

Idaho Chapter of
The Wildlife Society

2001 Annual Meeting

**"PREDATOR MANAGEMENT:
AN OLD PARADIGM REVISITED?"**

Programs and Abstracts



Double Tree Hotel Downtown
Boise, Idaho
March 7-9, 2001

Idaho Chapter of The Wildlife Society

Excellence in Wildlife Stewardship Through Science and Education

Program Development

Michelle Commons	Planning and Registration
Toni Holthuijzen	Planning and Facilities
Toni Holthuijzen	Program Assembly
Jim Peek and Chuck Harris	Symposium: Predator Control and Management: Past and Present
Chuck Harris and Janice Engle	Workshop: Biennial Rare Animal Workshop
Anna Owsiak	Ted Trueblood Communications Awards
Kerry Reese	Chapter Awards
Tom Hemker and Don Kemner	Fundraising/Auction
Sam Mattise	Auctioneer
Dave Musil	Web Page Development

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Chuck Harris, President	Toni Holthuijzen, Vice President
Michelle Commons, Treasurer	Anna Owsiak, Secretary
Joe Butsick, Newsletter Editor	Kerry Reese, Past President

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Program at a Glance

Wednesday, March 7th 9:00 am–5:00pm
6:00–8:00 pm

Workshop: Rare Animals
ICTWS Executive Board Meeting



Thursday, March 8th 8:00–8:05am
8:05–8:15am
8:15–9:00am
9:30am–5:10pm

Introductory Comments
Michael Gratson Remembered
Plenary Address, Rod Sando
Symposium: *Predator Control and Management: Past and Present*



8:00am–9:00pm
5:30–6:30pm
6:30–11:00pm

Posters
NO HOST BAR (BITTERROOT LOBBY)
SOCIAL AND AUCTION (BALLROOM)

Friday, March 9th 8:00am–3:45pm
8:00am–4:00pm
3:45–5:15pm

General Paper Session
Posters
ICTWS Business Meeting



Program

Wednesday, March 7th

7:00-8:00pm

(Cottonwood Meeting Room)

Registration (Lobby)



Workshop: **Biennial Rare Animal Workshop**

Organizers: Chuck Harris and Janice Engle, Idaho Department of Fish and Game, Boise, ID., Office: (208) 334-2920, charris@idfg.state.id.us

Statement of Purpose

The purpose of this meeting is to provide an update on rare species status reviews and conservation planning efforts, federal agency rare species lists, and discuss proposed changes to the IDFG species of special concern list.

WORKSHOP ON THE STATUS, MANAGEMENT, AND CLASSIFICATION OF RARE IDAHO NATIVE FAUNA (AKA RARE ANIMAL WORKSHOP)

9:00-9:05am	Opening Comments	Chuck Harris, IDFG
9:05-9:30am	Office of Species Conservation	Greg Schildwachter
9:30-10:00am	Idaho PIF Priority Bird Species and Habitats, Important Bird Areas; Bird Conservation Plans; NABCI	Sharon Ritter, IPIF Rita Dixon, IDFG
10:00-10:30am	Break	
10:30-11:00am	Idaho Partners in Amphibian and Reptile Conservation (IPARC)	Chuck Peterson, ISU Ted Koch, FWS
11:00-11:30am	Update on ESA listing actions and petitions affecting Idaho species	Ted Koch, FWS Jeri Wood, FWS
11:30-12:00am	ICBEMP—Source Habitats for Terrestrial Vertebrate Species of Focus	Vicki Saab, USFS Terry Rich, FWS
12:00-1:30pm	Lunch	

Wednesday, March 7th (continued)

1:30–2:00pm	TNC/ABI; NatureServe; Ecoregional Planning	Bas Hargrove, TNC
2:00–2:30pm	USFS Sensitive Species Criteria/List Update	Robin Garwood, USFS/SNRA
2:30–3:00pm	IDFG Species of Special Concern	Janice Engle, IDFG Chuck Harris, IDFG
3:00–3:30pm	Break	
3:30–5:00pm	IDFG Species of Special Concern	Janice Engle, IDFG Chuck Harris, IDFG

Thursday, March 8th

7:00-8:00am

(Selway/Sawtooth Meeting Room)

Registration (Lobby)



9:20am-5:30pm

Symposium: Predator Control and Management: Past and Present

Statement of Purpose

The purpose of this symposium is to provide a historical review of predator management, discuss the role of predator management in present-day wildlife management and policy, understand the Idaho Fish and Game Commission's Policy for Avian and Mammalian Predation Management, and provide a review of current predator management research being conducted in Idaho.

- 8:00-8:05am Introduction and Welcome—Chuck Harris,
President, Idaho Chapter of The Wildlife Society
- 8:05-8:15am Michael Gratson Remembered: A Video by Sue Nass, IDFG
- 8:15-8:20am Introduction of Plenary Speaker—Chuck Harris
- 8:20-9:00am Plenary Speaker—Rod Sando, Director, IDFG
- 9:00-9:30am Break

PREDATOR CONTROL AND MANAGEMENT: PAST AND PRESENT

Foundation and Background

- 9:20-9:40am Background and historical perspective: Jim Peek (Session
Chairperson)
- 9:40-10:00am A history of predator control in Idaho: Mark Collinge
- 10:00-10:20am Break
- 10:20-10:40am Public attitudes towards predators and predator control: Michael
Conover
- 10:40-11:00am Commission Policy for Avian and Mammalian Predation
Management: IDFG Commissioner Roy Moulton

Predation Effects on Wildlife and Efficacy of Control Efforts

- 11:00-11:30am Predation effects on big game and efficacy of control efforts: Jim
Unsworth

Thursday, March 8th (Continued)

- 11:30–12:00am Predation effects on upland game and efficacy of control efforts: David Musil
- 12:00–12:30pm Predation effects on waterfowl and efficacy of control efforts: Joe Ball
- 12:30–1:50pm Lunch Break

Current Studies and Issues

- 1:50–2:10pm Upland game and predator management: A tale of two species: Jack Connelly
- 2:10–2:30pm The effects of broadscale predator removal on mule deer populations: Mark Hurley and James Unsworth
- 2:30–2:50pm Clearwater Elk Project: Pete Zager
- 5 2:50–3:20pm Preliminary assessment of wolf predation on livestock on the Diamond Moose Allotment in central Idaho: John Oakleaf, Curt Mack, and Dennis Murray.
- 3:20–3:40pm Break
- 5 3:40–4:10pm The effects of predation on wintering ungulates by an introduced experimental population of wolves and native cougars in central Idaho: Gary Power and Jason Husseman
- 4:10–4:30pm Winter predation and interactions of cougars and wolves in the central Idaho wilderness: Jim and Holly Akenson
- 4:30–4:50pm Selkirk ecosystem predator/prey complex: woodland caribou, white-tailed deer, mule deer, and cougars: Wayne Wakkinen
- 4:50–5:10pm Wolf predation management: Carter Niemeyer
- 5:10–5:30pm Question and Answer Session/Wrap up
- 8:00am–6:00pm Posters (Lobby)
- 5:00–6:00pm Registration (Lobby)
- 5:30–6:30pm NO HOST BAR (BITTERROOT LOBBY)
- 6:30–11:00pm SOCIAL AND AUCTION (BALLROOM)



Awards—Kerry Reese
Raffles and Auction—Tom Hemker and Don Kemner
Auctioneer—Sam Mattise

Friday, March 9th

(Selway/Sawtooth Meeting Room)



7:30–8:00am

Registration (Lobby)

8:00am–5:20pm

General Paper Sessions (A–D)

8:00–9:40am

Session A: Conservation Biology and Habitat Management
Chairperson: Jena Hickey, U.S. Bureau of Reclamation

