IDAHO

DEPARTMENT OF FISH AND GAME

Jerry M. Conley, Director

Project W-168-C-12

Progress Report

FEDERAL AID TO WILDLIFE RESTORATION

Study I, Job 1: Wildlife Research Coordination

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July 1, 1994 to June 30, 1995

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Boise, Idaho

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PROGRESS REPORT
STATEWIDE WILDLIFE RESEARCH

STATE: Idaho **TITLE:** Wildlife Research Coordination
PROJECT NO.: W-168-C-12
STUDY NO.: I
JOB: 1

PERIOD COVERED: July 1, 1994 to June 30, 1995

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.

Field work was completed on the Coeur d'Alene River elk ecology project, the Region 3 and 4 mule deer habitat use projects, the bighorn sheep winter habitat use project, and the elk/livestock impacts on riparian vegetation project. A study plan for the upland game ecology project was completed and field work has commenced.

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.

PROGRESS REPORT
STATEWIDE WILDLIFE RESEARCH

STATE: Idaho **TITLE:** Coeur d'Alene Elk Ecology
PROJECT NO.: W-160-R-22
SUBPROJECT: 23
STUDY NO.: I-III

PERIOD COVERED: July 1, 1994 to June 30, 1995

COEUR D'ALENE ELK ECOLOGY

Study I: Bull elk habitat use

Monitoring of radio-collared elk in the Coeur d'Alene River drainage was continued through the 1994 hunting seasons. Monitoring was ended in December as we moved out of the fieldwork stage and on to data analysis.

Satellite imagery of the CDA study area has been classified into 10 cover types (8 vegetative plus rock and water). Cover types were described according to structure and composition using USFS ECODATA methodology. Cluster and factor analyses were used to evaluate our plant community groupings. These analyses confirmed differences in structure and composition and we feel confident that our groupings reflect real plant community phenomenon.

Vegetation data along with information on road access and topography will be used to evaluate habitat selection patterns and differences among adult bull, yearling bull, and cow elk. A preliminary report was presented at the 1995 Western States Deer and Elk Workshop. Data analysis is in progress and the final report will be completed this year. A manuscript reporting this work will be completed for submission to the Journal of Wildlife Management.

Study II: Elk sightability models

The completion report for Study II has been filed. A manuscript reporting the results of model validation work done at the Starkey Experimental Forest and Range in LaGrande, Oregon is in review with the Journal of Wildlife Management. We released the new and updated sightability software and user's manual last fall.

Study III: Elk habitat security characteristics and hunting season mortality rates.

A third regional telephone survey of Unit 4 general season elk hunters was conducted this year. The purpose of the survey was to determine hunter densities at a finer scale of resolution than obtainable through the statewide telephone survey. We have successfully contacted 900 hunters and recorded approximately 4,800 hunter days of effort.

The elk mortality data set is complete. Data on elk mortality rates, hunter density, road access, vegetation pattern, hunting season structure, and topography are being brought together to model their effects on bull elk vulnerability to rifle hunting. The final report will be completed this year. A manuscript reporting this work will be completed for submission to the Journal of Wildlife Management.

Meetings

Date	Purpose	Location
July	Stats consult with Dr. Miller/topography	Moscow
Aug	Venture 20 discussions	Kooskie
Aug	I&E, IDFG fair booth Kootenai County	CDA
Sep	Wildl. Bur. Research coord. mtg.	Red River
Oct	CDA Press, interview	CDA
Dec	Western Deer & Elk committee mtg.	Nampa
Dec	Calf mortality studies/Wash. Game & Fish	CDA
Jan	Big game regulations public mtg.	Mullan
Feb	IDFG biologist mtg.	Boise
Feb	Shoshone Press, interview	Enaville
Mar	Dave Vales mortality project review	LaGrande, OR
Mar	IDFG elk research review	Boise
Mar	USFS Fernan final roads edit for GIS	CDA
Mar	USFS Wallace final roads edit for GIS	Silverton
May	IFG Commission research review	Cambridge
May	Western deer and elk workshop	Sun Valley
May	GIS coord., BLM, USFS, IDL, IDFG, et al.	CDA
Jun	GIS coord., BLM, USFS, IDL, IDFG, et al.	CDA

Presentations

Leptich, David J., and Michael W. Gratson. 1994. A short-course on the application of sightability surveys for big game populations. Idaho Falls, Idaho.

Leptich, David J., and Michael W. Gratson. 1994. A short-course on the application of sightability surveys for big game populations. Nampa, Idaho.

Leptich, David J., and Michael W. Gratson. 1994. A short-course on the application of sightability surveys for big game populations. Lewiston, Idaho.

Leptich, David J. 1994. CDA elk mortality research. Silver Valley Kiwanis Club. Kellogg, Idaho.

Leptich, David J. 1995. CDA elk mortality research. IDFG sportsman no host breakfast. Coeur d'Alene, Idaho.

Leptich, David J. 1995. CDA elk mortality research. IDFG sportsman no host breakfast. Sandpoint, Idaho.

Leptich, David J. 1995. CDA elk mortality research. Bonner County Sportsman. Sandpoint, Idaho.

Leptich, David J., and Jim A. Hayden. 1995. Effectiveness of season timing as a tool to manage bull elk mortality rates and harvest age structure. Western States Deer and Elk Workshop. Sun Valley, Idaho.

Hayes, Stephen G., Edward O. Garton, and David J. Leptich. 1995. Sexual segregation of elk in northern Idaho. Western States Deer and Elk Workshop. Sun Valley, Idaho.

Leptich, David J. 1995. Elk mortality and access management. Rocky Mountain Elk Foundation State Directors Meeting. Sandpoint, Idaho.

Reports, Publications, Articles

Leptich, D. J., and P. Zager. 1994. Bull elk habitat use. Prog. Rep., Project W-160-R, Study I. Idaho Department of Fish and Game, Boise.

Leptich, D. J., and P. Zager. 1994. Elk habitat security characteristics and hunting season mortality rates. Prog. Rep., Project W-160-R, Study III. Idaho Department of Fish and Game, Boise.

Unsworth, J. W., F. A. Leban, D. J. Leptich, E. O. Garton, and P. Zager. 1994. Aerial Survey: User's Manual, Second addition. Idaho Department of fish and Game, Boise, Idaho. 84 pp.

Leptich, David J., and Jim A. Hayden. 1995. Effectiveness of season timing as a tool to manage bull elk mortality rates and harvest age structure. Proceedings of the Western States and Provinces 1995 Joint Deer and Elk Workshop. Abstract only. Sun Valley, Idaho.

