IDAHO

DEPARTMENT OF FISH AND GAME

Stephen P. Mealey, Director

Project W-168-C-14

Progress Report

FEDERAL AID TO WILDLIFE RESTORATION

Study I, Job 1: Wildlife Research Coordination

Prepared By:

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July 1, 1996 to June 30, 1997

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Boise, Idaho

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PROGRESS REPORT
STATEWIDE WILDLIFE RESEARCH

STATE: Idaho **JOB TITLE:** Wildlife Research Coordination
PROJECT NO.: W-168-C-14
STUDY NO.: I
JOB: 1

PERIOD COVERED: July 1, 1996 to June 30, 1997

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.

The Canada Goose Ecology project was completed and two new studies were initiated: one on mule deer in southeast Idaho and another on sage grouse in the Upper Snake Region. Project work for several graduate student projects (Panhandle, Clearwater, and Southeast Regions) was completed.

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:** (Lochsa) Elk Ecology
PROJECT NO.: W-160-R-24
SUBPROJECT NO: 31
STUDY NO.: I-IV

PERIOD COVERED: July 1, 1996 to June 30, 1997

(LOCHSA) ELK ECOLOGY

Study No. I: Road Closures and Bull Elk Mortality

Job 2: The effect of road closures on elk mortality in north-central Idaho.

We investigated hunting season survival rates of bull elk (*Cervus elaphus*) from 1991 through 1995 in 3 treatment areas in north-central Idaho that varied in motorized vehicle access during the 25-day general elk hunting season. In the roaded area (RO), densities of roads open to motorized vehicle use averaged 1.54 km/km^2 (2.49 mi/mi^2), whereas in the managed access area (MA), we reduced open road densities during the general elk season from 2.54 km/km^2 (4.08 mi/mi^2) to 0.56 km/km^2 (0.90 mi/mi^2). In the unroaded area (UN), open road densities averaged only 0.23 km/km^2 (0.37 mi/mi^2). Survival rates averaged 0.497 (0.394-0.625; 95% confidence intervals) in RO, 0.696 (0.603-0.802) in MA, and 0.710 (0.613-0.822) in UN for 231 radio-collared bulls across the 5 years. Thus, road-closures improved bull survival by approximately 20% and survival rates were comparable in areas in the MA and UN areas. Seventy (70) bulls were shot and recovered by hunters, but 9 bulls were mortally wounded and unrecovered by hunters. Differences in survival rates among years were greatest for bulls in RO and least for MA and UN bulls. Survival rates of yearling bulls averaged 0.616 (0.498-0.761), 2.5-yr-old bulls averaged 0.504 (0.394-0.643), and bulls older than 2.5 years averaged 0.721 (0.641-0.810), after statistically eliminating the effect of study area on survival. In addition, 7 bulls were shot and recovered by hunters and 3 bulls were mortally wounded by arrows and unrecovered by hunters during the preceding archery-only season. We conclude that road-closures of the magnitude used during this study can significantly improve bull elk survival rates, leading to higher bull:cow ratios and an older age structure of bulls compared to otherwise similar areas in which most roads are open to motorized vehicle use during the general hunting season. A model is being developed to help predict changes in bull survival rates with management of open and closed road and trail densities, hunter densities, hiding cover, and other factors influencing survival of bulls during the general elk season.

A completion report was submitted during FY 97.

Job 3: The effect of road closures on hunter density, distribution, and success in north-central Idaho.

The effects of road-closures on elk hunter density, success, demographics, opinions, and behaviors were investigated from 1992 through 1995 in north-central Idaho using telephone surveys. This information is important to understand the mechanisms by which road-closures, road densities, hunter densities, and other factors interact to affect elk mortality and harvest rates and what changes in hunters can be expected if road-closures become a major elk harvest management tool. In the roaded area (RO), densities of roads open to motorized vehicle use averaged 1.54 km/km^2 (2.49 mi/mi^2), whereas in the road-closure or managed access area (MA), we reduced open road densities during the general elk season from 2.54 km/km^2 (4.08 mi/mi^2) to 0.56 km/km^2 (0.90 mi/mi^2). In the unroaded area (UN), open road densities averaged only 0.23 km/km^2 (0.37 mi/mi^2). During the 25-day general elk season, hunter density averaged 0.529 ± 0.8689 (SD) hunter-days/km^2/day (1.372 ± 2.2502 hunter-days/mi^2/day) in the RO, but only 0.146 ± 0.1103 hunter-days/km^2/day (0.377 ± 0.2857 hunter-days/mi^2/day) in the MA. MA hunter density was similar to the UN in which hunter density averaged 0.188 ± 0.2478 hunter-days/km^2/day (0.486 ± 0.6420/mi^2/day). Hunter density did not significantly change from 1992 to 1995 on any area. Hunter success rates averaged 25.0% (44/176) in MA, 12.9% (35/272) in RO, and 32.3% (96/297) in UN. Hunter success remained stable or declined slightly in the MA, declined sharply in the RO, and remained stable in the UN from 1992 to 1995. In general, > 60% of hunters in each study area said road-closures were either "easily acceptable" or "not easy to accept but tolerable" as a method ... "to maintain good numbers of bulls and branch-antlered bulls," but acceptability differed significantly among study areas. More MA hunters than UN hunters and more UN hunters than RO hunters said road-closures were "easily acceptable." A greater percentage of hunters that said road-closures were "easily acceptable" (27.1%; 74/273) than those that said road-closures were "not acceptable" (7.9%; 9/113) lived ≥ 80 km (≥ 50 mi) from where they hunted, whereas a greater percentage that said road-closures were "not acceptable" (68.1%; 77/113) than said they were "easily acceptable" (47.2%;129/273) lived ≤16 km (≤ 10 mi) from where they hunted. Most hunters (> 55%) on all 3 study areas said "tradition" was the most important reason for choosing the area they hunted, but how they hunted differed among areas. Although most bull elk hunters on all areas only walked while hunting (> 45% all areas), use of "all-terrain-vehicles (ATVs) or motorcycles" was higher among RO (22.7%; 62/273) than MA (10.4%; 14/134) and UN (13.8%; 44/319) hunters and use of "horses, mules, or llamas" was lowest for RO hunters (8.8%; 24/273), intermediate for MA hunters (24.6%; 33/134), and highest for UN hunters (31.9%; 102/319). In MA 11.9% (16/134) of hunters used bicycles, whereas bicycle use was < 1.5% in either RO or UN. We conclude that road-closures were fairly acceptable among hunters and led to lower hunter densities, increased success rates, and increased use of stock and bicycles and decreased use of ATVs or motorcycles while hunting.