8:00–8:20am

THE IDAHO BIRD CONSERVATION PLAN—OFF AND RUNNING: Sharon Ritter



8:20–8:40am

BREEDING BIRD RESPONSE TO THE CESSATION OF LIVESTOCK GRAZING IN A COTTONWOOD-WILLOW RIPARIAN SYSTEM: Terrell D. Rich, David J. Krueper, and Jonathan Bart

8:40–9:20am

PARTNERSHIPS FOR WETLAND RESTORATION IN THE KOOTENAI VALLEY: Patrick Cole and Jeffrey McCreary

9:20–9:40am

RATES AND CAUSES OF MORTALITY OF NORTH AMERICAN WOLVERINE: John Krebs, Eric Lofroth, Jeff Copeland, Vivian Banci, Howard Golden, Maurice Hornocker, Audrey Magoun, and Robert Mulders

9:40–10:20am

~~Break~~ Os Garton

10:20–11:40am

Session B: Nongame Birds: Chairperson—Scott Robinson, BLM

10:20–10:40am

BREEDING LANDBIRDS IN NORTHERN IDAHO: Scott R. Robinson



St 10:40–11:00am

HOME RANGE SIZE OF BLACK-BACKED WOODPECKERS, PICOIDES ARCTICUS: Johnthan Dudley

11:00–11:20am

TRENDS IN MIDWINTER BALD EAGLE COUNTS, 1986-2000: Karen Steenhof, Laura Bond, Kirk K. Bates, and Lynda Leppert

11:20–11:40am

RESULTS FROM A RAPTOR IDENTIFICATION STUDY CONDUCTED IN SOUTHWEST IDAHO DURING FALL MIGRATION: Greg Kaltenecker and Marc Bechard

11:40am–1:00pm

Lunch

1:00–1:40pm

Session C: Big Game: Chairperson—Janet Rachlow, University of Idaho

1:00–1:20pm

BLACK BEARS AND HEIFERDUST: Jim Hayden, Dave Spicer, John Beecham, and Eric Crawford.



Scott
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John N
judging

Kristen gone

Joe B. judging

Kristen Bach?

Friday, March 9th (Continued)

- 1:20–1:40pm MULE DEER POPULATION MONITORING IN IDAHO: Hollie Miyasaki, James W. Unsworth, and Mark Hurley
- 1:40–3:40pm **Session D: Upland Game:** Chairperson—Rita Dixon, IDFG 
- 1:40–2:00pm THE TERM "GOOD ENOUGH FOR GOVERNMENT WORK" SHOULD NOT APPLY TO MONITORING SAGE GROUSE LEK DATA: Michelle L. Commons and Jack W. Connelly
- St 2:00–2:20pm MORTALITY PATTERNS OF SAGE GROUSE CHICKS IN SOUTHEAST IDAHO: Nathan A. Burkepile, Kerry P. Reese, and John W. Connelly
- St 2:20–2:40pm COLUMBIAN SHARP-TAILED GROUSE FITNESS ASSOCIATED WITH DIFFERENTIAL HABITAT USE: Jennifer H. Boisvert (Boy-ver)
- St 2:40–3:00pm PRELIMINARY RESULTS OF A SAGE GROUSE ECOLOGY STUDY IN OWYHEE COUNTY, IDAHO: Paul A. Wik, Kerry P. Reese, and John W. Connelly
- 3:00–3:20pm SURVIVAL AND REPRODUCTION OF PEN-REARED AND WILD PHEASANTS TRANSLOCATED INTO SOUTHERN IDAHO: David D. Musil
- 3:20–3:40pm Break
- 3:40–3:45pm TED TRUEBLOOD COMMUNICATIONS AWARDS (Professional and Student): Anna Owsiak
- 3:45–5:00pm ICTWS BUSINESS MEETING
- 8:00am–4:00pm Posters (Lobby)
- 5:00pm Meeting Ends

Have a safe trip home and see you next year!

- (April 20 - May 5 best time)
- lek counts - April 5 - May 5 - based on literature, (not based on peak lek counts in data)
- Do counts in April ^{1-3 weeks} after peak hen attendance (Apr 5-15)
- So 1.
- Count all leks in a route all 3 times you run lek otherwise note in PR report that leks were not all counted
- Count from 1/2 hr before to 1 1/2 hours after sunrise

Posters

(Lobby)

- I **DISTRIBUTION AND RELATIVE ABUNDANCE OF MAMMALIAN CARNIVORES IN HELLS CANYON:** Frank B. Edelman and Anthonie M. A. Holthuijzen
- II **DISTRIBUTION OF ROCKY MOUNTAIN GOATS RELATIVE TO THE HELLS CANYON HYDROELECTRIC COMPLEX:** Frank B. Edelman and Anthonie M. A. Holthuijzen
- III **COMPOSITION AND RELATIVE ABUNDANCE OF THE SMALL MAMMAL COMMUNITY IN THE HELLS CANYON REACH OF THE SNAKE RIVER, IDAHO:** Anthonie M. A. Holthuijzen
- IV **DISTRIBUTION AND ABUNDANCE OF WINTERING BALD EAGLES IN HELLS CANYON:** Anthonie M. A. Holthuijzen
- V **WINTERING WATERFOWL IN THE HELLS CANYON STUDY AREA:** Anthonie M. A. Holthuijzen
- VI **HABITAT CHANGE ANALYSIS USING NALC SATELLITE IMAGES FOR SOUTHEAST IDAHO:** Michelle L. Hymas, Mark A. Hurley, and James W. Unsworth
- VII **THE RAPTOR NESTING COMMUNITY IN THE HELLS CANYON COMPLEX:** Von R. Pope, Anthonie M. A. Holthuijzen, Frank B. Edelman, and Kelly D. Wilde
- VIII **NEOTROPICAL MIGRATING BIRDS: IDENTIFYING HABITAT CHARACTERISTICS THAT INFLUENCE DIVERSITY AND DEMOGRAPHY IN SOUTHEAST IDAHO:** Joel Sauder
- IX **MANAGEMENT IMPLICATIONS OF SUMMER DISTRIBUTIONS OF THE TEX CREEK ELK HERD:** Terry Thomas
- X **DISTRIBUTION AND RELATIVE ABUNDANCE OF REPTILES IN HELLS CANYON:** Kelly D. Wilde, Anthonie M. A. Holthuijzen, Jon M. Beck, Charles R. Peterson, and Mark Gerber

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*General Paper Session
and Poster Papers*



*Arranged in Alphabetical Order
by Senior Author*

COLUMBIAN SHARP-TAILED GROUSE FITNESS ASSOCIATED WITH DIFFERENTIAL HABITAT USE. Jennifer H. Boisvert, University of Idaho, Moscow, ID 83843

Although there is evidence of Columbian sharp-tailed grouse use of recently introduced habitats during the breeding season in Colorado, there is little knowledge of their association with these areas beyond this, particularly regarding their productivity and survival. Columbian sharp-tailed grouse were captured and equipped with radio transmitters on leks in Conservation Reserve Program (CRP) and post-act coal mine lands in northwestern Colorado during spring of 1999 and 2000. Sharp-tailed grouse captured in CRP during the breeding season primarily used native shrub steppe and CRP during spring, summer, and fall, while grouse from mine reclamation continued to use mine reclamation lands. Nest success in mine reclamation lands during the study was 80.8%, while nest success in CRP was only 14.3%, and 22.2% in native shrub steppe. Broods used CRP and shrub steppe habitats only 3.9% and 19.6% of the time, while mine reclamation lands were used 67.6% of the time. Annual survival of sharp-tailed grouse associated with CRP and post-act coal mine lands in 1999 was 20%. During spring through fall, grouse captured in mine reclamation lands had a 44% survival rate compared to only 17% for CRP birds. Observed differences in survival rates and habitat use between the 2 groups of birds suggest that habitat may have an effect on productivity and survival time of grouse associated with CRP and mine reclamation lands.