Hayes, Stephen G., Edward O. Garton, and David J. Leptich. 1995. Sexual segregation of elk in northern Idaho. Proceedings of the Western States and Provinces 1995 Joint Deer and Elk Workshop. Abstract only. Sun Valley, Idaho.

PROGRESS REPORT
STATEWIDE WILDLIFE RESEARCH

STATE: Idaho **TITLE:** (Lochsa) Elk Ecology
PROJECT NO.: W-160-R-22
SUBPROJECT: 31
STUDY NO.: I-III

PERIOD COVERED: July 1, 1994 to June 30, 1995

(LOCHSA) ELK ECOLOGY

Study No. I. Road Closures and Bull Elk Mortality

Jobs 2, 3: The effect of road closures on elk mortality and hunter density, distribution, and success in north-central Idaho

We are investigating bull elk (*Cervus elaphus*) hunting mortality rates in relation to hunter density, distribution, success, and habitat characteristics in three treatment areas that vary in motorized vehicle access during the general elk hunting season. This information will be used to develop a model that elk managers can use to predict changes in bull elk mortality rates that would occur by managing hunter access, hunter density, and habitat characteristics. In the roaded area open road densities average 1.54 km/km^2 (2.49 mi/mi^2). In the managed access area total road densities average 2.52 km/km^2 (4.08 mi/mi^2), but roads are closed to motorized vehicle use during the general elk season so that open road densities average 0.56 km/km^2 (0.90 mi/mi^2). In the unroaded area open road densities average 0.23 km/km^2 (0.37 mi/mi^2). Of 59 bulls radio-located approximately 770 times during the 1994 archery and general hunting seasons, 17 (28.8%) were harvested during the general season, 2 (3.4%) were wounded during the general season and unrecovered by hunters, 2 (3.4%) were harvested during the archery season, 1 (1.7%) was wounded during the archery season and unrecovered by the hunter, 1 (1.7%) died of natural causes, and 1 (1.7%) presumably left the study area in the early part of the archery season. Thirty-five (59.3%) bulls survived. Estimates of hunting season survival rates were 0.46 (0.31-0.69; 95% confidence intervals) for bulls in the roaded area, 0.73 (0.55-0.96) for bulls in the managed access area, and 0.83 (0.68-1.00) for bulls in the unroaded area. Thus, survival of bulls was about 27% higher in the managed access area than in the roaded area during the 1994 hunting season. Hunter densities, estimated by a post-season telephone survey of random samples of hunters encountered in the field and from the 1993 list of declared unit hunters in Units 10, 10A, and 12, appeared to be highest in the roaded area ([1.086$\pm$1.7131 hunter-days/km^2/day/subunit]; 0.419$\pm$0.6614 hunter-days/mi^2/day/subunit; mean$\pm$SD), lowest in the managed access area ([0.647$\pm$0.8209; 0.249$\pm$0.3169), and somewhat lower than the roaded area in the unroaded area ([0.972$\pm$1.2997; 0.375$\pm$0.5018). Over 60% of our sample of hunters, across all treatment areas, said that closing roads to motorized vehicle use during the elk season was easily acceptable, or not easy to accept but tolerable, as a management action to help

maintain good numbers of bulls and branch-antlered bulls. Opinions of elk hunters on other elk and land management and research questions were also investigated.

Study No. II. Optimum Yield of Elk

Job 1: The effect of harvest on elk population size and composition in Idaho

We initiated an antlerless elk management program in Idaho in 1992 that uses some underlying principles of experimental design to evaluate the effects of different cow harvest rates on elk population dynamics. During the hunting seasons of 1992-96 we are attempting to harvest a relatively constant fraction of the antlerless elk population in each of 11 GMUs (three very low harvest units - 2 to 5% harvest rate; four low harvest units - 6 to 10% harvest rate, and four moderate harvest units - 14 to 30% harvest rate) using the controlled-hunt permit system. During 1994, harvest rates averaged 2.4 $\pm$ 4.5% (SD) higher than target harvest rates for the 11 GMUs in the study and 95% confidence intervals on harvest estimates (19.4 $\pm$ 9.5% of the estimate) were, on average, 7% lower than during the first year of study (12.4 $\pm$ 2.6%) due to reduced intensity of sampling hunters. A regression of the most recent cow elk population change (population growth rate) on the 1992 harvest rate ($r = 0.39$, $P > 0.10$, 8 df) indicates that there is no relationship between harvest rate (up to our treatment of about 28%) and population growth rate over the short-term. Although an earlier analyses, using 1991 through 1993 data indicated that the annual change in recruitment (change in calf:cow ratio) might be related to antlerless harvest rate, a regression using the most recent data suggests that there is no relationship between recruitment and harvest rate ($r = 0.04$, $P > 0.10$, 8 df). This suggests >1-2 yrs of data are needed to investigate these questions. We are also investigating the effect of antlerless harvest rate with data from all Idaho elk units using the statewide harvest and population databases.

Study No. III. Elk Sightability

Job 1: Develop an elk sightability model for the Bell 206 Jet Ranger helicopter

Models that correct observed numbers of animals for visibility or detection bias during aerial surveys are often aircraft specific. A major reason for this is that visibility of survey paths can differ among aircraft. Idaho has developed an elk sightability model for use with the Hiller UH-12E helicopter. We developed a method to modify this model so that it can be used with other aircraft. We first conducted a laboratory experiment that provided strong evidence that aircraft type would not affect how detecting elk groups are influenced by elk group size, vegetation cover, or snow cover (the variables important in elk detection bias). Thus, we modified only the y-intercept of Idaho's Hiller model, not the parameter coefficients for group size, vegetation, and snow, to develop elk aerial survey models for the Bell 206 jet Ranger, the Bell 47 Soloy, and the Hughes 500 helicopters. Modifications were based on relative viewing area used by observers and pilot in each aircraft estimated by photography. We tested the new model for use with the Bell 206 jet Ranger by conducting 3 survey trials of a known-sized elk herd at Starkey Experimental Forest and Range, OR. Our estimates were an average of 91.4% $\pm$ 15.17 (SD) of the known-sized elk population, for an accuracy ($1\text{-}MSE^{1/2}$) of 80.4%. This job was completed during FY 95.