A completion report was submitted during FY 97.

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 1992-96 hunting seasons, we are attempting to harvest a relatively constant fraction of the antlerless elk population in each of 11 GMUs (3 very low harvest units - 2 to 5% harvest rate; 4 low harvest units - 6 to 10% harvest rate, and 4 moderate harvest units - 14 to 30% harvest rate) using the controlled-hunt permit system. In 1995, target harvest rates were met for 2 units, but not for 2 other units (< 10% harvest rate) in the moderate harvest treatment. For the low harvest treatment units, target harvest rates were met for 2 units, but for 2 others harvests were < 5%. For very low harvest rate treatment units, the harvest met the target for 1 unit, but exceeded the target for the other 2 (> 5%). Harvest rates averaged 4.8 ± 2.3% (SD), 5.5 ± 2.3%, and 11.8 ± 4.9% in very low, low, and moderate treatment units, respectively. Hunter success rates averaged 39.2 ± 11.9% (SD), 36.5 ± 12.2%, and 35.1 ± 5.8% in these same treatment units. Annual growth rates of the cow population in very low, low, and moderate treatment units averaged -3.2%, 17.5%, and 4.2%, respectively. We are also investigating the effect of antlerless harvest rate with data from all Idaho elk units using statewide harvest and population databases. Statewide, elk recruitment (calf:cow ratios) is negatively correlated with cow density. This study will continue with focus on understanding the relationship among elk density as it is impacted by antlerless harvest rates, habitat, and calf recruitment using an experimental framework and analyses of statewide data.

We are also investigating the effect of antlerless harvest rate with data from all Idaho elk units using statewide harvest and population databases.

(New) Study No. III: Statewide elk data analysis

Job 1: Analyses of statewide elk population and habitat dataset.

Objective: Develop landscape-scale predictive models relating habitat, elk population characteristics, and recruitment rates.

Working with the Idaho Cooperative Wildlife Research Unit and the Department of Wildlife Resources at the University of Idaho, we began to identify and assemble appropriate data sets for this analysis during FY 97. We expect to begin working with physical and primary productivity data sets during this calendar year. Elk data sets will be incorporated once we have thoroughly considered the primary productivity data.

Study IV: Factors influencing elk calf recruitment

(Old) Job 1: Develop a study plan.

Completed and submitted 11/97.

(Old) Job 2: Implement the study plan.

(New) Job 1: Pregnancy rates and condition of cow elk.

Objective: Determine pregnancy rates and condition for yearling, 2.5-year-old, and adult cow elk in GMUs exhibiting high calf recruitment and those exhibiting low recruitment rates.

We captured 20 adult cow elk in each of 2 contrasting study areas (Lochsa study area, GMU 10/12 and South Fork study area, GMU 15) during March 1997 to assess condition and pregnancy. Pregnancy rates were comparable (72% vs 74%) but unexpectedly low on both study areas. Compared to cows captured on the South Fork study area, those captured on the Lochsa were in poorer overall condition, older (10 vs 7 years old), and selenium deficient. Estimated weights of adult cows were essentially equal on both areas.

We began preparations to collect samples from cow elk harvested during fall 1997. These samples will provide pregnancy and condition information for all age classes of cow elk.

(New) Job 2: Calf mortality causes and rates.

Objective: Determine the primary causes of elk calf mortality and measure calf mortality rates in areas with relatively high recruitment rates vs those with low recruitment rates.

To evaluate causes and rates of calf elk mortality, we captured and radio collared 31 newborn (≤4 days old) elk calves on the South Fork study area and 28 on the Lochsa study area during the first 2 weeks of June. Calves were monitored daily for about 6 weeks, then every other day. When mortalities were detected, we thoroughly investigated the sites as soon as possible to determine the cause of death. Data collection and analysis is ongoing.

(New) Job 3: Predation effects on elk calf recruitment.

Objective: Determine the effects of predation and predator density on elk calf recruitment.

We continued preparations and making preliminary contacts for this effort. No field work was scheduled during this FY.

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

Training - How to lead a team; CareerTrack	Spokane, WA
Enforcement - Nonenforcement personnel	Myrtle
Training - Helicopter safety	Boise
Training - CPR and first aid	Lewiston
Training - Inservice training all IDFG personnel	Boise
Meetings - Elk vulnerability presentation to CAC	Orofino
Open House - Deer and elk regulations	Orofino, Moscow
Meeting - Idaho Chapter, The Wildlife Society (officer)	Boise
Meeting - Calf mortality and recruitment, Washington Department of Wildlife	Coeur d'Alene
Meeting - Calf mortality and recruitment, Oregon Dept. of Wildlife and USFS Experimental Forest and Range Station	La Grande, OR
Meeting - Calf mortality and recruitment, predation with Washington State University	Pullman, WA
Meeting - Calf mortality and recruitment with IDFG biologists	McCall
Presentation - Elk and deer sightability	Myrtle
Presentation - Experience with modification of factors influencing changes. Dynamics of Northern Idaho Forests Conference.	Coeur d'Alene
Presentation - Managing harvest for sustainable ungulate populations. Second Annual Conference of The Wildlife Society.	Portland, OR

Reports and Publications:

Gratson, M. W., C. Whitman, and P. Zager. 1995. 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. Study II. Optimum yield of elk. Job 1. The effect of harvest on elk population size and composition in Idaho. Idaho Dept. Fish and Game, Fed. Aid in Wildl. Restor. Job Prog. Rep., Proj. W-160-R-22. 28 pp.

