mathematical Biology, University of Washington, Department of Zoology, in March and the Seminar in Quantitative Fisheries, University of Washington, School of Fisheries, in April.

REPORTS, PUBLICATIONS, ARTICLES

Cooper, A., and J. W. Unsworth. 1998. Southwest Region Big Game Modeling. Job Progress Report, Project W-160-R-25. Idaho Dept. Fish and Game, Boise.

**PROGRESS REPORT
STATEWIDE WILDLIFE RESEARCH**

STATE: Idaho **SUBPROJECT:** Southeast Mule Deer Ecology
PROJECT NO.: W-160-R-26
SUBPROJECT NO.: 51
STUDY NO.: I-II

PERIOD COVERED: July 1, 1998 to June 30, 1999

ABSTRACTS

STUDY I: INFLUENCE OF PREDATORS ON MULE DEER POPULATIONS

Coyotes were removed from the 4 treatment areas (Units 55, 57, 73A, and 73 Elkhorn) by helicopter gunning in winters 1997, 1998, and 1999. Flights continued until less than 1 coyote was killed per hour flown. Additional trapping effort was maintained through July in 1999. Nontreatment areas included Units 54, 56, 71, and 73 Malad, in which coyote removal was minimal.

In 1998, 66 coyote transects were completed in the summer and 80 were completed in the fall. The summer index was lower in Units 73 and 73A (0.071) than in Unit 56 (0.116). The fall survey index, however, showed the opposite trend with 73A higher (0.183) than 56 (0.124). Coyote transects were completed in all study units in the summer of 1999 with the exception of Unit 54.

Six mountain lions were radio collared in Units 56 and 73A in 1998. An additional 3 mountain lions were radio collared in Unit 56 in 1999. One radio-collared female was harvested by a hunter in Unit 55. Both the mountain lion removal and track index information suggest a reduction in the mountain lion numbers in the liberal hunt units at least for 1999. Age structure data obtained from harvested mountain lions also suggests a high harvest rate in the liberal hunt units.

Indexes of alternate prey were developed through Lagomorph spotlight transects and microtine trapping transects which were completed during the summer of each year. Highest catch rates (primarily *Peromyscus maniculatus*) were in the low elevation sagebrush type. Lagomorphs populations are increasing across the study area, especially in the *Lepus* species.

Aerial composition surveys were completed in all study units during December and early January. The results show no pattern of fawn/doe ratios related to control or treatment units. Aerial population surveys were conducted in April using the methodology outlined in Unsworth et al. (1994). Winter ranges were surveyed completely to provide comparable data to previous surveys. Although some of the population estimates for the eight study units were different between years, there was little relationship to coyote removal efforts.

Mule deer were captured by drive netting or net gunning at sites uniformly distributed across the major winter ranges in Units 56 and 73A. Capture operations were completed in January and early February 1999. Newborn fawns were captured from late May through the third week of June.

Blood samples were drawn from 95 adult does, 12 yearling does, and 4 female fawns in 1998. Blood serum was tested for pregnancy, nutritional serum profile, and disease profile. Pregnancy results from 1998 confirmed high pregnancy rates; 98% of 2.5+ years and 83% of 1.5 year does were pregnant. None of the fawns were pregnant. Blood samples were drawn from 57 adult does and 11 yearling does in four units across the study area (Units 54, 56, 71, and 73A). Pregnancy rates were 91% for 2.5+ years and 100% for yearlings. Nutritional and disease panels results are completed for 1999, but results are not yet compiled.

June fawn at heel ratios averaged 1.64/doe in Unit 73A and 1.62/doe in Unit 56 in 1998. The ratios were even higher in 1999, averaging 1.71/doe in Unit 73A and 1.76/doe in Unit 56.

The mortality of newborn fawns attributed to coyotes was lower in Unit 73A (7%, $n=3$) than Unit 56 (21%, $n=6$) when 1998 and 1999 are combined. Mountain lion-caused mortality was higher in 73A (10%, $n=4$) than Unit 56 (7%, $n=2$). Survival of 6-month-old fawns was high this year, similar in both units (70% in 73A, 69% in 56). Fifteen percent of the fawns died from malnutrition in 73A, but none in Unit 56. Annual adult survival was high for both years of the study, 87% in Unit 56 and 91-97% in Unit 73A. Adult mortality in 1999 was caused completely by mountain lions, accounting for 13% in Unit 56 and 3% in Unit 73A.