MORTALITY PATTERNS OF SAGE GROUSE CHICKS IN SOUTHEAST IDAHO . Nathan A. Burkepile, Kerry P. Reese, Department of Fish and Wildlife Resources, University of Idaho, Moscow, ID 83844-1136, John W. Connelly, Idaho Department of Fish and Game, Pocatello, ID 83204.

Little is known about sage grouse (*Centrocercus urophasianus*) chick mortalities from day of hatch to 8 weeks post hatch. From 1999 – 2000, we studied sage grouse chick survival and mortality patterns in southeast Idaho. We radio-marked 31 chicks from 13 broods in 1999 and 44 chicks from 15 broods in 2000. Survival estimates for 1999 and 2000 were 15% and 18%, respectively. The average age of death in 1999 was 10.9 (\pm 1.9) days and ranged from 4 to 31 days after hatch. In 2000, the average age of death was 8.9 (\pm 1.2) days and ranged from 1 to 32 days after hatch. In both years >85% of the mortalities occurred during the first 2 weeks after hatching indicating that this time period is critical to sage grouse chick survival. Predators were responsible for 90% of mortalities in 1999 and 100% of the mortalities in 2000. Sage grouse chicks were taken by both avian and mammalian predators. In 1999 exposure to weather contributed to 10% of the mortalities indicating that adverse weather conditions play a minor role in the overall mortality of sage grouse chicks. Even though the majority of deaths were attributed to predation, other factors may be leading to this high predation rate. Current research is addressing what factors may be contributing to the high predation rate.

PARTNERSHIPS FOR WETLAND RESTORATION IN THE KOOTENAI VALLEY. Patrick Cole, IDFG, Sagle, Idaho 83864, and Jeffrey McCreary, Ducks Unlimited, Pocatello, Idaho 83204

Despite near complete agricultural conversion of 50,000 acres of floodplain wetlands, significant habitat restoration opportunity exists in the Kootenai Valley. Formation, and restorative importance of the floodplain landscape will be described, as well as its functional linkage with the relatively undeveloped Selkirk Ecosystem. Partnership development, wetland restoration, and habitat management for the new Boundary Creek Wildlife Management Area will be briefly covered. Development of a North American Wetland Conservation Act grant proposal opened additional habitat restoration opportunities in the Kootenai Valley. Grant partners included DU, TNC, USFWS, The Kootenai Tribe of Idaho, Crown Pacific Inland, private individuals, the Clark Fork Pend Oreille Wetland Trust, USFS, NRCS, and IDFG. Further partnership development and restoration efforts will be coordinated by the Intermountain West Joint Venture through delineation of Wetland Focus Areas, and identification of important wetland complexes.

THE TERM "GOOD ENOUGH FOR GOVERNMENT WORK" SHOULD NOT APPLY TO MONITORING SAGE GROUSE LEK DATA. Michelle L. Commons and Jack W. Connelly. Idaho Department of Fish and Game, 868 E. Main St., Jerome, ID 83338, and IDFG, 1345 Barton Road, Pocatello, ID 83204, USA

Sage grouse (*Centrocercus urophasianus*) lek counts have been conducted in Idaho since the early 1950's. Initially biologists located leks and began recording the maximum number of males observed on leks each spring. During the 1960's and 1970's more leks were identified but "trend" leks were usually monitored each year. By the mid-1980s the Idaho Department of Fish and Game adopted a lek route system for monitoring breeding populations. Federal (biologists) and state (biologists, conservation officers, technicians) agency personnel and volunteers were responsible for conducting counts along lek routes. A route was established in a particular area with a series of leks. Theoretically all leks associated with a particular route would be counted as well as any other additional displaying males (i.e., new leks). In Idaho, on at least 16 of 40 (40%) lek routes, not all leks on the established route were counted every year. In some cases, the routes were conducted but counts were made during adverse weather or relatively late in the morning. Thus, for some areas or some years, the numbers can be highly inaccurate. This presentation summarizes the inconsistencies and inaccuracies we have found while analyzing Idaho's long-term lek data. Consistency is important on a yearly basis when conducting sage grouse lek surveys. All land management agencies will benefit from having accurate data that will help in the management of this species.

RATES AND CAUSES OF MORTALITY OF NORTH AMERICAN WOLVERINE.

John Krebs, Columbia Basin Fish and Wildlife Compensation Program, Nelson, BC; Eric Lofroth, British Columbia Ministry of Environment, Lands, and Parks, Victoria, BC; Jeff Copeland, Idaho Dept. Fish and Game, Idaho Falls, ID; Vivian Banci, Maple Ridge, BC; Howard Golden, Alaska Dept. Fish and Game, Anchorage, AK; Maurice Hornocker, Hornocker Wildlife Institute, Inc., Bozeman, MT; Audrey Magoun, Wildlife Research and Management, Fairbanks, AK; Robert Mulders, Resources, Wildlife and Economic Development, Government of the NWT, Yellowknife NWT.

An understanding of vital rates is fundamental to the evaluation of conservation options for wolverine (*Gulo gulo*). In western North America, ten radio-telemetry studies of wolverine ecology have been (or are being) completed spanning Idaho, Montana, and British Columbia in the south to northern Alaska, Yukon, and the Northwest Territories in the north. These studies provide data from trapped and untrapped populations of wolverine from temperate, boreal, and arctic environments. This collaborative paper presents preliminary results and compares rates and causes of mortality within and among these studies. Survival rates were estimated using Kaplan-Meier techniques. Mortality causes were summarized as trapped/hunted, road/rail, natural, predation, and unknown. Results will assist managers to estimate sustainable yield and identify other factors influencing wolverine mortality.

HOME RANGE SIZE OF BLACK-BACKED WOODPECKERS, *PICOIDES ARCTICUS*.

Jonathan Dudley, Rocky Mountain Research Station, Boise, Idaho 83702.

I studied Black-backed Woodpeckers in burned ponderosa pine/Douglas-fir forests of southwestern Idaho. I radio-tracked three males during the post-fledging period. Home range sizes were determined from daily re-locations and estimated as 253.0, 174.4, and 162.9 ha (n = 66, 42, and 46, respectively) using the Adaptive Kernel method. Mean distances between successive re-locations were 666.9, 692.7, and 642.2 m for the three males. Each male showed two or more areas of concentrated use within their home ranges. Male Black-backed Woodpeckers appeared to forage more often on dying and recently dead trees located in live patches at the edge of burned forests.

DISTRIBUTION OF ROCKY MOUNTAIN GOATS RELATIVE TO THE HELLS CANYON HYDROELECTRIC COMPLEX. (POSTER) Frank Edelmann, and Anthonie Holthuijzen, Idaho Power Company, Boise, Idaho 83707

Mountain goats (*Oreamnos americanus*) are native to Hells Canyon, but after 1936 were absent until reintroduced in 1964. Suggesting a potential for conflict, mountain goat numbers may be increasing adjacent to the Hells Canyon Hydroelectric Complex (HCHC). To investigate conflict potential, a survey was conducted in 1996 documenting the distribution and abundance of mountain goats relative to the HCHC. The survey was conducted in early spring when mountain goats were highly observable and most likely concentrated near the HCHC. One-hundred seventeen mountain goats were observed with a kid: adult ratio of 0.11. Only a small proportion of the population-segment was observed near the HCHC, with 8% south of Hells Canyon Dam and 92% north of Hells Canyon Dam. Additionally, elevation differences placed predictable mountain goats over 0.5 mile from the HCHC. Mountain goat elevations south of Hells Canyon Dam (mean=3,460 ft.) averaged 1,760 ft. above the reservoir's elevation (1,700 ft.). The spatial separation likely reduces potentials for conflict between mountain goats and operation and maintenance activities of the HCHC.