Gratson, M. W., and P. Zager. 1995. Lochsa elk ecology. Study III. Job 1. Develop an elk sightability model for the Bell 206 Jet Ranger helicopter. Idaho Dept. Fish and Game, Fed. Aid in Wildl. Restor. Job Completion Rep., Proj. W-160-R-22. 15 pp.

Gratson, M. W., W. A. Wall, and B. K. Johnson. In review. Modifying aerial survey models for other aircraft. J. Wildl. Manage. 00:000-000.

Meetings and Presentations (Pete Zager)

Date	Purpose	Location
July	Elk Team meeting	Boise
	Data Evaluation Team meeting	Boise
	Hells Canyon BHS Initiative meeting	Lewiston
	Elk Team meeting	Boise
August	Elk Team meeting	Lewiston
	Elk Team meeting	McCall
	Leptich exit rating	Coeur d'Alene
September	Hells Canyon BHS Initiative meeting	Baker
	Mountain Quail Workshop	Riggins/McCall
October	Elk calf recruitment meeting	Moscow
	Scott Tomson committee meeting	Missoula
	Elk calf recruitment meeting	Missoula
	Developed 3 RMEF proposals	
November	Open House for deer/elk plans	Moscow
	Open House for deer/elk plans	Grangeville
	Hells Canyon BHS Initiative meeting	Boise
	Elk Team meeting	Boise
	Met with UI faculty candidate	Moscow
December	Wildlife Ecology class presentation	Moscow
	Hells Canyon BHS Initiative meeting	Enterprise
	Wildlife Immobilization training	Myrtle
January	Personnel meeting	Myrtle
	Open House for deer/elk plans	Lewiston
	Open House for deer/elk plans	Moscow
February	Wildlife Ecology class presentation	Pullman
	Elk Team meeting	Boise
	Review packet of GAP proposals	Moscow
April	Commission meeting	Boise
	Mountain Lion workshop	Moscow
May	Hells Canyon BHS Initiative meeting	Billy Cr
	Training session for interns	Lewiston
June	Predator/prey relationships meeting	Missoula

Reviewed Manuscripts for:

Journal of Wildlife Management.
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:

Gratson, M. W., and P. Zager. 1997. Elk calf recruitment study plan. Idaho Dept. Fish and Game, Boise.

Gratson, M. W., and P. Zager. 1996. Lochsa elk ecology. Study II. Optimum yield of elk. Job. Prog. Rep., Fed. Aid Wildl. Restor., Proj. W-160-R-23, Subproj. 31. Idaho Dept. Fish and Game, Boise.

Gratson, M. W., C. Whitman, and P. Zager. 1996. Lochsa elk ecology. Study I, Job 2. The effects of road closures on elk mortality in north-central Idaho. Study I, Job 3. The effects of road closures on hunter density, distribution, and success in north-central Idaho. Job. Compl. Rep., Fed. Aid Wildl. Restor., Proj. W-160-R-23, Subproj. 31. Idaho Dept. 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.

Heekin, P. E., K. P. Reese, and P. Zager. 1997. Fall/winter mountain quail ecology. Job Prog. Rep., Proj. W-160-R-23., Subproj. 44. Idaho Dept. Fish and Game, Boise.

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.

Leptich, D. J., S. G. Hayes, and P. Zager. 199-. Elk mortality in the Coeur d'Alene drainage on northern Idaho. Draft.

Lindbloom, A., K. Reese, and P. Zager. 1996. Seasonal habitat use, population characteristics, and management of chukar partridge (Alectoris chukar) in north-central Idaho. Job Prog. Rep., Proj. W-160-R-23., Subproj. 43. Idaho Dept. Fish and Game, Boise.

Secord, M., P. Zager, and D. Pletscher. 199-. White-tailed deer use of clearcuts in northern Idaho. In review.

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. Draft.

Tomson, S., K. Foresman, and P. Zager. 1996. Pine marten ecology. Job Prog. Rep., Proj. W-160-R-23., 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. Draft.

PROGRESS REPORT
STATEWIDE WILDLIFE RESEARCH

STATE: Idaho **TITLE:** Mule Deer Ecology
PROJECT NO.: W-160-R-24
SUBPROJECT NO.: 35
STUDY NO.: II-IV