Training, Meetings, and Presentations (M.W. Gratson)

Training - Nonenforcement ride-along	Salmon River
Training - Nonenforcement	Myrtle
Training - CPR and first aid	Lewiston
Training - Sexual harassment	Lewiston
Training - Animal capture and restraint	Coeur d'Alene
Training - Inservice training all IDFG personnel	Boise
Meetings - Elk vulnerability & habitat effectiveness (cooperative implementation with IDFG & US Forest Service & Nez Perce Tribe)	Grangeville, Orofino
Meeting - Idaho wildlife research	Red River
Meeting - Big game regulations R-2	Lewiston
Meeting - Idaho Chapter The Wildlife Society	Idaho Falls
Meetings - Unit 12 evaluation and calf:cow ratios	Moscow, Boise
Meeting - Calf mortality and recruitment, with Washington Dept. Wildlife	Coeur d'Alene
Meeting - Project review of elk vulnerability model of D. Vales, Blue Mtns Initiative	La Grande, OR
Meeting - 1995 Western States and Provinces Joint Deer and Elk Workshop, coordination	Boise, Moscow
Meetings - Coordinating session on Managing Ungulates as Components of Ecosystems, for Second Annual Conference of The Wildlife Society, with Johnson, B.K, OR Dept. Fish and Game, N. T. Hobbs, CO Div. Wildlife, H. Gucinski, PNRS	La Grande, Enterprise, OR
Presentations - Gratson, M. W., and D. Leptich, A short course on the application of sightability surveys for big game	Idaho Falls, Lewiston, Nampa
Presentation - Gratson, M. W., et al., Integrating research and management: Idaho's approach to antlerless elk harvest. Western States and Provinces Joint Deer and Elk Workshop	Sun Valley
Presentation and workshop - Gratson, M. W., G. Pauley, and J. W. Unsworth, Modeling Wildlife Populations. IDFG inservice training	Boise
Presentation and workshop - Gratson, M. W., Adaptive Resource Management. IDFG inservice training	Boise
Presentation - Gratson, M. W. Developing new sightability models for aerial surveys of wildlife using multiple helicopter types. First Annual Conference of The Wildlife Society.	Albuquerque, NM
Presentation - Gratson, M. W., and D. Leptich. Elk research. Bureau of Wildlife.	Boise
Presentation - Gratson, M. W. Elk research. IDFG Commission.	Brownlee
Presentation - Gratson, M. W. Elk research. IDFG, Oregon Dept. Fish and Game, and Washington Dept. Wildlife.	Lewiston
Presentation - In prep. Gratson, M. W. and B. K. Johnson. Managing harvest for sustainable ungulate populations. Second Annual Conference of The Wildlife Society.	Portland, OR

Meetings and Presentations (Pete Zager)

Date	Purpose	Location
July	Mark Secord thesis defense	Missoula
	Sportsmen's meeting	Grangeville
	Dr. Stan Miller (UI) re geostat applications	Moscow
August	Dave Volsen thesis defense	Moscow
	Venture 20 meeting - elk vulnerability	Kooskia
	Scott Tomson committee meeting	Clark Fork
September	Enforcement training	Myrtle
	Tomson and Foresman meeting	Clark Fork
	IDFG research meeting	Red River
	PVA meeting/workshop	Moscow
	Columbia River Basin EM team meeting	Moscow
October	Sportsmen's breakfast	Lewiston
	Bitterroot Ecosystem Management meeting	Lewiston
	Salvage timber sale coordination meeting	Lewiston
	Caribou PVA meeting	Spokane
	Deer/elk species plan meeting	Boise
November	Nez Perce National Forest - yew harvest	Grangeville
	Public meeting - big game regulations	Grangeville
	Public meeting - big game regulations	Orofino
	New employees tour presentation	Lewiston
December	Nez Perce Tribe re Craig Mountain elk project	Lewiston
	Washington Dept. of Wildlife - elk research	Coeur d'Alene
	Craig Mountain elk project planning	Boise
January	Region 2/BOW meeting re big game regulations	Lewiston
	Caribou Steering Committee meeting	Spokane
February	Andy Lindbloom committee meeting	Moscow
	IDFG biologists meeting	Boise

Date	Purpose	Location
	Personnel training - sexual harassment	Lewiston
	Frank Edelmann thesis defense	Moscow
	Southeast Deer Study Group meeting and presentation	San Antonio
March	Society of American Foresters meeting - session moderator	Moscow
	BOW meeting re elk projects	Boise
	BLM/UI re mountain quail project	Lewiston
April	IDFG/Idaho Coop. Wildl. Rsch. Unit coordination meeting	Moscow
	Caribou Recovery Team meeting	Spokane
	Animal handling and restraint workshop	Coeur d'Alene
	IDFG research presentation at WSU	Pullman
May	Western States/Provinces Deer and Elk Workshop and poster	Sun Valley
	IDFG Commission meeting and presentation	Brownlee
	Group 2000 meeting	Lewiston
	Elk of North America group meeting	Sun Valley
June	Society for Conservation Biology meeting and presentation	Fort Collins

Reports, Publications, and Articles

Gratson, M. W., C. Whitman, and P. Zager. 1994. Lochsa elk ecology. Study I. Road closures and bull elk mortality. Job 2. The effects of road closures on elk mortality in north-central Idaho. Job 3. The effects of road closures on hunter density, distribution, and success in north-central Idaho. Fed. Aid in Wildl. Restor., Job Prog. Rep., Proj. W-160-R-21. Idaho Dep. Fish and Game, Boise. 25pp.

Gratson, M. W., and P. Zager. 1994. Lochsa elk ecology. Study II. Optimum yield of elk. Job 1. The effect of harvest on elk population size and composition in Idaho. Fed. Aid in Wildl. Restor., Job Prog. Rep., Proj. W-160-R-21. Idaho Dep. Fish and Game, Boise. 14pp.

Gratson, M. W., and P. Zager. 1994. Lochsa elk ecology. Study III. Job 1. Elk sightability model for the Bell 206 Jet Ranger helicopter. Fed. Aid in Wildl. Restor., Job Prog. Rep., Proj. W-160-R-21. Idaho Dep. Fish and Game, Boise. 27pp.

Gratson, M. W. 1995. Elk ecology study plan: 1991-1996, Clearwater Drainage, North-central Idaho. 35pp.

Bell, J. , S. Blair, D. Davis, M. Gratson, K. Leidenfrost, G. Servheen, B. Stotts, J. White. 1995. Interagency guidelines for managing elk habitats and populations on USFS lands in central Idaho. Idaho Dep. of Fish and Game, Lewiston. 54pp. (Draft.)

Gratson, M. W. 1995. Research proposal to investigate inter-unit and inter-region dynamics of elk vulnerability. Idaho Dep. of Fish and Game, Lewiston. 3pp. (Draft)

Compton, B. B., P. Zager, and G. Servheen. 1995. Survival and cause-specific mortality of translocated woodland caribou. Wildl. Soc. Bull. *in press.*

Edelmann, F., K. P. Reese, and P. Zager. 1995. Cottonwood turkey ecology. Fed. Aid Wildl. Restor., Job Compl. Rep., Proj. W-160-R-21, Subproj. 33. Idaho Dep. Fish and Game, Boise. 168pp.