The work this year shows some result of coyote removal on newborn fawns survival, although no relationship was observed in the population surveys. The high pregnancy rates (especially in yearling does) and high fetal rates in both areas indicate deer are on a high nutritional plain. The winter was mild across the study areas and survival was high for all age classes.

STUDY II: INFLUENCE OF HABITAT QUALITY AND COMPOSITION CHANGES TO PRODUCTIVITY AND RECRUITMENT OF MULE DEER

Data has been gathered from each of the regions in South Idaho (4-7) concerning the population direction of deer, elk, bear, mountain lion, and coyotes for each big game management unit. These data layers will be overlaid on digital maps of habitat change over the last 30 years. Acquisition and testing of habitat maps is continuing.

MEETINGS AND PRESENTATIONS

MONTH	MEETING OR PRESENTATION	LOCATION
August	Biologist Meeting and Presentation	Island Park
September	Meeting with Wildlife Services – Annual Report	Pocatello
September	Enforcement Training	Pocatello
October	Mountain Lion Management Workshop	Bozeman
December	Predator Symposium	Boise
December	Wildlife Services Field Season Planning Meeting	Pocatello

MONTH	MEETING OR PRESENTATION	LOCATION
December	Personnel Meeting with Director	Pocatello
January	Presentation to Safari Club Int.	Pocatello
February	Public Input Meeting	Soda Springs
February	Public Input Meeting	Pocatello
February	Presentation to Blackfoot River Bowmen	Blackfoot
February	Safari Club Annual Meeting	Pocatello
March	Lion Study Coordination meeting with Dr. Dave Wolf	Salt Lake
March	Western States Deer and Elk Workshop	Salt Lake
March	Presentation to Mule Deer Country Workshop	Salt Lake
March	BLM Coordination Meeting	Pocatello
April	Physical Fitness and Enforcement Training	Pocatello
April	Regional Meeting	Pocatello
May	Meeting with Predator Ecology Personnel	Pocatello
May	Presentation to SE Mule Deer Foundation	Pocatello

PUBLICATIONS

Hurley, M. A., and J. W. Unsworth. 1998. Southeast Mule Deer Ecology, Study I: Influence of predators on mule deer populations. Job Progress Report, Project W-160-R-25. Idaho Dept. Fish and Game, Boise. 10 pp.

Hurley, M. A., and J. W. Unsworth. 1998. Southeast Mule Deer Ecology, Study I: Influence of habitat quality and composition changes to productivity and recruitment of mule deer. Job Progress Report, Project W-160-R-25. Idaho Dept. Fish and Game, Boise. 8 pp.

STUDY II: MORTALITY PATTERNS OF JUVENILE SAGE GROUSE

Based on available data throughout the species' range and documented habitat changes in Idaho, many sage grouse population declines may be due to low juvenile survival associated with decreasing quantity and quality of brood rearing habitat. During 1997 and 1998 mortality patterns were documented for both sexes of juvenile sage grouse and compared between a relatively xeric habitat dominated by Wyoming big sagebrush (*A. t. wyomingensis*) and a more moist habitat characterized by mountain big sagebrush (*A. t. vaseyana*). Fieldwork began in summer 1997. Twenty-one juveniles and 3 adult hens were captured by night-lighting on summer range and equipped with radio-transmitters. Survival to the breeding season was relatively high for birds marked in sagebrush/agriculture lowlands. Survival for juvenile males (85%) was similar to that of juvenile females (86%). Predation was the most common cause of death of juvenile and adult sage grouse during the 1997-1998 field season. Avian predators more commonly preyed on juveniles than did mammalian predators, while adult deaths were more evenly split between the two predator types. Accidental deaths due to power line collisions also accounted for a relatively high percentage of juvenile deaths. Seventy percent of juvenile females returned to their natal range during summer 1998 while only 10% of the males did so.

During 1999, we began assessing survival of sage grouse chicks between the ages of 1 day and 8 weeks. The 1999 field season was a pilot study to develop and refine marking and capturing techniques. Satisfactory techniques were developed and about 75% of chicks died before reaching 3 weeks of age ($n = 31$).