PERIOD COVERED: July 1, 1996 to June 30, 1997

MULE DEER ECOLOGY

Study II: Mule Deer Mortality

Deer (n=447) were radio collared on three study areas during 1992-97. Overall survival rates varied between winters (X^2 = 41.656, df = 4, 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, 79% during the winter of 1994-95, 83% during the winter of 1995-96, and 72% during the winter of 1996-97. Doe survival rates did not vary among the five winters (X^2 = 3.138, df = 4, P = 0.535). A greater percentage of bucks died during the winter of 1992-93 and 1995-96 (X^2 = 15.974, df = 4, P = 0.003) than during 1993-94, 1994-95, or 1996-97. (Table 1). Fawn survival varied among the five winters (X^2 = 44.588, df = 4, P < 0.001) (Table 1). Survival rates were similar among study areas during 1992-1993 (X^2 = 0.191, df = 2, P = 0.909), 1995-96 (X^2 = 3.470, df = 2, P = 0.176), and 1996-97(X^2 = 0.8653, df = 2, P = 0.649), 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 = 0.021, df = 2, P = 0.990). This pattern held in 1994-95 (X^2 = 2.340, df = 2, P = 0.310), in 1995-96 (X^2 = 0.357, df = 2, P = 0.836), and in 1996-97 (X^2 = 1.700, df = 2, P = 0.428). Doe survival was similar among study areas during the winter of 1993-94 (X^2 = 0.360, df = 2, P = 0.835) and 1996-97 (X^2 = 4.816, df = 2, P = 0.090), but varied during 1994-95 (X^2 = 10.143, df = 2, P = 0.006) and in 1995-96 (X^2 = 6.188, df = 2, P = 0.045). I calculated annual survival rates for the periods 6/1 to 5/31 of the following year (Table 2). Annual rates did not vary by study area for bucks (X^2 = 1.374, df = 2, P = 0.503). Annual rate did vary for does (X^2 = 8.325, df = 2, P = 0.016). Annual rates varied among years for bucks (X^2 = 22.343, df = 3, P < 0.001) and does (X^2 = 8.682, df = 3, P = 0.034). I calculated summer survival rates for the period 6/1 to 8/31 (Table 2). Summer rates did not vary among years (X^2 = 5.627, df = 3, P = 0.131). Summer rates did not vary among study areas (X^2 = 1.870, df = 2, P = 0.393). Summer survival rates were also similar for bucks (99%) and does (97%) (X^2 = 0.579, df = 1, P = 0.447). During fall (9/1 to 11/30) survival rates varied between years (X^2 = 10.391, df = 3, P = 0.016), sexes (X^2 = 44.266, df = 1, P < 0.001), but not among study areas (X^2 = 3.623, df = 2, P = 0.163) (Table 2).

Study III: Mule Deer Sightability

Two hundred ten sightability data points were collected on the Owyhee, Blacks Creek, Salmon, 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), 548 (325 - 769, 90% CI), 410 (276 - 543, 90% CI), and 348 (50 - 645, 90% CI) in 1993, 1994, 1995, and 1996, respectively. The telephone survey estimated a harvest of 398 in 1993, 542 in 1994, 475 in 1995, and 409 in 1996. I used the previous years check station results to restratify subunits for the following survey.

Meetings and Presentations

Month	Purpose	Location
July	Clint Gray's Thesis Defense	Bozeman
	Biologist Meeting	Boise
	Deer Team Meeting	Stanley
	Elk Team Meeting	Garden City
	Deer Team Meeting	Garden City
	TRD Meeting	Boise
	ADC Meeting	Boise
	Deer Team Meeting	Garden City
August	Region 3/ Fishery Bureau Meeting	Nampa
	Region 3/ Enforcement Training	Nampa
	ADC Meeting	Boise
	Elk Team Meeting	McCall
September	Cougar Research	Malta
	Presentation to ADC	Sun Valley
	Presentation to Operations Group	Boise
	Presentation KBOI Radio Show	Boise
October	Presentation IDFG Commission	Boise
November	Research Meeting	Boise
	Preference Points	Boise
	Public Meeting	Caldwell
	Open House on Big Game	Nampa
	Open House on Big Game	Boise
	Deer Team Meeting	Boise
	Presentation IDFG Commission	Boise

Month	Purpose	Location
December	Open House on Big Game	Boise
	Presentation IDFG Commission	Boise
	SE Idaho Deer Study	Jerome
January	Personnel Meeting	Nampa
February	Deer Team Meeting	Boise
	Presentation TWS	Boise
	Meeting with Montana FWP	Pocatello
	Deer Team Meeting	Garden City
	Meeting with ADC on SE Deer Study	Jerome
	Presentation at Hunter's Rally	Nampa
March	Presentation IDFG Commission	Boise
April	Sell's Thesis Defense	Moscow
	Meeting with Oregon Dept. Wildlife	Brownlee
May	Presentation Giant Buck Society	Missoula, MT
	SE Idaho Mule Deer Study	Jerome
	Presentation KIDO Radio Show	Boise
	Animal Damage Control Board Meeting	Boise
	Western State Deer Meeting	Rio Rico, AR
	TWS with University of Idaho Staff	Nampa
June	SE Idaho Mule Deer Study	Jerome

Reports, Publications, Articles:

Bishop, C. J., and J. W. Unsworth. 1997. Study I: Region 4 Mule Deer Fawn Mortality. Job Completion Report, Project W-160-R-23. Idaho Dept. Fish and Game, Boise. 30 pp.

Cooper, A., and J. W. Unsworth. 1997. 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. 1997. Mule Deer Ecology. Study II: Mule Deer Mortality. Job Progress Report, Project W-160-R-23. Idaho Dept. Fish and Game, Boise. 10 pp.

Unsworth, J. W. 1997. Mule Deer Ecology. Study III: Mule Deer Sightability. Job Progress Report, Project W-160-R-23. Idaho Dept. Fish and Game, Boise. 8 pp.

Unsworth, J. W. 1997. Mule Deer Ecology. Study IV: Mule Deer Harvest Estimation. Job Progress Report, Project W-160-R-23. Idaho Dept. Fish and Game, Boise. 10 pp.

COMPLETION REPORT
STATEWIDE WILDLIFE RESEARCH

STATE: Idaho **TITLE:** Canada Goose Ecology
PROJECT NO.: W-160-R-24
SUBPROJECT: 37
STUDY NO.: I-III