Heekin, P. E., K. P. Reese, and P. Zager. 1994. Mountain quail ecology. Fed. Aid Wildl. Restor., Job Compl. Rep., Proj. W-160-R-21, Subproj. 32. Idaho Dep. Fish and Game, Boise. 3pp.

Heekin, P. E., K. P. Reese, and P. Zager. 1994. Fall/winter mountain quail ecology. Fed. Aid Wildl. Restor., Job Prog. Rep., Proj. W-160-R-21, Subproj. 44. Idaho Dep. Fish and Game, Boise.

Koza, J. S., and P. Zager. 1994. Seasonal habitat use, population characteristics, and management of chukar partridge (*Alectoris chukar*) in north-central Idaho. Fed. Aid Wildl. Restor., Job Prog. Rep., Proj. W-160-R-21. Subproj. 43. Idaho Dep. Fish and Game, Boise. 37pp.

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. *in review*.

Leptich, D.J., and P. Zager. 1994. Coeur d'Alene elk ecology project. Study I. Bull elk habitat use. Fed. Aid Wildl. Restor., Job Prog. Rep., Proj. W-160-R. Idaho Dep. Fish and Game, Boise.

_____, and _____. 1994. Coeur d'Alene elk ecology project. Study II. Elk sightability models. Fed. Aid Wildl. Restor., Job Prog. Rep., Proj. W-160-R. Idaho Dep. Fish and Game, Boise.

_____, and _____. 1994. Coeur d'Alene elk ecology project. Study III. Elk habitat security characteristics and hunting season mortality rates. Fed. Aid Wildl. Restor., Job Prog. Rep., Proj. W-160-R. Idaho Dep. Fish and Game, Boise.

Lindbloom, A., R. Lantz, K. Reese, and P. Zager. 1994. Chukar ecology. Fed. Aid Wildl. Restor., Job Prog. Rep., Proj. W-160-R-21, Subproj. 43. Idaho Dep. Fish and Game, Boise.

Tomson, S., K. Foresman, and P. Zager. 1994. Pine marten ecology. Fed. Aid Wildl. Restor., Job Prog. Rep., Proj. W-160-R-21, Subproj. 44. Idaho Dep. Fish and Game, Boise.

Unsworth, J. W., F. A. Leban, D. J. Leptich, and P. Zager. 1994. Aerial survey: user's manual. 2nd edition. Idaho Dept. Fish and Game, Boise.

Wakkinen, W., B.B. Compton, P. Zager, and J. R. Skalski. 199-. A census technique for woodland caribou. *submitted.*

Warren, C. D., J. M. Peek, G. Servheen, and P. Zager. 199-. Movements and habitat use of translocated caribou types in north Idaho and southeastern British Columbia. *submitted.*

Wielgus, R. B., F. L. Bunnell, W. L. Wakkinen, and P. Zager. 1994. Population dynamics of Selkirk Mountains grizzly bears. J. Wildl. Manage. 58:266-272.

PROGRESS REPORT
STATEWIDE WILDLIFE RESEARCH

STATE: Idaho **TITLE:** Mule Deer Ecology
PROJECT NO.: W-160-R-22
SUBPROJECT: 35
STUDY NO.: II-IV

PERIOD COVERED: July 1, 1994 to June 30, 1995

MULE DEER ECOLOGY

Study II: Mule Deer Mortality

Deer (n=317) were radio collared on 3 study areas during 1992-94. Overall survival rates varied between winters (X^2 = 35.414, df = 2, P < 0.001) (Table 1). With both sexes and all age classes combined, survival rates were 58% in the winter of 1992-93, 87% during the winter of 1993-94, and 79% during the winter of 1994-95. Doe survival rates did not vary among the 3 winters (X^2 = 2.433, df = 2, P = 0.296). A greater percentage of bucks died during the winter of 1992-93 (X^2 = 14.245, df = 2, P = 0.001) than during 1993-94 or 1994-95 (Table 1). Fawn survival varied among the 3 winters (X^2 = 30.666, df = 2, P < 0.001) (Table 1). Survival rates were similar among study areas during 1992-1993 (X^2 = 0.191 df = 2, P = 0.909), but were different during 1993-94 (X^2 = 9.773, df = 2, P = 0.008) and during 1994-95 (X^2 = 10.661, df = 2, P = 0.005). Most of the difference in 1993-94 was due to differences in fawn survival; 44% of the fawns survived on the Owyhee study, while the Bennett Mountain and Blacks Creek study areas had 90% fawn survival (X^2 = 14.069, df = 2, P = 0.001). Fawn survival again showed the most variation in the winter of 1994-95 (Table 1). During winter 1993-94, buck survival did not vary significantly among study areas (X^2 = 0.677, df = 2, P = 0.713). This pattern held in 1994-95 (X^2 = 2.340, df = 2, P = 0.310). Doe survival was similar among study areas during the winter of 1993-94 (X^2 = 0.360, df = 2, P = 0.835), but varied during 1994-95 (X^2 = 10.143, df = 2, P = 0.006). I calculated annual survival rates for the periods 6/1/93 to 5/31/94 and 6/1/94 to 5/31/95 (Table 2). Annual rates did not vary by study area for bucks (X^2 = 0.590, df = 2, P = 0.745) or does (X^2 = 3.919, df = 2, P = 0.141). Annual rates varied between years for bucks (X^2 = 4.511, df = 1, P = 0.034) and does (X^2 = 6.417, df = 1, P = 0.011). I calculated summer survival rates for the period 6/1/93 to 8/31/93 and 6/1/94 to 8/31/94 (Table 2). Summer rates did not vary between years (X^2 = 3.491, df = 1, P = 0.062). Summer rates did not vary among study areas (X^2 = 4.014, df = 2, P = 0.134). Summer survival rates were also similar for bucks (99%) and does (97%) (X^2 = 0.606, df = 1, P = 0.436). During fall (9/1 to 11/30) survival rates varied between years (X^2 = 7.432, df = 1, P = 0.006), sexes (X^2 = 14.420, df = 1, P < 0.001), but not among study areas (X^2 = 0.094, df = 2, P = 0.954) (Table 2). Bucks had 67% and 81% survival rates and does had 86% and 100% survival rates during fall, 1993 and 1994 respectively.

Study III: Mule Deer Sightability

One hundred fifty-eight sightability data points were collected on the Owyhee, Blacks Creek, and Bennett Mountain study areas. These data were combined with 255 data points from southeast Idaho (Ackerman 1988). A sightability model has been developed. This model was added to the sightability software and the manual was updated. To determine the best timing for sightability surveys, 4 surveys were flown during winter and 4 additional surveys were flown during spring, 1991-92, in the Wolf Creek and Deer Creek drainages of Unit 11. The raw data have been summarized.