STUDY III: SAGE GROUSE RESPONSE TO EXPLOITATION

Since the mid-1980s sage grouse seasons have been liberalized in many areas. Idaho, Montana, Wyoming, and Colorado generally held seasons that were 30 days in length with bag limits of 3 birds/day. By 1996, following widespread population declines, seasons again were established more conservatively and areas in both Colorado and Idaho were closed to sage grouse hunting. Although some information is available on the response of sage grouse to exploitation, there is little empirical evidence documenting the effect of hunting on sage grouse populations. Thus, we initiated efforts to document effects of different exploitation rates on survival of sage grouse and began a meta-analysis of existing sage grouse data to better understand sage grouse mortality, including hunting.

REPORTS

Apa, A. D. 1998. Habitat use and movements of sympatric sage and Columbian sharp-tailed grouse in southeastern Idaho. Ph.D. dissertation, University of Idaho, Moscow. 199 pp.

Edelmann, F. B., M. J. Ulliman, M. J. Wisdom, K. P. Reese, and J. W. Connelly. 1998. Assessing habitat quality using population fitness parameters: a remote sensing/GIS based habitat-explicit model for sage grouse. Idaho For., Wildl., and Range Exp. Sta. Bull. Tech. Bull. 25. 33 pp.

- Connelly, J. W., M. W. Gratson, and K. P. Reese. 1998. Sharp-tailed grouse species account. Birds of N. A. Species Account No. 354. The Birds of North America Inc., Philadelphia, PA. 20 pp.
- Nelle, P. 1998. The long-term effect of fire on sage grouse nesting and brood-rearing habitats on the upper Snake River Plain. M.S. thesis. University of Idaho, Moscow. 85 pp.
- Connelly, J. W., K. P. Reese, R. A. Fischer, and W. L. Wakkinen. 1999. Effects of fire on a sage grouse breeding population in southeastern Idaho. Wildl. Soc. Bull. In press.
- Connelly, J. W., A. D. Apa, R. B. Smith, and K. P. Reese. Hunting and predation as mortality factors of adult sage grouse in Idaho. Wildl. Biol. Submitted.
- Leonard, K. M., K. P. Reese, and J. W. Connelly. Distribution, movements, and habitats of sage grouse on the upper Snake river Plain of Idaho: changes from the 1950s to the 1990s. Wildl. Biol. Submitted.
- Nelle, P., K. P. Reese, and J. W. Connelly. 2000. The long-term effect of fire on sage grouse nesting and brood-rearing habitats on the upper Snake River Plain. J. Range Manage. In Press.

MEETINGS AND PRESENTATIONS

- Connelly, J. W. 1999. A review of sage grouse ecology. Presented at the Upper Snake Local Working Group Meeting. Mud Lake, ID. April 26.
- Connelly, J. W., A. R. Sands, T. P. Hemker, and M. A. Schroeder. 1998. Sage grouse management in North America: a revision of old guidelines. Presented at the annual meeting of the Idaho Chapter, The Wildlife Society. March 5-6. Moscow ID.
- Connelly, J. W., A. D. Apa, R. B. Smith, and K. P. Reese. 1999. Hunting and predation as mortality factors of adult sage grouse in Idaho. International Grouse Symposium. Rovaniemi, Finland. September 13-17.
- Connelly, J. W., A. D. Apa, R. B. Smith, and K. P. Reese. 1999. Hunting and predation mortality factors of adult sage grouse in Idaho. Presented at the Upper Snake Local Working Group Meeting. Mud Lake, ID. September 2.
- Leonard, K. M., K. P. Reese, and J. W. Connelly. 1999. Distribution, movements, and habitats of sage grouse on the upper Snake River Plain of Idaho: changes from the 1950s to the 1990s. International Grouse Symposium. Rovaniemi, Finland. September 13-17.
- Lucia, M., K. P. Reese, and J. W. Connelly. 1999. Mortality of juvenile sage grouse in southeastern Idaho. Presented at the annual meeting of the Idaho Chapter of The Wildlife Society. Boise, ID. March 10-13.