PERIOD COVERED: July 1, 1996 to June 30, 1997

CANADA GOOSE ECOLOGY

Trend or population estimates are needed to effectively manage Great Basin Canada goose (*Branta canadensis moffitti*) populations in the Pacific Northwest. Seasonal distribution patterns are poorly understood, and this lack of knowledge can cause misinterpretation of breeding ground survey or other population trend data. I evaluated a management technique in current use and 2 additional techniques to monitor breeding ground population trends in southwest Idaho by comparing the precision of estimation techniques and comparing their relationship to nest counts and fall trend surveys. I used 319 radio-collared geese (561 radio-collared goose years) to determine seasonal presence or absence of young, 1- and 2-year old, and >3-year old geese on the study area. Seasonal relocation rates were different within years for young ($P < 0.001$) and adults ($P < 0.001$) present on the study area during August and September (before opening of the hunting season) for all years. Relocation rates for adults absent from the study area during August and September (before opening of the hunting season) were different among seasons ($P = 0.001$) for all years, but seasonal relocation rates were not different among years ($P > 0.050$). Radio-collared 1- and 2-year old geese were located on pre-hunting season surveys at lower rates than radio-collared geese > 2-years of age ($P = 0.017$). Pair and total number of geese counted on management breeding ground counts had higher coefficients of variation than for similar data collected on research counts ($P = 0.023$). None of the parameters measured on either type of survey correlated significantly with ground nest counts ($P > 0.05$). Knowledge of the affects of hunter harvest on populations is needed to adequately manage local Canada goose populations. I determined survival rates by monitoring 319 radio-collared local geese (561 radio-collared goose years) from July 1, 1993 to June 1, 1997 in southwest Idaho. A total of 179 mortalities were recorded, including; 117 hunter recoveries (65%), 17 (9.5%) categorized as predator involved, and 45 (25.1%) categorized as cause unknown. A total of 152 mortalities (84.6%) occurred during or within 2 weeks of the end of the hunting season. Average annual survival rates for young and adult radio-collared geese present on the study area before the opening of the hunting season decreased ($P = 0.020$ and $P = 0.037$, respectively) after implementation of a more liberal season and bag limit structure in 1994. Direct mortality rates were calculated for adult geese absent from the study area in September before the opening of the hunting season, due to violations of assumptions implicit to use of the Kaplan Meier survival estimator. Radio-collared geese categorized as absent had lower mortality rates than adult geese categorized as present ($P < 0.001$). Adult radio-collared geese stratified as 1- and 2-year old had lower average annual mortality rates than radio-collared geese > 2-year old ($P < 0.001$). Problems associated with

violations of assumptions for marking studies suggest that actual population survival rates cannot be determined from radio-collared geese, but such data may be useful in determining mortality trends.

Meetings and Presentations

Date	Purpose	Location
July	Owyhee County Historical Society	Murphy
January	Ducks Unlimited	Boise
	Oregon F&G, USFWS, SW Region Meeting	Nampa
	CAC Meeting	Nampa/Caldwell
April	SW Region Personnel Meeting	Boise
May	Physical Assessment & Non-enforcement Training	Boise
	Idaho F&G Commission Meeting	Boise

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. 48 pp.

Bodie, W. L. 1993. No One Knows Where The Wild Goose Goes. Idaho Wildlife. Idaho Department of Fish and Game. 13(6):10-11.

Bodie, W. L. and L. E. Oldenburg. 1994. A Standardized Technique for Bighorn Sheep Aerial Surveys. Bienn. Symp. North. Am. Wild Sheep and Goat Counc. 9:65-68.

McCoy, M. W., W. L. Bodie, and E. L. Taylor. 1994. An Observation of Out-of-Season Breeding in California Bighorn Sheep. Great Basin Naturalist. 55(2) 181-182.

Bodie, W. L., O. E. Garton, E. L. Taylor, and M. W. McCoy. 1995. A Sightability Model for Bighorn Sheep in Desert Habitats, J. Wildl. Manage. 59(4) 834-840.

PROGRESS REPORT
STATEWIDE WILDLIFE RESEARCH

STATE: Idaho **TITLE:** Chukar Ecology
PROJECT NO.: W-160-R-24
SUBPROJECT: 43
STUDY NO.: I

PERIOD COVERED: July 1, 1996 to June 30, 1997

CHUKAR ECOLOGY

Field work was completed during FY 97. Data analysis is nearly complete and the final report will be submitted by January 1, 1998.

Reports:

Lindbloom, A., K. Reese, and P. Zager. 1996. Seasonal habitat use, population characteristics, and management of chukar partridge (Alectoris chukar) in north-central Idaho. Job Prog. Rep., Proj. W-160-R-23. Subproj. 43. Idaho Dept. Fish and Game, Boise.

PROGRESS REPORT
STATEWIDE WILDLIFE RESEARCH

STATE: Idaho **TITLE:** Mountain Quail Ecology
PROJECT NO: W-160-R-24
SUBPROJECT: 44
STUDY NO.: I

PERIOD COVERED: July 1, 1996 to June 30, 1997

MOUNTAIN QUAIL ECOLOGY

Field work was completed during FY 97. Data analysis and interpretation is ongoing. We expect to submit a completion report by July 1, 1998.

Reports:

Heekin, P. E., K. P. Reese, and P. Zager. 1997. Fall/winter mountain quail ecology. Job Prog. Rep., Proj. W-160-R-23. Subproj. 44. Idaho Dept. Fish and Game, Boise.

PROGRESS REPORT
STATEWIDE WILDLIFE RESEARCH

STATE: Idaho **TITLE:** Pine Marten Ecology
PROJECT NO.: W-160-R-24
SUBPROJECT 46
STUDY NO.: I

PERIOD COVERED: July 1, 1996 to June 30, 1997

PINE MARTEN ECOLOGY

Field work was completed during FY 97. Data analysis is nearly finished and a completion report will be submitted by January 1, 1998.

Reports:

Tomson, S., K. Foresman, and P. Zager. 1996. Pine marten ecology. Job Prog. Rep., Proj. W-160-R-23. Subproj. 46. Idaho Dept. Fish and Game, Boise.