Study IV: Mule Deer Harvest Estimation

I used fishery access point methods to estimate deer harvest. I estimated the total deer harvest in Unit 40 to be 294 (224 - 364, 90% CI) in 1993 and 548 (325 - 769, 90% CI) in 1994. The telephone survey estimated a harvest of 398 in 1993 and 542 in 1994. I used the 1993 check station results to restratify subunits for the 1994 survey.

Meetings and Presentations

Month	Meeting	Location
July	Meeting on Bighorn Sheep	Boise
August	Idaho state library focus group	Boise
	Sightability Meeting (U of I)	Moscow
September	Research Meeting (IDFG)	Red River
	Owyhee Tour (IDFG)	Mud Flat
December	Presentation on Mule Deer (USFS)	McCall
February	Biologists Meeting (IDFG)	Boise
March	The Wildlife Society	Idaho Falls
May	Commission Meeting (IDFG)	Brownlee
	Deer/elk Workshop	Sun Valley
	Presentation on Mule Deer (IDFG)	Nampa

Reports, Publications, Articles

Milner, G. B., and J. W. Unsworth. 1995. Region 3 mule deer habitat use. Job Completion Report, Project W-160-R-22. --pp.

Gray, C. J., and J. W. Unsworth. 1995. Region 4 mule deer habitat use. Job Completion Report, Project W-160-R-22. 64 pp.

Unsworth, J. W. 1995. Mule deer ecology. Study II: Mule deer mortality. Job Progress Report, Project W-160-R-22. Idaho Dept. Fish and Game, Boise. 10 pp.

Unsworth, J. W. 1995. Mule deer ecology. Study III: Mule deer sightability. Job Progress Report, Project W-160-R-22. Idaho Dept. Fish and Game, Boise. 8 pp.

Unsworth, J. W. 1995. Mule deer ecology. Study IV: Mule deer harvest estimation. Job Progress Report, Project W-160-R-22. Idaho Dept. Fish and Game, Boise. 10 pp.

PROGRESS REPORT
SURVEYS AND INVENTORY

STATE: Idaho **TITLE:** Canada Goose Ecology
PROJECT NO.: W-160-R-22
SUBPROJECT: 37
STUDY NO.: I-III

PERIOD COVERED: July 1, 1994 to June 30, 1995

CANADA GOOSE ECOLOGY

Study I: Evaluation of Population Trend and Harvest Estimates

Weekly breeding pair counts (SBPC), during March, April, and May were conducted on the Snake, Payette, and Boise Rivers. These surveys were conducted to ascertain the peak period of breeding pair numbers, describe the breeding distribution, determine the amount of variation inherent in this type of survey, give the researcher experience in conducting the surveys, and determine the problems associated with the survey technique and interpreting the results. Peak pair numbers were observed during the 4/05-4/20 period for all three survey areas. Comparisons of data generated on research flights were made to similar data collected by the Southwest Region management personnel on their regularly scheduled Spring BPC surveys. Several potential reasons for the high variances observed in Regional SBPC surveys were identified.

One hundred and twenty-two locally produced Canada geese were equipped with neck-collar-mounted radio transmitters and U. S. Fish and Wildlife Service (USF&WS) aluminum leg bands and then released. Radio-collared geese were monitored through the 1994 hunting season. Survival of radio-collared geese was 62% for adults and 48% for young. Harvest rates of radio-collared geese was highest during the first 3 weeks and last 4 weeks of the season.

Study II: Factors Affecting Mortality Rates

Field work was limited to the capture and banding of locally produced Canada geese. Approximately 1,300 geese were banded during the spring of 1994 in southwestern Idaho. Habitat use areas were determined for fall, winter, and spring periods.

Study III: Identification of Subpopulations

This study was cancelled during this reporting period due to high cost and to avoid a duplication of USF&W Service research efforts.

Meetings and Presentations

Date	Name	Location
July	Owyhee County Historical Society	Murphy
January	Ducks Unlimited	Boise
	Oregon F&G, USFWS, SW Reg. Mtg.	Nampa
April	Desert Bighorn Sheep Council	El Paso, Texas
	SW Reg. Pers. Mtg.	Boise
May	Phys. Ass. & Firearms Training	Boise
	ID F&G Commission Meeting	Brownlee

Reports, Publications, Articles

Bodie, W. L. 1993. Canada Goose Ecology In Southern Idaho. A Problem Analysis and Study Plan. Cmpt. Rpt. W-160-R-20. Idaho Department of Fish and Game. Boise. 48pp.

Bodie, W. L. 1993. No One Knows Where The Wild Goose Goes. Idaho Wildlife Review. Idaho Department of Fish and Game. In Press.

Bodie, W. L. 1994. A Standardized Technique for Bighorn Sheep Aerial Surveys. Proc. Northern Wild Sheep and Goat Counc. Cranbrook, B. C. In Press.

McCoy, M. W., Bodie, W. L., and Taylor, E. L. 1994. An Observation of Out of Season Breeding in California Bighorn Sheep. Northwest Science. In Press.

Bodie, W. L. 1995. A Sightability Model for Bighorn Sheep in Desert Habitats, J. Wildl. Manage. 59(4) 834-840.

PROGRESS REPORT
STATEWIDE WILDLIFE RESEARCH

STATE: Idaho
PROJECT NO.: W-160-R-22
SUBPROJECT: 38
STUDY NO.: II

TITLE: Elk/Livestock Impacts on Riparian Vegetation

PERIOD COVERED: July 1, 1994 to June 30, 1995

ELK/LIVESTOCK IMPACTS ON RIPARIAN VEGETATION

A 5-fold increase in elk numbers in the Lemhi area has come at a time when the cattle grazing on federal lands is being reduced as a means of improving range conditions. This has raised questions of how elk contribute to range deterioration and whether elk use will replace cattle use as cattle numbers are reduced. To address this question, summer forage removal by elk (*Cervus elaphus*) and cattle (*Bos taurus*) was documented on the Lemhi Mountain, Idaho, during a wet (1993) and a dry (1994) growing season. In 1993, 61 vegetative transects (100 m) were randomly established in 4 vegetative cover types in areas considered suitable range for cattle. An additional cover type was added in 1994, and the number of transects was increased to 96. Forage use, measured as a percent of peak graminoid biomass and forb biomass removed, was sampled on > 300 plants along each transect at one month intervals coinciding with cattle movement to and from grazing units. Ungulate pellet groups were counted within 6 circular plots (0.01 ha) along the transect at the same time as vegetation was sampled. Differences in forage use among cover types and units were tested using ANOVA and differences between years were tested using a paired t-test. Graminoid removal by elk or cattle was related to the presence of specific cover types, physiographic factors, and intensity of forage removal by the other species using linear regression.