DISTRIBUTION AND RELATIVE ABUNDANCE OF MAMMALIAN CARNIVORES IN HELLS CANYON. (POSTER) Frank Edelmann, and Anthonie Holthuijzen, Idaho Power Company, Boise, Idaho 83707

In addition to aesthetic and economic values, mammalian carnivores and furbearers (Orders *Carnivora* and *Rodentia*) comprise important components of the biological diversity in most terrestrial ecosystems. However, little is documented about the carnivore and furbearer community in Halls Canyon. Therefore, we determined species composition, estimated relative abundance, and described spatial relationships of carnivore and furbearer species associated with the Hells Canyon Hydroelectric Complex (HCHC). During October 1995, we detected carnivores and furbearers with 390 scent-stations systematically distributed through the survey area. Coyote (35 detections) was most commonly detected and red fox was least (3 detections). Other species detected were black bear, raccoon, bobcat, long-tailed weasel, and striped skunk. Incidental observations included mountain lion, river otter, badger, and beaver. However, low detection rates for relatively abundant species (e.g., coyote) suggested that scent-stations would probably monitor population trend inefficiently. However, scent-stations adequately detected species with moderate to low abundance. For detecting rare carnivore and furbearer species associated with the HCHC, additional specialized techniques should be considered.

BLACK BEARS AND HEIFERDUST. Jim Hayden, Dave Spicer, John Beecham, and Eric Crawford. Idaho Department of Fish and Game, Coeur d'Alene, ID 83815.

There is considerable public and professional debate regarding trends in large predator numbers, and assumed impacts to prey populations such as deer and elk. We initiated a short-term study to address the question of changes in black bear (*Ursus americanus*) numbers in Idaho's panhandle. During 1999 and 2000, we replicated black bear trapping efforts from the late 1970's and early 1980's as part of the Idaho Fish and Game Department's Black Bear Study by John Beecham. Maximum likelihood estimates for black bears declined from 0.295/km² in 1978 to 0.288/km² in 1983, to 0.223/km² in 1999 in Game Management Unit 4. The estimated exponential rate of increase is -0.013 annually. Data from Game Management Unit 6 during 2000 produced an estimate of 0.300 bears/km². While densities in Unit 6 appear higher than in Unit 4 during 1999, they are similar to those observed in Unit 4 during 1978. We conclude that bear densities have not increased in Idaho's panhandle over the past 22 years, and have decreased in some areas.

DISTRIBUTION AND ABUNDANCE OF WINTERING BALD EAGLES IN HELLS CANYON. (POSTER) Anthonie M. A. Holthuijzen, Idaho Power Company, Boise, Idaho 83712.

Bald eagles (*Haliaeetus leucocephalus*) winter in relatively large numbers along the Hells Canyon reach of the Snake River and its associated reservoirs. However, bald eagle numbers have not been consistently monitored throughout the entire Hells Canyon reach. The objective of this study was to determine the numbers and distribution of wintering bald eagles in the Hells Canyon reach of the Snake River. Annual aerial surveys were employed to count bald eagles during the winters of 1993 through 1998. Numbers, locations, and age classes (subadult and adult birds) were recorded. From 1993 through 1998, total bald eagle numbers averaged 102.5 (± 31.2 STD) in the study area. The highest numbers were counted in 1994 (152 individuals) and the lowest in 1998 (68 individuals). The highest numbers of eagles per river mile were found along Oxbow Reservoir (1.9 bald eagles/mile), and the lowest along the unimpounded reaches below Hells Canyon Dam (0.4 bald eagles/mile) and above Brownlee Reservoir (0.2 bald eagles/mile). Concentration areas appeared to have reliable food sources, such as fish, waterfowl, and winter-killed mule deer (*Odocoileus hemionus*). The proportion of subadult bald eagles varied among years between 40.2% in 1993 (39 of 97 birds) to 11.1% in 1997 (8 of 72 birds). Subadult birds comprised, on average, 19.9% (± 11.4 %STD) of the annual wintering population. The highest overall proportion of subadult bald eagles was reported for the Powder River Arm (44.8%, or 39 of 87 birds) and the lowest for Hells Canyon Reservoir (7.7%, or 7 of 91 birds). Bald eagles seek wintering areas offering an abundant and readily available food supply with suitable night roosts, perching substrate, and overall low disturbance levels. Key parameters that determine the use of an area by wintering bald eagles are met in the study area. The lacustrine environment in the study area is highly attractive to wintering bald eagles.

COMPOSITION AND RELATIVE ABUNDANCE OF THE SMALL MAMMAL COMMUNITY IN THE HELLS CANYON REACH OF THE SNAKE RIVER, IDAHO. (POSTER) Anthonie M.A. Holthuijzen, Idaho Power Company, Boise, Idaho 83712.

In April 1997 and 1998, small mammals were sampled at nine sites along 30 trap lines in the Hells Canyon Study Area between Weiser and the confluence of the Snake and Salmon rivers. The objectives were to determine 1) relative abundance and distribution of small mammals, 2) community composition of the small mammal community, and 3) habitat relationships between dominant cover types and the small mammal community. Nine cover types were sampled (*Shore & Bottomland Wetland*, *Scrub-Shrub Wetland*, *Forested Wetland*, *Desertic Shrubland*, *Grassland*, *Shrub Savanna*, *Shrubland*, *Mountain Shrubland*, and *Forested Upland*). Trap lines consisted of 25 stations set 10 m apart, with two traps at each station (a Sherman live trap and a snap trap). Traps were pre-baited for one day, followed by three consecutive nights of trapping, for a total of 4205 trap nights. Shrews were selectively trapped using pit-traps at three perennial creeks. Each site was operated for 18 trap-days between April 1 and May 8, 1997. Eight species of small mammals were captured along trap lines. In order of frequency these were: the deer mouse (*Peromyscus maniculatus*), montane vole (*Microtus montanus*), western harvest mouse (*Reithrodontomys megalotis*), vagrant shrew (*Sorex vagrans*), Great Basin pocket mouse (*Perognathus parvus*), western jumping mouse (*Zapus princeps*), long-tailed vole (*Microtus longicaudus*), and bushy-tailed woodrat (*Neotoma cinerea*). Small mammal abundances ranged between 14.2 and 41.6 small mammals captured/100 trap nights and averaged 21.8 ± 10.5 small mammals/100 trap nights. Differences in small mammal abundance were not found among study reaches or cover types. Relative abundance of small mammals in the study area was similar to those reported in southern Idaho. The highest species diversity was found for the *Mountain Shrubland* cover type ($H' = 1.03$) and the lowest for *Shore & Bottomland Wetland* ($H' \leq 0.01$). Small mammal communities in upland and riparian habitats of the Hells Canyon Study Area were similar in both relative abundance and composition.

WINTERING WATERFOWL IN THE HELLS CANYON STUDY AREA. (POSTER) Anthonie M.A. Holthuijzen, Idaho Power Company, Boise, Idaho 83712.