PROGRESS REPORT
STATEWIDE WILDLIFE RESEARCH

STATE: Idaho **TITLE:** Upland Game Ecology
PROJECT NO: W-160-R-24
SUBPROJECT: 47
STUDY: I-II

PERIOD COVERED: July 1, 1996 to June 30, 1997

UPLAND GAME ECOLOGY

Study I: Pheasant Response to Intensive Habitat Management

Data collected from 1994 through 1996 were analyzed during 1997. Pending completion of these analyses, field work during 1997 was somewhat reduced. The 1997 field season of investigating the response of ring-necked pheasants (*Phasianus colchicus*) to intensive habitat management in Bingham and Gooding Counties was limited to population monitoring and further habitat improvements. Within our study areas, about 995 acres of food plots were established and >17,000 trees were planted in shelter belts between 1994 and 1997. Although no additional birds were captured and radio-marked during the 1997 field season, a total of 150 individual pheasants were captured by mist nets or walk-in traps within the two counties in 1995 and 1996, with many of the FY 96 birds monitored through much of FY 97. Relatively high mortality rates (44%) for pheasants captured in spring and followed through summer were documented in 1995 and 1996. Females had considerably lower survival rates (50%) than males (75%) overall. Survival rates were higher in treatment areas (71%) than control areas (40%). Crowing counts and territorial mapping suggested generally higher breeding populations in control areas than treatment areas in Gooding County and higher breeding populations in treatment than control areas for Bingham County. These results suggest that habitat management is more effective in areas with lower quality habitat and pheasant population density, such as Bingham County, than in areas with relatively good pheasant habitat and higher numbers of pheasants in parts of the county, such as Gooding County.

Study II: Pheasant response to predator management.

Data collected from 1994 through 1996 were analyzed during 1997. Pending completion of these analyses, field work during 1997 was somewhat reduced. The 1997 field season of investigating the response of ring-necked pheasants (*Phasianus colchicus*) to predator management in Bingham and Gooding Counties was limited to assessing mortality of radio-marked birds and pheasant population monitoring. 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 and 1996. Relatively low survival rates of 39% and 45% for adult and juvenile hen pheasants, respectively, were documented during the 1995 and 1996 field seasons for birds trapped during the spring and monitored through autumn. These rates were generally higher in

treatment (50%) than control (35%) areas. 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 Bingham County but not Gooding County. 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

Apa, A. D., K. P. Reese, and J. W. Connelly. 1996. An evaluation of nest placement theory using artificial and Columbian sharp-tailed grouse nests. Presented at the 7th International Grouse Symposium. Aug.20-24. Ft. Collins, CO.

Bell, P., K. P. Reese, and J. W. Connelly. 1997. Effects of fire on sage grouse habitat in high precipitation areas. Presented at the annual meeting of the Idaho Chapter, The Wildlife Society. Feb 27-28. Boise, ID.

Compton, B. B., and J. W. Connelly. 1996. The effects of exploitation on sage grouse: Implications from a stochastic model. Presented at the annual meeting of the Idaho Chapter, The Wildlife Society. Mar. 6-8. Boise, ID.

Connelly, J. W. 1996. Long-term trends in sage grouse populations in western North America. Invited lecture. Nov. 5. South Dakota State Univ., Brookings.

Connelly, J. W. 1997. Long-term changes in sage grouse populations in western North America. Presented at the annual meeting of the Idaho Chapter, The Wildlife Society. Feb 27-28. Boise, ID.

Connelly, J. W., and C. E. Braun. 1996. Long-term changes in sage grouse populations: where do we go from here? Presented at the 7th International Grouse Symposium. Aug.20-24. Ft. Collins, CO.

Connelly, J. W., and B. B. Compton. 1996. Trends in sage grouse populations in southern Idaho: do we have a crisis? Presented at the annual meeting of the Idaho Chapter, The Wildlife Society. Mar. 6-8. Boise, ID.

Edelmann, F., M. Wisdom, K. P. Reese, and J. W. Connelly. 1996. Contribution of sage grouse life stages to population growth. Presented at the 20th Western States Sage and Columbian Sharp-tailed Grouse Workshop. July 15-18. Gillette, WY.

Gardner, S. C., K. P. Reese, and J. W. Connelly. 1996. Evaluation of a Columbian sharp-tailed grouse reintroduction with a test of a habitat suitability index model. Presented at the annual meeting of the Idaho Chapter, The Wildlife Society. Mar. 6-8. Boise, ID.

Leonard, K. M., K. P. Reese, and J. W. Connelly. 1996. Sage grouse on the upper Snake River Plain: changes from the 50s to the 90s. Presented at the annual meeting of the Idaho Chapter, The Wildlife Society. Mar. 6-8. Boise, ID.

Leonard, K. M., K. P. Reese, and J. W. Connelly. 1996. Sage grouse on the upper Snake River Plain: changes from the 50s to the 90s. Presented at the 20th Western States Sage and Columbian Sharp-tailed Grouse Workshop. July 15-18. Gillette, WY.

Nohrenberg, G., K. P. Reese, and J. W. Connelly. 1996. The effects of habitat improvement programs and predator management on ring-necked pheasant populations in southern Idaho. Presented at the annual meeting of the Idaho Chapter, The Wildlife Society. Mar. 6-8. Boise, ID.

Nohrenberg, G., K. P. Reese, and J. W. Connelly. 1997. The effects of predator management on ring-necked pheasant populations in southern Idaho. Presented at the annual meeting of the Idaho Chapter, The Wildlife Society. Feb 27-28. Boise, ID.

Reese, K. P., and J. W. Connelly. 1996. Translocations of sage grouse in North America. Presented at the 7th International Grouse Symposium. Aug.20-24. Ft. Collins, CO.

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. Submitted.

Connelly, J. W., and C. E. Braun. 1997. A review of long-term changes in sage grouse populations in western North America. Wildl. Biol. In press.

Connelly, J. W., M. W. Gratson, and K. P. Reese. Sharp-tailed grouse species account. Birds of N. A. Species Account. Submitted.

Crowley, C. M., and J. W. Connelly. 1996. Sage grouse population and habitat trends in southeastern Idaho and southwestern Montana. Idaho Dept. Fish and Game, Pocatello. 205 pp.

Crowley, C. M., and J. W. Connelly. 1997. Trends in agricultural lands in sage grouse range in southeast Idaho and southwest Montana. Idaho Dept. Fish and Game, Pocatello. 56 pp.