Nearly 90% (average = 29%, ranging from 8 to 55% of peak biomass) of all graminoid forage removed across the allotment was attributed to cattle, while other herbivores removed just over 10% (3% peak biomass, 1 to 15%). Pellet group counts indicated that elk were the primary large mammalian herbivore when cattle were absent. During 1993, cattle grazing of graminoids was negatively associated with elevation and positively associated with the presence of meadow and riparian habitats, while graminoid use by elk was positively associated with slope, meadow, and forested cover types, and negatively associated with riparian communities. During the drought (1994), both elk and cattle forage removal increased within mesic areas. Elk and cattle diets became more dissimilar during the drought; elk selected forbs above other forage classes, while cattle diets did not change between years.

Graminoid removal by elk was not higher on the rested pasture than in other units when cattle were absent indicating that elk do not congregate in rested pastures. However, elk use of the rested pasture may also have been limited by disturbance since roads open to motorized vehicles paralleled streamside habitat with no cover between roads and meadows in this unit. Common

use by elk and cattle was highest on wet and moist meadows (45 to 63%), but elk forage utilization averaged less than 10% of peak graminoid biomass.

Graminoid forage removal by cattle and elk averaged across the units was below objectives (50%) set by the USDA Forest Service. It appears that the current reductions in cattle stocking levels and the recently implemented rest-rotation grazing system can promote improved range conditions in the Lee Creek Allotment. The degree of elk vs cattle use on riparian areas may merit further investigation because of direct implications for the protection of spawning habitat of anadramous fish.

PROGRESS REPORT
STATEWIDE WILDLIFE RESEARCH

STATE: Idaho **TITLE:** Region 3 Mule Deer Habitat Use
PROJECT NO.: W-160-R-22
SUBPROJECT: 41
STUDY: II

PERIOD COVERED: July 1, 1994 to June 30, 1995

REGION 3 MULE DEER HABITAT USE.

The completion report for this study is in progress.

Meetings and Presentations

The Wildlife Society - March 1995, Idaho Falls.

Reports, Publications, Articles

Milner, G. B., and J. W. Unsworth. 1995. Region 3 mule deer habitat use. Job Completion Report, Project W-160-R-22. --pp.

PROGRESS REPORT
STATEWIDE WILDLIFE RESEARCH

STATE: Idaho **TITLE:** Region 4 Mule Deer Habitat Use
PROJECT NO.: W-160-R-22
SUBPROJECT: 42
STUDY: II

PERIOD COVERED: July 1, 1994 to June 30, 1995

REGION 4 MULE DEER HABITAT USE

The factors governing mule deer (*Odocoileus hemionus*) habitat use patterns in south-central Idaho are poorly understood. Therefore, 16 radio-collared does were tracked from the ground in 1993, and 9 of the same does were also tracked in 1994 to gather data on habitat use and to document the effects of the primary land use in the area, cattle grazing, on mule deer. The field season of 1993 was cooler and wetter than the 1994 season. Average home range size during the hot and dry field season was significantly smaller than the average home range size during the cool, wet season ($P<0.01$). Deer showed a strong preference for the Mountain Brush cover type for all activities, Aspen and Riparian cover types for bedding, and Sage/Bitterbrush for feeding. Cooler northeastern and eastern aspects were preferred by deer and southwestern and flat aspects were avoided. Overall, deer appeared to prefer steeper than average areas, but within Mountain Brush they chose flatter sites. Areas near water were preferred and stock ponds may have made bedding areas that would have been too far from water otherwise available for use. Deer preferred microsites that did not have fresh sign of cattle. Habitat use appeared to overlap more between deer and cattle during the dry year and the latter part of the summer/fall period. A more detailed analysis of the effects of cattle on mule deer was not possible due to the high density of different landowners in the area. Hunting season did not affect bed concealment or flushing distance of deer but may have caused movements out of established home ranges and premature migration to the winter range. Deer chose shaded areas for bedding and preferred clumps of Salix sp. shrubs within the Mountain Brush cover type. Microhistological fecal analysis documented the transition from forbs to shrubs in late summer. A model built with multiple logistic regression identified overhead cover as the most important factor for determining sites likely to be used by deer. This study documented the importance of the Mountain Brush cover type to mule deer in sage steppe environments. It also identified the potential of hunting pressure to trigger premature migrations.

Meetings and Presentations

None.

Reports, Publications, Articles

Gray, C. J., and J. W. Unsworth. 1995. Region 4 mule deer habitat use. Job Progress Report, Project W-160-R-22. 64 pp.

PROGRESS REPORT
STATEWIDE WILDLIFE RESEARCH

STATE: Idaho **TITLE:** Chukar Ecology
PROJECT NO.: W-160-R-22
SUBPROJECT: 43
STUDY NO.: I

PERIOD COVERED: July 1, 1994 to June 30, 1995

CHUKAR ECOLOGY

Twenty-three chukars (*Alectoris chukar*) were trapped, and 22 were fitted with radio collars, during February, March, and April 1995 on the Salmon River study area. Monitoring and vegetation sampling was initiated in May and will continue through August. The student will be on campus taking courses during fall 1995. Field work will begin again in January 1996. We are currently testing backpack-mounted transmitters on pen-raised chukars.

PROGRESS REPORT
STATEWIDE WILDLIFE RESEARCH

STATE: Idaho **TITLE:** Fall/Winter Mountain Quail Ecology
PROJECT NO.: W-160-R-22
SUBPROJECT: 44
STUDY NO.: I

PERIOD COVERED: July 1, 1994 to June 30, 1995

FALL/WINTER MOUNTAIN QUAIL ECOLOGY

For medical reasons, this report will not be ready until February 15, 1996.

PROGRESS REPORT
STATEWIDE WILDLIFE RESEARCH

STATE: Idaho **TITLE:** Bighorn Sheep Winter Habitat Use
PROJECT NO.: W-160-R-22
SUBPROJECT: 45
STUDY NO.: I

PERIOD COVERED: July 1, 1994 to June 30, 1995

BIGHORN SHEEP WINTER HABITAT USE

Study I: Winter habitat use patterns of bighorn sheep in Big Creek

Six bighorn ewes in the Big Creek Drainage were captured and fitted with radio collars. Bighorn sheep were monitored from January to April. Fecal analyses has been returned from Colorado State University and food habits have been determined. Activity of bighorn sheep seems to decline during nocturnal hours; however, small sample size precludes any definite conclusions as to time spent moving, feeding, resting, and standing alert.