Information on wintering waterfowl in the Hells Canyon reach of the Snake River is sparse, particularly on the unimpounded reach below Hells Canyon Dam. The objectives were to: 1) identify key waterfowl concentration areas, and 2) determine numbers, species composition and distribution of waterfowl. Annual helicopter surveys of the Snake River reach between Weiser, Idaho and the confluence of the Snake and Salmon Rivers were conducted during the winters of 1994–1999, coinciding with the Annual Waterfowl Midwinter Count. Waterfowl numbers averaged $7,905 \pm 3,295$ STD birds over the entire surveyed reach. The highest number of waterfowl were reported in the Powder River Arm (120.3 ± 68.5 STD birds/RM) and the unimpounded reach above Farewell Bend (169.3 ± 68.5 STD birds/RM). Numbers rapidly declined through Brownlee Reservoir (61.6 ± 35.9 STD birds/RM), Oxbow Reservoir (53.2 ± 28.5 STD birds/RM) and Hells Canyon Reservoir (17.2 ± 11.3 STD birds/RM). The lowest numbers of birds were counted in the unimpounded reach below Hells Canyon Dam (1.3 ± 0.7 STD birds/RM). Seventeen species of waterfowl were observed that were classified in three groups: dabbling ducks (55.2%), diving ducks (44.6%), and surface dippers (0.2%). The most common species was the mallard (*Anas platyrhynchos*) (46.7% of all waterfowl counted), followed by the goldeneye (both common [*Bucephala clangula*] and Barrow's goldeneye [*B. islandica*] combined; 20.5%), common merganser (*Mergus merganser*) (19.4%), Canada goose (*Branta canadensis*) (6.1%) and bufflehead (*B. albeola*) (1.4%). All other species were observed in very small numbers (<1% of all observations). The percentage dabbling ducks in the waterfowl population declined from the unimpounded reach above Farewell Bend through Brownlee Reservoir and Hells Canyon Reservoir. Diving ducks showed, not surprisingly, an opposite trend. The unimpounded reach above Brownlee Reservoir and the Powder River Arm where much of the waterfowl concentrated provide the best quality wintering habitat in the surveyed reach.

HABITAT CHANGE ANALYSIS USING NALC SATELLITE IMAGES FOR SOUTHEAST IDAHO. (POSTER)

Michelle L. Hymas, Mark A. Hurley, and James W. Unsworth, Idaho Fish and Game, Pocatello, Idaho.

Identification of habitat change is crucial information for wildlife, habitat, and fishery managers. Soil vegetation inventory method (SVIM) obtained from BLM presented much needed soil and vegetation information from the 1970's, it includes pictures of general areas, hand drawn maps, and 772 sample points from the Utah border north to Rockland and east to Malad. North American Landscape Characterization (NALC) satellite images have been obtained for the 1970's and 1990's, using Arc/Info and ArcView to produce a change map that shows areas of high change (>10%), slight change (<10%), or no change. This output image overlaid with Conservation Reserve Program (CRP) lands (1990), towns, roads, grazing allotments (1970-1990), fire (1930-2000) will help managers to better understand how the habitat is changing and fragmenting. A crew will work the 2001 field season to ground truth and revisit the 772 sample sites, as well as, areas of high change. We know habitat is critical to the survival of many game and non-game species. This is the first step in developing and maintaining important information to make managerial decisions.

RESULTS FROM A RAPTOR IDENTIFICATION STUDY CONDUCTED IN SOUTHWEST IDAHO DURING FALL MIGRATION.

Greg Kaltenecker and Marc Bechard, Department of Biology, Boise, Idaho, 83725.

From 1996-1999, we conducted a raptor identification study at Lucky Peak, a raptor migration site located in southwest Idaho. Raptors captured for banding were released approximately 300 m away from observers. Upon release, observers attempted to identify raptors to species, age, and sex. A total of 1625 raptors were released in this study. The majority were Sharp-shinned Hawks (*Accipiter striatus*) and Cooper's Hawks (*Accipiter cooperii*). For Cooper's Hawks ($N = 422$), observer calls were correct to species 99% and 95% of the time, while observer calls for Sharp-shinned Hawks ($N = 863$) were correct 96% and 99.7% of the time for females and males, respectively. Observers were less skilled at identification of hawks to age. Cooper's Hawks were identified correctly to age 75% and 80% of the time, while Sharp-shinned Hawks were identified correctly to age 75% and 72% of the time for adults and immatures, respectively. Observers were least skilled at identification of hawks to sex. Cooper's Hawks were identified correctly to sex only 33% and 39% of the time, while Sharp-shinned Hawks were identified correctly to sex 57% and 47% of the time for females and males, respectively. Our data indicate that raptor migration counts can be accurate with regards to identification to species, although identification of raptors to age and sex is more difficult.

MULE DEER POPULATION MONITORING IN IDAHO. Hollie Miyasaki, James W. Unsworth, and Mark Hurley, Idaho Department of Fish and Game.

The Idaho Department of Fish and Game has traditionally monitored mule deer (*Odocoileus hemionus*) populations by obtaining estimates of population size (sightability surveys) and age and sex ratios (herd composition surveys). Improved population models can be developed by incorporating survival rate estimates into the existing framework. During the past 3 field seasons, we captured and radio-collared 667 fawns in 11 study areas across central and southern Idaho using helicopter drive nets and helicopter net guns. Over 770 volunteers were involved in capture operations. From information gathered from the radio marked fawns, we were able to detect regional differences in fawn weights, survival rates, and net recruitment to the mule deer populations. Enhanced population monitoring will help wildlife managers meet specific management goals of herd size and composition by altering doe harvests according to annual changes in survival, recruitment, and population size. This program also provides real time data on fawn survival to managers, enabling them to more accurately communicate population status to hunters.

SURVIVAL AND REPRODUCTION OF PEN-REARED AND WILD PHEASANTS TRANSLOCATED INTO SOUTHERN IDAHO. David D. Musil, Idaho Dept. Fish & Game, 868 East Main St., Jerome, Idaho 83338

One hundred forty-nine (117 hens, 32 roosters) wild pheasants (OR, CA) and 991 (742 hens, 249 roosters) pen-reared pheasants (Marsing, ID) were released onto four sites in southern Idaho to augment resident pheasant populations. By monitoring radio-marked birds (201 hens, 29 roosters) during March-September, 2000, we estimated 27% wild hen (n=89) and 10% wild rooster (n=10) survival. Pen-reared pheasants had 1% hen (n=95) and 0% rooster (n=16) survival. Most (93%) of the pen-reared hen mortality (n=94) occurred during the first month after release compared to 32% for the wild hens (n=65). All of the radio-marked pen-reared roosters (n=16) died during the first month after release while 6 of the 9 wild rooster mortality occurred then. Of the 186 deaths recorded, 27% were caused by mammalian predators, 3% by avian predators, 3% by natural causes, and 2% by accidents with vehicles. Causes could not be determined for 67% of the mortality. At least 1 radio-marked pen-reared hen attempted to nest but was killed by an avian predator. Nine of 17 wild nests were successful.

THE RAPTOR NESTING COMMUNITY IN THE HELLS CANYON COMPLEX. (POSTER) Von R. Pope, Anthonie M.A. Holthuijzen, Frank B. Edelmann, and Kelly D. Wilde, Idaho Power Company, Boise, Idaho 83712.