Edelmann, F. B., M. J. Wisdom, K. P. Reese, and J. W. Connelly. Contribution of sage grouse life stages to population growth. J. Wildl. Manage. Submitted.

Edelmann, F. B., M. J. Ulliman, M. J. Wisdom, K. P. Reese, and J. W. Connelly. 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. Submitted.

Fischer, R. A., K. P. Reese, and J. W. Connelly. 1996. An investigation on fire effects within xeric sage grouse brood habitat. J. Range Manage. 49:194-198.

Fischer, R. A., K. P. Reese, and J. W. Connelly. 1996. Influence of vegetal moisture content and nest fate on timing of female sage grouse migration. Condor 98: 868-872.

Fischer, R. A., K. P. Reese, and J. W. Connelly. 1997. Effects of prescribed fire on movements, of female sage grouse from breeding to summer ranges. Wilson Bull. 109:82-91.

Gardner, S. C. 1997. Movements, survival, productivity, and test of a habitat suitability index model for reintroduced Columbian sharp-tailed grouse. M.S. thesis. Univ. of Idaho. Moscow, ID. 91 pp.

Reese, K. P., and J. W. Connelly. 1997. Translocations of sage grouse in North America. Wildl.Biol. In press.

PROGRESS REPORT
STATEWIDE WILDLIFE RESEARCH

STATE: Idaho
PROJECT NO: W-160-R-24
SUBPROJECT: 48
STUDY NO.: I

TITLE: Southeast Region Upland Bird Study

PERIOD COVERED: July 1, 1996 to June 30, 1997

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 in 1995 and 325 nests in 1996, >50% of which were those of mallards (*Anas platyrhynchos*). Duck nest success on the treatment area was nearly 2 times higher than that which occurred on the control area, in both 1995 and 1996. Percentage of duck nests destroyed by avian predators did not differ when results between the 2 areas were compared. About twice as many magpie nests were found in the control area as in the treatment area in both years. 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%, and 59% in 1996. Nests were primarily built in big sage brush (*Artemisia tridentata*) on the treatment area and had 52% fledgling nest success in 1995 and 71% in 1996. Results obtained from artificial nests with timers indicate that >66% and >50% of the predated nests were destroyed during daylight hours in 1995 and 1996, respectively. This 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 2 years 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. The data collected during this study have been analyzed and a draft of a master's thesis completed. A completed thesis and final reported is being prepared.

Presentations

Connelly, J. W. !995. Nesting waterfowl, predation and Russian olives in southeastern Idaho. Graduate student lecture, South Dakota State University. November 14. Brookings, SD.

Publications

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

PROGRESS REPORT
STATEWIDE WILDLIFE RESEARCH

STATE: Idaho
PROJECT NO.: W-160-R-24
SUBPROJECT: 49
STUDY: I

TITLE: Southwest Region Big Game Modeling

PERIOD COVERED: July 1, 1996 to June 30, 1997

SOUTHWEST REGION BIG GAME MODELING

The previous report by Cooper and Unsworth (1996) provided introductory information on the objectives, methods, and data requirements for the Southwest Region Big Game Modeling project. During the period of July 1, 1996 through June 30, 1997, I continued research on the theory and application of the various methods used in this study, collected all the available and applicable data from Idaho Department of Fish and Game's databases and written reports, and initiated a mail-in survey of hunters' travel costs and hunting preferences. During the next year, I will enter the newly acquired data, apply the previously researched models to these data, and begin analyzing these results. Along with this, I will present the results of the full analysis of the hunter travel cost study.

Meetings and Presentations:

None.

Reports, Publications, Articles:

Cooper, A., and J. W. Unsworth. 1997. Study I: Harvest and population modeling. Job Completion Report, Project W-160-R-23. Idaho Dept. Fish and Game, Boise. 7 pp.

PROGRESS REPORT
STATEWIDE WILDLIFE RESEARCH

STATE: Idaho
PROJECT NO.: W-160-R-24
SUBPROJECT: 50
STUDY: I

TITLE: Region 4 Mule Deer Fawn Mortality

PERIOD COVERED: July 1, 1996 to June 30, 1997

REGION 4 MULE DEER FAWN MORTALITY

A knowledge of the factors which contribute to mule deer (*Odocoileus hemionus*) fawn mortality during winter is necessary for successful management of deer populations. Major factors include predation, nutritional quality of forage, fawn condition at the beginning of winter, and weather. We radio-monitored 61 fawns during the 1995-96 winter and 60 fawns during the 1996-97 winter on 3 study areas in southwest Idaho. Bitterbrush (*Purshia tridentata*) and cheatgrass brome (*Bromus tectorum*) samples were randomly collected from various habitats within each study area and analyzed for protein content and digestibility. Fawn survival rate during the 1995-96 winter was 0.754 (SE = 0.055, n = 61). A majority of the mortality occurred in the Bennett Hills north of Glenns Ferry, Idaho (_ = 0.524, SE = 0.109, n = 21). Fawn survival rate was 0.447 (SE = 0.065, n = 60) through the 1996-97 winter. Mortality occurred more evenly across the 3 study areas. Through both field seasons, coyote (*Canis latrans*) and mountain lion (*Felis concolor*) predation was the major cause of mortality. During the 1996-97 winter, mean capture weight of mortalities (_ = 75.6 lbs, SD = 11.15) was significantly lower (t = -2.09, df = 55, P = 0.041) than the mean weight of surviving fawns (_ = 81.4 lbs, SD = 9.31). Bitterbrush quality was significantly different between study areas (F = 53.27, 2 df, P < 0.001), and habitats (F = 2.746, df = 5, P = 0.024). Cheatgrass quality was significantly different between study areas (F = 8.975, df = 2, P < 0.001). A predictive fawn mortality model will be developed based on data from this study. Factors contributing to fawn mortality appear to be related to one another. Understanding these relationships is beneficial for mule deer management.