Locations and observations of bighorn sheep indicate they may select grassland and talus habitats during the winter. Field work has been completed and the thesis (Completion Report) is in preparation.

PROGRESS REPORT
STATEWIDE WILDLIFE RESEARCH

STATE: Idaho **TITLE:** Pine Marten Ecology
PROJECT NO.: W-160-R-22
SUBPROJECT: 46
STUDY: I

PERIOD COVERED: July 1, 1994 to June 30, 1995

PINE MARTEN ECOLOGY

The first field season concluded in December 1994 and the second season began in June 1995. Initial efforts focused on trapping and radio-collaring pine marten (*Martes americana*) in the Cabinet Mountain study area. In mid-July, fieldwork shifted to telemetry, small mammal trapping, and vegetation sampling. Field work will continue at least until December 1995.

PROGRESS REPORT
STATEWIDE WILDLIFE RESEARCH

STATE: Idaho **TITLE:** Upland Game Ecology
PROJECT NO: W-160-R-22
SUBPROJECT: 47
STUDY: I-II

PERIOD COVERED: July 1, 1994 to June 30, 1995

UPLAND GAME ECOLOGY

Study I. Pheasant response to intensive habitat management.

The first full field season of investigating the response of ring-necked pheasants (*Phasianus colchicus*) to intensive habitat management in Bingham and Gooding counties was begun in 1995. Within our study areas, >550 acres of food plots were established and >7,900 trees were planted in shelterbelts. Sixty-two individual pheasants were captured by mist nets or walk-in traps within the two counties. Relatively high mortality rates (61%) for pheasants captured in winter and spring and followed through June 30 were documented during the first field season. Crowing counts and territorial mapping were used to provide indices to breeding populations in both counties. Initial results suggest that both methods provided comparable data in Bingham County but crowing counts underestimated breeding populations in Gooding County. In general, the territorial mapping technique indicated that there were considerably more pheasants in the habitat development areas than in corresponding control areas. Movements and home ranges of radio-marked birds in these areas are being monitored. Reproductive data will continue to be collected through summer 1995.

Study II: Pheasant response to predator management.

The first full field season of investigating the response of ring-necked pheasants (*Phasianus colchicus*) to predator management in Bingham and Gooding counties was begun in 1995. Roadside surveys, scent stations, and trapping indicated that striped skunk (*Mephitis mephitis*), red fox (*Vulpes vulpes*), and feral cats were the most common mammalian predators in both counties. These predators were trapped and removed from treatment areas during late winter and early spring 1995. Relatively high mortality rates of pheasants (59%) were documented during the 1995 field season for birds trapped during the winter and spring and monitored through June 30. Both crowing counts and territorial mapping suggested that pheasant breeding populations may have been somewhat higher in the predator removal areas compared to the control areas in both counties. However, these differences could be related to other factors (e.g., pesticides) that may have differed between areas but were not easily detected.

Meetings and Presentations

Connelly, J. W. 1994. Ecology and management of sage grouse. Graduate student lecture, South Dakota State Univ. Oct. 27. Brookings, SD.

Connelly, J. W., and K. P. Reese. 1994. Sage grouse response to fire in the intermountain region represented at the first annual meeting of the Wildlife Society. September 6-10. Albuquerque, NM.

Connelly, J. W., K. P. Reese, R. A. Fischer, and W. L. Wakkinen. 1994. The effects of fire on sage grouse populations in southeastern Idaho. Presented at the 19th Western States Sage and Columbian Sharp-tailed Grouse Workshop. July 26-28. Reno, NV.

Fischer, R. A., K. P. Reese, and J. W. Connelly. 1994. The impacts of fire on sage grouse habitat in southeastern Idaho. Presented at the 19th Western States Sage and Columbian Sharp-tailed grouse Workshop. July 26-28. Reno, NV.

Schneider, J. W., K. P. Reese, J. W. Connelly, and J. H. Klott. 1994. Winter food habits of Columbian sharp-tailed grouse. Presented at the annual meeting of the Idaho Chapter, The Wildlife Society. March 3-5. Post Falls, ID.

Ulliman, M. J., K. P. Reese, J. W. Connelly, and J. H. Klott. 1994. Winter habitat use of Columbian sharp-tailed grouse. Presented at the annual meeting of the Idaho chapter, The Wildlife Society. March 3-5. Post Falls, ID.

Publications

Apa, A. D., K. P. Reese, and J. W. Connelly. An evaluation of nest placement theory using artificial and Columbian sharp-tailed grouse nests. Oikos. In press.

Blus, L. J. and J. W. Connelly. 1993. Use of radiotelemetry to determine exposure and effects of organophosphorus insecticides on sage grouse. Proc. Soc. Envir. Toxic. and Chem. Pellston Workshop. In press.

Church, K. E., J. W. Connelly, and J. W. Enck. 1994. The role of non-governmental organizations in gamebird conservation. Trans. N.Am. Wildl. and Natur. Res. Conf. 59:488-493.

Connelly, J. W., K. P. Reese, W. L. Wakkinen, M. D. Robertson, and R. A. Fischer. 1994. Sage grouse ecology final report. W-160-R, Subproj. 19. 91 pp.

Connelly, J. W., K. P. Reese, R. A. Fischer, and W. L. Wakkinen. 1996. Effects of fire on a sage grouse breeding population in southeastern Idaho. Conserv. Biol. In press.

Fischer, R. A., K. P. Reese, and J. W. Connelly. 1996. The impacts of fire on sage grouse brood habitat in southeastern Idaho. J. Range Manage. In Press.

Musil, D. D., K. P. Reese, and J. W. Connelly. 1994. Nesting and summer habitat use by sage grouse translocated into central Idaho. Great Basin Natur. In press.

Robertson, M. D., K. P. Reese, and J. W. Connelly. 1996. Movements and distribution of wintering sage grouse in response to prescribed fire in southeastern Idaho. J. Wildl. Manage. In Press.

Wakkinen, W. L., J. W. Connelly, and K. P. Reese. Sage grouse nest site characteristics in southeastern Idaho. J. Wildl. Manage. Peer review.

PROGRESS REPORT
SURVEYS AND INVENTORY

STATE: Idaho **TITLE:** Southeast Region Upland Bird Study
PROJECT NO: W-160-R-22
SUBPROJECT: 48
STUDY NO.: I

PERIOD COVERED: July 1, 1994 to June 30, 1995

SOUTHEAST REGION UPLAND BIRD STUDY

Study I. The Effects of Predation on Upland Nesting Game Birds.