From 1995 to 1999, we documented occupied nesting territories of raptors along the three reservoir complex in the Hells Canyon Area. The objective of this study was to describe raptor resources within the Study Area. Specifically, this included: 1) a determination of cliff nesting birds of prey, based on occupancy surveys, 2) an estimation of the relative abundance of nesting raptors using point surveys and incidental observations. In 1995 and 1996, we surveyed sections of cliff for nesting raptors using 2 hour survey bouts from fixed points. In 1995, sections of cliff along Hells Canyon Reservoir and its tributaries were surveyed from Hells Canyon Dam to Oxbow Dam. In this reach, 16 occupied nesting territories were documented including six golden eagles (*Aquila chrysaetos*), five American kestrels (*Falco sparverius*), two prairie falcons (*Falco mexicanus*), one each for the red-tailed hawk (*Buteo jamaicensis*), peregrine falcon (*Falco peregrinus*) and common raven (*Corvus corax*). In 1996, cliff surveys for nesting raptors along Brownlee and Oxbow Reservoirs revealed 17 occupied territories, the golden eagle (N=5), red-tailed hawk (N=4), common raven (N=4), prairie falcon (N=3), and American kestrel (N=1). In addition to point surveys, we opportunistically recorded all observations of nesting raptors within the study area from 1995-1999. With these incidental observations, we identified seven raptor species that had not been identified during cliff surveys. This included five species of owls (great horned owl (*Bubo virginianus*), common barn-owl (*Tyto alba*), western screech-owl (*Otus kennicottii*), long-eared owl (*Asio otus*), and burrowing owl (*Athene cunicularia*)), the bald eagle (*Haliaeetus leucocephalus*) and Cooper's hawk (*Accipiter cooperii*). Although the species richness and diversity for all three reaches was similar, the species composition among the three reaches was quite different. Oxbow Reservoir may be a transition area, with a raptor community similar to both the Brownlee and Hells Canyon Reaches. Although the golden eagle was distributed throughout the study, it was most abundant along Oxbow and Hells Canyon Reservoirs while the red-tailed hawk and several owl species were more abundant along Brownlee Reservoir. Raptor Species composition was similar to previous studies in the area with some notable differences. Historically, the Swainson's hawk and northern harrier have nested in the study area but were not observed nesting during this study. Differences in survey techniques and objectives may account for differences in the composition of nesting raptors.

BREEDING BIRD RESPONSE TO THE CESSATION OF LIVESTOCK GRAZING IN A COTTONWOOD-WILLOW RIPARIAN SYSTEM. Terrell D. Rich, U. S. Fish and Wildlife Service, Boise, ID 83709, David J. Krueper, U. S. Bureau of Land Management, Sierra Vista, AZ 85635, Jonathan Bart, USGS-Biological Resources Division, Boise, ID 83706.

Breeding birds were monitored for 5 years following the removal of livestock from the San Pedro River in southeastern Arizona. Predicted increases in vegetation and breeding birds were dramatic. Sixty-one species met the minimum sample requirements: 42 increased (26 significantly) and 19 decreased (8 significantly). For all species combined, mean detections/km increased from 103/km in 1986 to 221/km in 1990 - a highly significant increase of 23%/yr. A significant increase was shown by all groups, irrespective of habitat preference, nest type, vertical vegetation layer preferred, foraging guild or residency status, except for cavity nesters. The latter showed a positive, but non-significant, increase. This study provides unequivocal evidence that management to increase vegetation in cottonwood-willow riparian areas will have pronounced benefits for breeding bird populations

THE IDAHO BIRD CONSERVATION PLAN—OFF AND RUNNING. Sharon Ritter, Idaho Partners in Flight, Hamilton, MT 59840

We published the Idaho Bird Conservation Plan- Version 1.0 in January 2000. The plan covers four of the highest priority bird habitats: Riparian, Non riverine Wetlands, Sagebrush, and Dry Ponderosa Pine/Douglas-fir/Grand Fir Forests. We set habitat objectives and tasks for meeting them, taking a habitat-based approach. The main riparian objective is: by 2025, restore at least 10% of the historical extent of each riparian system to target conditions for focal species. The dry forest objective is: restore by 2025 as much as possible but at least 10% of the historical range of these forests meeting the conditions needed for White-headed Woodpeckers (a focal species). Partners' steps toward implementing the plan include forming a Pine Task Force, writing a brochure about Russian olive and saltcedar, planning habitat restoration projects and finding funds and partners, working on a statewide monitoring program, publishing Keeping Birds in the Sagebrush Sea, preparing a sagebrush habitat map, expanding the Important Bird Areas Program, and others.

BREEDING LANDBIRDS IN NORTHERN IDAHO. Scott R. Robinson, Bureau of Land Management, Coeur d'Alene, Idaho 83814.

The Bureau of Land Management established 4 Breeding Bird Census plots in northern Idaho. Since 1991, this project has established annual indices of population abundance, estimated population densities, and investigated habitat relationships of landbirds. 91 species either nested or visited one or more of the 4 plots: 1 in brush; 2 in birch; 2 in ponderosa pine; 3 in grassland; 8 in wetland; 10 in cedar-hemlock; 26 in low mixed conifer habitat; and 39 in riparian. Although it had the greatest number of species and the greatest density of nesting territories, the riparian forest also experienced the greatest downward trend from 260 to 128 territories per 40 hectares in 10 years. High water during the breeding season accounted for decreased numbers in recent years rather than an actual population decline. Swainson's Thrush, a sensitive species, was the most common territorial species in this study. American Robin and Townsend Warbler, another sensitive species, were the next two most common territorial species.

NEOTROPICAL MIGRATING BIRDS: IDENTIFYING HABITAT CHARACTERISTICS THAT INFLUENCE DIVERSITY AND DEMOGRAPHY IN SOUTHEAST IDAHO. (POSTER) Joel Sauder, Idaho State University, Dept. of Biological Sciences, Box 8007, Pocatello, ID 83209

With the increasing emphasis on multiple-use management, land managers need data and guidelines on how to include non-game animals in their management plans. Other than two established breeding bird survey routes, few data are available on the diversity and demography of many neotropical bird species in the Malad and Snake River BLM resource areas of Southeast Idaho. I have used two point count rounds and five mist-netting periods to survey the nesting birds in seven shrubsteppe, six juniper woodland, and six aspen habitats plots in the Curlew Valley. The habitat characteristics of the study plots have been quantified using point quarter and cover board techniques. Habitat variables to be examined include: species richness, shrub structure and density, forb occurrence, tree diameter and height, ground cover, and snag density. Preliminary results indicate significant differences in species richness and distribution.

TRENDS IN MIDWINTER BALD EAGLE COUNTS, 1986-2000. Karen Steenhof, USGS Forest and Rangeland Ecosystem Science Center, 970 Lusk Street, Boise, Idaho 83706, Laura Bond, Boise State University, Office of Information Technology, Boise, Idaho 83706, Kirk K. Bates, and Lynda Leppert, Boise State University, Raptor Research Center, 970 Lusk Street, Boise, Idaho 83706.

Each January, eagle counts take place throughout Idaho as part of a survey initiated in 1979 by the National Wildlife Federation. We evaluated midwinter count data from 1986-2000 to determine trends for the nation, for separate regions, and for Idaho. We used only those routes that were surveyed consistently in at least 4 years where at least 4 eagles were counted in a single year. Our analysis, using a hierarchical mixed model, was based on >5,000 surveys of >500 routes in 42 states. Results show generally stable trends over this time period in most areas sampled, but count trends varied by region and whether the survey was in an eagle concentration area. The proportion of increasing counts was higher in the northern half of the country than in the southern half. Count trends in Idaho were similar to national trends, but the Panhandle had a higher percentage of increasing counts than eastern Idaho.

MANAGEMENT IMPLICATIONS OF SUMMER DISTRIBUTIONS OF THE TEX CREEK ELK HERD. (POSTER) Terry Thomas, Idaho Department of Fish and Game, Idaho Falls, Idaho.