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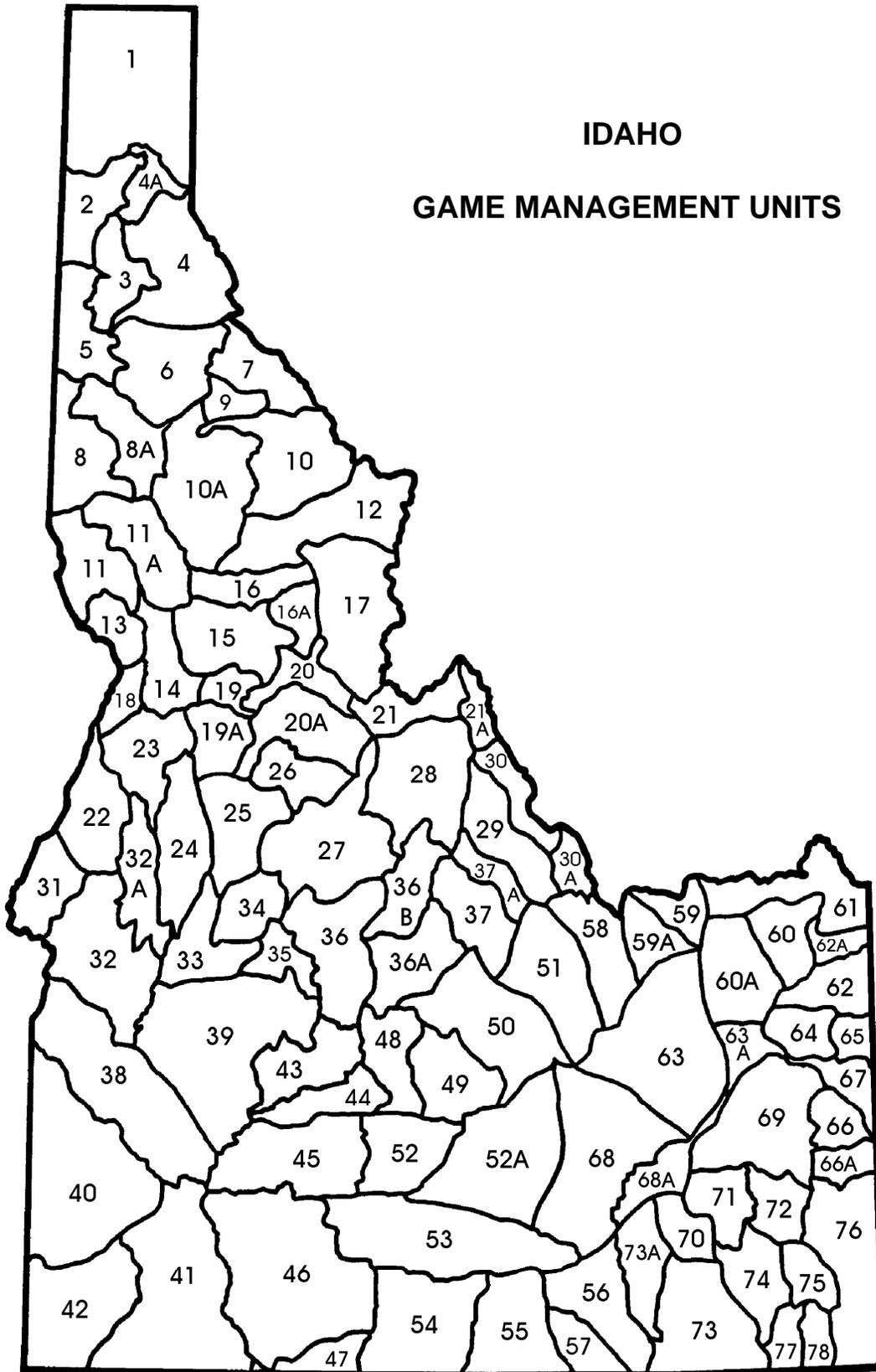
IDAHO DEPARTMENT OF FISH AND GAME

Tom Parker

Tom Parker, Acting Chief
Bureau of Wildlife

IDAHO

GAME MANAGEMENT UNITS



FEDERAL AID IN WILDLIFE RESTORATION

The Federal Aid in Wildlife Restoration Program consists of funds from a 10% to 11% manufacturer's excise tax collected from the sale of handguns, sporting rifles, shotguns, ammunition, and archery equipment. The Federal Aid program then allots the funds back to states through a formula based on each state's geographic area and the number of paid hunting license holders in the state. The Idaho Department of Fish and Game uses the funds to help restore, conserve, manage, and enhance wild birds and mammals for the public benefit. These funds are also used to educate hunters to develop the skills, knowledge, and attitudes necessary to be responsible, ethical hunters. Seventy-five percent of the funds for this project are from Federal Aid. The other 25% comes from license-generated funds.