Russian olive trees (*Elaeagnus angustifolia*) were removed from one-half of the Sterling Wildlife Management Area (SWMA) located in southeastern Idaho. This process was completed to determine if removal of this tree species as nest sites for black-billed magpies (*Pica pica*), a potential duck nest predator, would increase duck nest success on the treated area. Duck nest searches resulted in the discovery of 263 nests, over ½ of which were those of mallards (*Anas platyrhynchos*). Duck nest success on the treatment area was nearly 3 times higher than that which occurred on the control area, 9.9% and 3.7%, respectively. Percentage of duck nests destroyed by avian predators did not differ when results between the 2 areas were compared, nearly 33% for each area. Over twice as many magpie nests were found in the control area (72) as in the treatment area (31). Distribution and density of nests did not change in the control area, but did change in the treatment area. All magpie nests in the control area were built in Russian olive trees and experienced an overall fledgling nest success of 72%, but 31 nests were primarily built and in big sage brush (*Artemisia tridentata*) on the treatment area had 52% fledgling nest success. Magpie activity surveys revealed that magpie habitat usage was nearly 4 times greater on the treatment area than on the control area. Results obtained from artificial nests with timers indicate that 2/3 of the predated nests were destroyed during daylight hours, which implies that the majority of nests were destroyed by magpies. Artificial nests marked with willows were destroyed at the same percentage as those nests not marked with willows. This indicates that duck nest predators were not using willow sticks as cues to locate marked nests. Cameras located at artificial nests photographed magpies, striped skunks (*Mephitis mephitis*), and raccoons (*Procyon lotor*), verifying the existence of these nest predators on the SWMA. Data gathered 1 year after Russian olive trees were removed from a portion of the SWMA indicate this technique alone may not be sufficient to increase duck nest success to the 30% objective level that is desired for the SWMA. However, more time may have to elapse before a substantial increase concerning duck nest success is realized as a result of Russian olive tree removal.

Publications

Ball, I. J., R. J. Gazda, and D. B. McIntosh. 1994. A simple device for measuring survival time of artificial nests. J. Wildl. Manage. 58:793-796.

Gazda, R. J. and J. W. Connelly. 1993. Ducks and predators: more ducks with fewer trees. Idaho Wildl. 13(6):8-10.

Gazda, R. J. 1994. Duck productivity and nest predation in southeastern Idaho. M.S. thesis. Univ. of Montana. Missoula. 60 pp.

Gazda, R. J., I. J. Ball, and J. W. Connelly. Duck nesting success and predation in southeastern Idaho. Peer review.

Submitted by:

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Approved by:

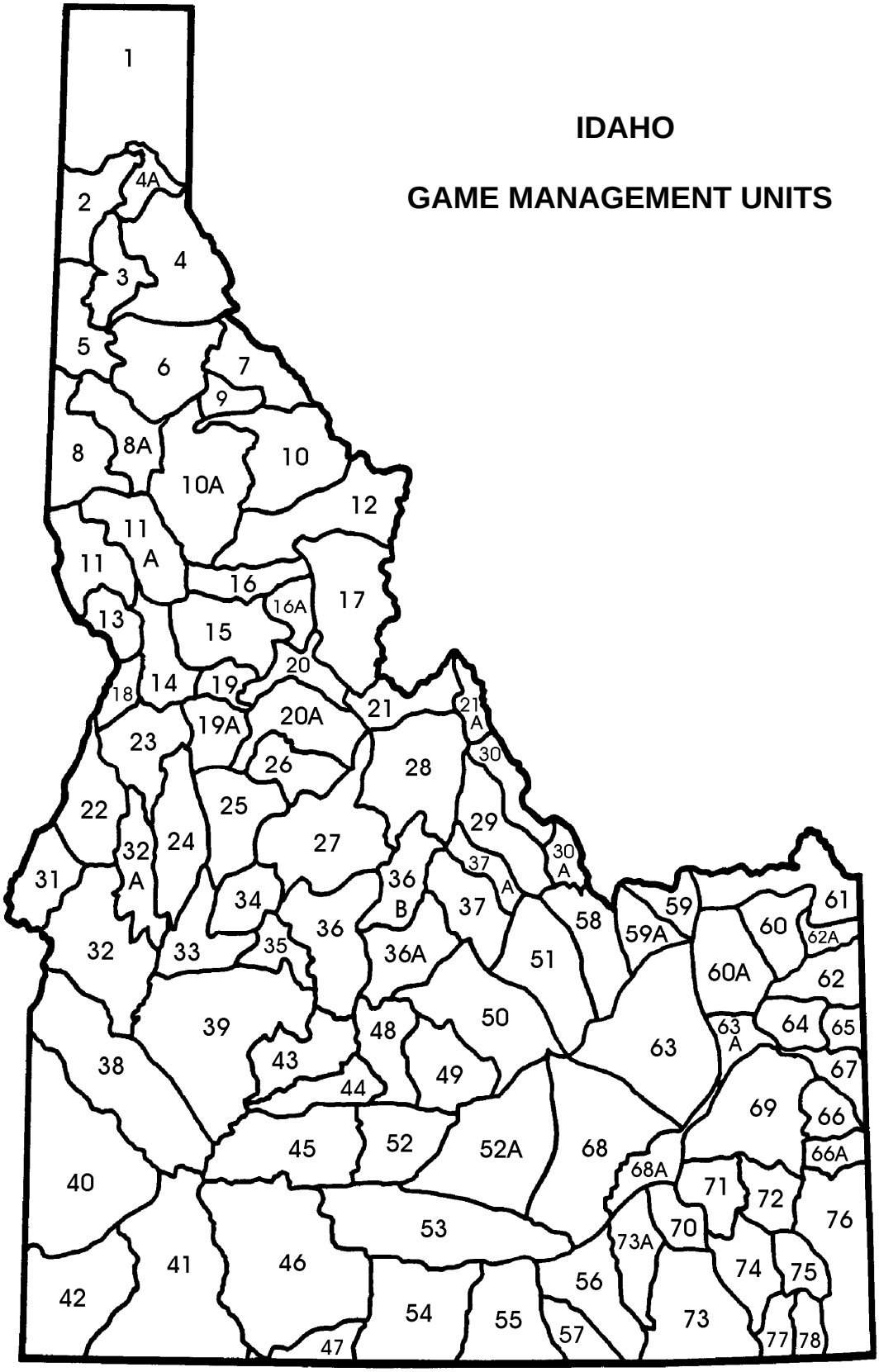
IDAHO DEPARTMENT OF FISH AND GAME

Tom Reinecker

Tom Reinecker, 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.