During the winters of 1997-98 and 1998-99, 34 adult female elk were marked with radio collars on Tex Creek Wildlife Management Area, located 15 miles east of Idaho Falls, Idaho. The Tex Creek elk herd is a migratory herd managed under two different harvest strategies based on administrative boundaries between the Upper Snake and the Southeast Regions of Idaho Department of Fish and Game. The purpose of the study was to determine if elk still followed migration and summer distribution patterns similar to those found in a study conducted from 1978-80 and to relate this information to current elk management strategies. 39.4% of the elk summered north of the administrative boundary (McCoy Creek Road) and the remaining 60.6% summered south of the administrative boundary. These results were similar to those from the 1978-80 study. Migration corridors and migration timing were also investigated and found to be consistent with the earlier study. An attempt was made to determine the role of motorized access on the distribution of elk in the two units. MANAGEMENT CONSIDERATIONS: The difficulty of managing a herd with two differing management philosophies is discussed. Management based on winter range objectives in a situation such as exists at Tex Creek is likely inappropriate. A method to estimate summer populations is presented. The relationship of elk distribution and motorized access is discussed.

PRELIMINARY RESULTS OF A SAGE GROUSE ECOLOGY STUDY IN OWYHEE COUNTY, IDAHO. Paul A. Wik, Kerry P. Reese, University of Idaho, Moscow, Idaho 83844. John W. Connelly, Idaho Fish and Game, Pocatello, Idaho 83204.

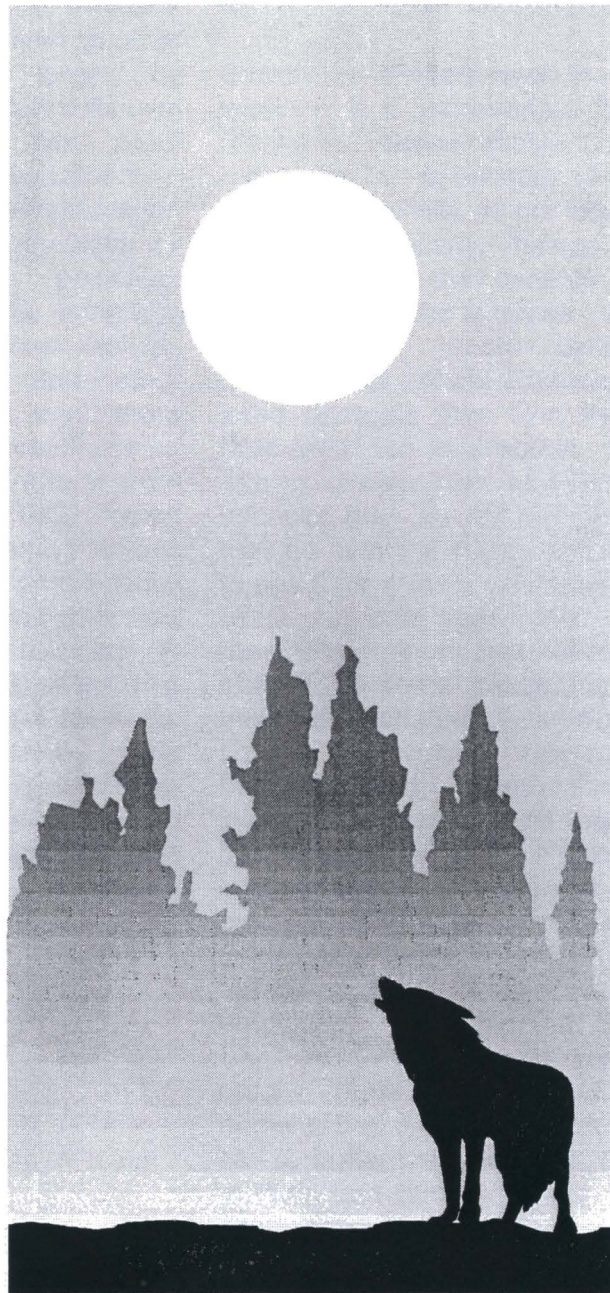
Radio-marked sage grouse (*Centrocercus urophasianus*) were monitored to determine survival, nesting success and nest site characteristics. Twenty males and 36 females were monitored from May 1999 to April 2000. Survival for both sexes was 52% (males 50%, females 54%). Twenty-three hens were monitored during the 2000 nesting season, 19 (82%) attempted to nest, 9 (39%) hatched nests. Two hens re-nested successfully. No significant differences were found between vegetation of successful and unsuccessful nests. Shrub height at the nest and grass height within 0.5 m of the nest differed ($p=0.0013$ and 0.0078 respectively) between nests and random plots. Of 9 successful nests, only 3 (13% hen success) had chicks present at 10 weeks of age. Field work will continue in 2001.

DISTRIBUTION OF AMPHIBIANS IN HELLS CANYON. Kelly D. Wilde and Anthonie M. A. Holthuijzen, Idaho Power Company, Boise, Idaho 83712; Jon M. Beck, Charles R. Peterson and Mark Gerber, Idaho State University, Pocatello, Idaho 83209.

Little information is available on the distributions of amphibians in Idaho, including the Hells Canyon Reach of the Snake River, focus of the relicensing efforts of the Hells Canyon Hydroelectric Complex, operated by Idaho Power Company. We used drift-fence trapping supplemented with incidental observations and timed searches to determine presence and habitat associations of amphibians along the Snake River in Hells Canyon. We conducted drift-fence trapping during April-July, 1995-1997. Incidental observations and timed searches from March through October 1995-1999. Eight species were observed. The Pacific treefrog (*Hyla regilla*) was the most widely distributed frog. It was found throughout the study area. The long-toed salamander (*Ambystoma macrodactylum*), the only salamander found in the study reach, was also found throughout the study reach. The western toad (*Bufo boreas*), the most common toad, was reported throughout the study reach. It bred in many ephemeral ponds in the water level fluctuation zone below Hells Canyon Dam. The rest of the species were observed in low numbers or in few sites in our study area. The Great Basin toad (*Spea intermontana*) and Woodhouse's toad (*Bufo woodhousii*) appear to be at the edge of their natural distribution and are limited by adequate habitat. The spotted frog (*Rana luteiventris*) prefers the cooler, moister areas above the canyon and was only found at only one site in the study reach. The tailed frog (*Ascaphus truei*) was reported in several of the tributary streams within Hells Canyon that meet the species' narrow habitat requirements of perennial, cold water streams with clean cobble. The bullfrog (*Rana catesbeiana*) is an introduced species that is detrimental to native populations of amphibians. The species was present at a few ponds in the southern end of the study reach. No species thought to be in the study area vicinity went undetected in our surveys. The presence of two species, the spotted frog and tailed frog were somewhat surprising in the hot, dry, low elevation habitat of Hells Canyon. Populations of the treefrog, long-toed salamander, and western toad are widespread and do not appear to have been impacted by water level fluctuations. The Woodhouse's toad and Great Basin spadefoot are found at too few sites to make inferences about their populations within our study reach.

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*Predator Control and Management:
Past and Present*



Arranged in Order of Presentation

A HISTORY OF PREDATOR CONTROL IN IDAHO. Mark Collinge, USDA-APHIS Wildlife Services, 9134 W. Blackeagle Dr., Boise, ID 83709.

The history of predator control in Idaho followed a course similar to that in other western states, influenced largely by prevailing public opinion, Congressional action and relevant Federal laws. State and Federal government involvement in organized predator control efforts began in the early 1900's, characterized by widespread, aggressive poisoning campaigns and trapping efforts, along with payment of bounties on coyotes, wolves, mountain lions, magpies and other species. Poisoning efforts from about 1920-1948 relied on widespread use of strychnine drop baits, while efforts from 1948 on up through the late 1960's relied primarily on the use of Compound 1080 in large meat baits. Public and agency attitudes toward predators and their role shifted during this time, resulting in discontinuing bounties and increasing restrictions on predator control methods. Most use of toxicants was banned by the Federal government after 1972, and from that point to the present, aerial hunting has been one of the most important tools used in the State.