Meetings and Presentations:

The Wildlife Society - February 1996, Boise.

Reports, Publications, Articles:

Bishop, C. J., and J. W. Unsworth. 1997. Study I: Region 4 Mule Deer Fawn Mortality. Job Completion Report, Project W-160-R-23. Idaho Dept. Fish and Game, Boise. 30 pp.

PROGRESS REPORT
STATEWIDE WILDLIFE RESEARCH

STATE: Idaho **TITLE:** Southeast Mule Deer Ecology
PROJECT NO.: W-160-R-24
SUBPROJECT: 51
STUDY NO.: I

PERIOD COVERED: July 1, 1996 to June 30, 1997

SOUTHEAST MULE DEER ECOLOGY

Inactive.

PROGRESS REPORT
STATEWIDE WILDLIFE RESEARCH

STATE: Idaho
PROJECT NO.: W-160-R-24
SUBPROJECT: 52
STUDY NO.: I
TITLE: Blue Grouse/Livestock Grazing Relationships

PERIOD COVERED: July 1, 1996 to June 30, 1997

BLUE GROUSE/LIVESTOCK GRAZING RELATIONSHIPS

The West Mountain portion of the study area was dropped from the 1997 field season due to no survival of radio-collared hens from 1996. Mean clutch size for the Andrus Wildlife Management Area (AWMA) was 8.25 eggs\nest, (n=8). Chick survival data has not been analyzed for 1996. The juvenile : adult ratio determined from hunter killed blue grouse was 10.7:1. The observed pre-season juvenile:adult ratio was 3.8:1 and was significantly different ($p = 0.05$) than the ratio determined from harvested birds. A total of 39 radio-collared blue grouse are being monitored during the 1997 field season.

Submitted by:

John J. Beecham
John J. Beecham
Wildlife Game and Research Manager

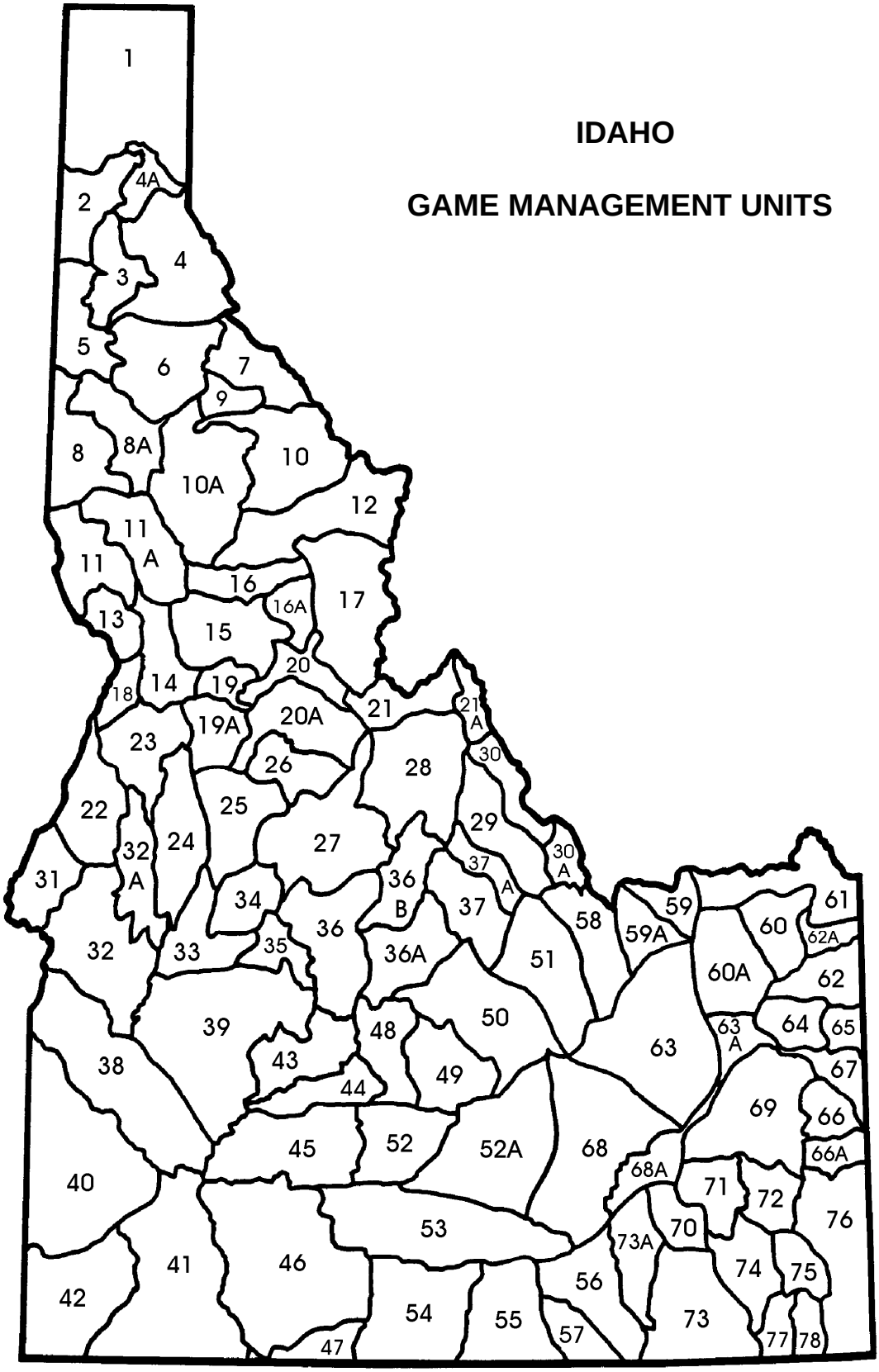
Approved by:

IDAHO DEPARTMENT OF FISH AND GAME

Steven M. Huffaker
Steven M. Huffaker, 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.