PUBLIC PERCEPTION OF THE USE OF LETHAL MEANS TO REDUCE WILDLIFE DAMAGE. Michael R. Conover, Jack Berryman Institute, Department of Fisheries and Wildlife, Utah State University, Logan, UT 84322-5210

Society is divided over the question of whether it is appropriate to use lethal means to reduce wildlife damage. One reason for this is because the benefits and liabilities of wildlife do not fall even upon all members of society. Instead, some people reap most of the benefits while others suffer most of the liabilities. When coyotes are preying upon lambs, farmers economically benefit if the coyote culprit is killed because they own the sheep and their livelihood is a stake. Other people are not directly harmed if lambs are killed because they do not own the lambs, but they do own the coyote and may not want to see their wildlife sacrificed for someone else's personal gain. We, as a society, have determined that killing animals is justified in some cases, but not others. Important variables include which wildlife species is involved, how much damage has occurred, whether the specific individual animal causing the damage can be removed, and if this can be accomplished in a humane and environmentally-benign manner. To ensure that these conditions are met, the federal government hires wildlife biologists employed by the U.S.D.A./Wildlife Services. They have to responsibility to resolve these difficult conflicts between humans and wildlife. These people serve as a buffer -- not only between wild animals and humans -- but also between polarized segments of society.

PREDATION EFFECTS ON BIG GAME AND EFFICACY OF CONTROL EFFORTS: James W. Unsworth, Idaho Department of Fish and Game, Nampa, Idaho 83686.

The role of predation in limiting big game populations has been a controversial topic among wildlife managers and sportsmen since the beginning of modern game management. In recent years, declines in mule deer (*Odocoileus hemionus*) and elk (*Cervus elaphus*) have been blamed on predators, especially coyotes (*Canis latrans*), mountain lions (*Puma concolor*), and black bears (*Ursus americanus*). The results of studies to determine the impact of predation on big game populations vary. Predation may be a significant mortality factor under certain conditions; however, the relationship of prey populations to carrying capacity, number of predator species, alternate prey, weather, and habitat alterations make evaluations difficult. Social and economic considerations of predator control vary based on scale, species to be benefited, and the objectives of the control effort. Wildlife managers need to carefully evaluate the social costs of predator control and be aware of how changing human demographics in Western States may impact the public acceptance of predator control and influence long range management options.

PREDATION EFFECTS ON UPLAND GAME AND EFFICACY OF CONTROL EFFORTS David D. Musil, Idaho Dept. Fish & Game, 868 East Main St., Jerome, Idaho 83338

In general, studies have determined predator control can increase upland gamebird populations if done over large areas, with multiple removal methods, and with multiple predator species removed. The effects of predator removal are short-lived, sometimes cost prohibitive, and generally not supported by the public. Several authors recommend habitat restoration, aversion techniques, and other non-lethal alternatives to predator control.

PREDATION EFFECTS ON WATERFOWL AND EFFICACY OF CONTROL EFFORTS. I. J. Ball, Unit Leader, Montana Cooperative Wildlife Research Unit, University of Montana, Missoula, MT 59812

High rates of nest failure create serious conservation problems in upland-nesting ducks and a wide variety of other avian species: the primary proximate cause of the losses in most situations is nest predation. High rates of nest predation often occur because habitats and predator communities have been altered by human activities. Although conservation and restoration of habitat clearly is the most fundamental requirement for maintaining duck populations, attempts to decrease nest predation by improving nesting cover commonly fail. Those failures apparently occur because most habitat management projects are applied on a small, site-specific scale and because changes in predator communities and densities are inadequately considered. Direct, lethal predator control (PC) can effectively raise rates of duck nest success: the scientific evidence on this effect is in fact stronger for PC than for virtually any other duck management practice. PC also may have no detectable effect or actually reduce duck nest success by shifting predator communities toward species that are smaller but more numerous. This diversity of potential outcomes, and the high risk of wasting scarce conservation funds, make political mandates for (or against) PC a particularly bad idea. PC formed a common management strategy until about the 1950's, but fell from favor for a variety of reasons. Heated debate continues on the appropriateness of PC for conservation of ducks and other birds. Part of the continuing disagreement occurs because we commonly mix concerns based on science (problem definition, efficacy, economic efficiency, ecological implications, etc.) with those based on ethics and values.

UPLAND GAME AND PREDATOR MANAGEMENT: A TALE OF TWO SPECIES. J. W. Connelly, Idaho Department of Fish and Game, 1345 Barton Road, Pocatello, ID 83204

Despite voluminous evidence linking healthy gamebird populations to adequate habitat, some sportsmen, politicians, and natural resource administrators promote predator control as a solution to declining gamebird populations. There is little evidence that routine predator control is a cost-effective method of increasing gamebird populations. However, recent work on waterfowl and past research on pheasants (*Phasianus colchicus*) and gray partridge (*Perdix perdix*) suggest that under some circumstances, predator control may be an appropriate management strategy. Data collected on sage grouse (*Centrocercus urophasianus*) suggest otherwise. Pheasants and sage grouse have very different population characteristics. It is possible that management strategies devised for one species are inappropriate for the other. The purpose of this talk is to compare the efficacy of predator management for two gamebird species with very different population attributes.

THE EFFECTS OF BROADSCALE PREDATOR REMOVAL ON MULE DEER POPULATIONS. Mark A. Hurley and James W. Unsworth, Idaho Department of Fish and Game.

We monitored the effects of removing coyotes and mountain lions on mule deer populations in 8 game management units in southern Idaho. Wildlife Services removed coyotes from 4 management units using winter aerial gunning annually, 1997-00. Intensive ground efforts in fawning areas were added during spring and summer 1999-00. Sport harvest of mountain lions was liberalized in 1997 in 4 of the units and remained conservative in the other units. The experimental design provided 2 replicates of each possible predator removal treatment. Small mammal transects were completed each year to index alternate prey populations. We used aerial surveys in Dec. and Mar. to monitor changes in the composition and size of deer populations. We radio-collared 200 deer, adults, newborn fawns, and 6 month-old fawns in one removal and one non-removal area to monitor rates and causes of mortality. Changes in deer populations have varied among units. In two units with both coyote and lion removal, one increased at 13% while the other unit increased at only 3%. Other treatments have produced similar conflicting results. Average fawn/doe ratios were higher in the coyote removal units for the first time in 2000 (70 vs. 64). Mortality of radio-collared adults was lower in the removal unit in 1998 and 1999, then higher in 2000. Mortality of 6 month-old fawns was lower in the removal units for all 3 years. The difference was attributed to lower lion caused mortality in 1998 and 1999 then lower coyote caused mortality in 2000. Newborn fawn mortality was higher in the removal area in 1998 and then lower in 1999-00. Both weather and alternate prey populations appear to influence the effectiveness of predator removal.

PRELIMINARY ASSESSMENT OF WOLF PREDATION ON LIVESTOCK ON THE DIAMOND MOOSE ALLOTMENT IN CENTRAL IDAHO. J. K. Oakleaf¹, C.M. Mack², and D.M. Murray¹. ¹Department of Fish and Wildlife Resources, University of Idaho, Moscow, ID 83844 (john_oakleaf@hotmail.com). ²Nez Perce Tribe, Dept. of Wildlife Management, Box 1922, McCall, ID 83638.

We examined wolf-cattle interactions within an allotment in Idaho in an attempt to evaluate effects of wolves on calf survival. The Diamond Moose Association (DMA) calf losses increased over historic levels following wolf establishment. Despite this increase, few calf mortalities were conclusively documented as being the result of wolf depredation. During the 1999 grazing season, we embarked upon a two-year study to determine the fate of calves by radio-marking one third of the total calf population (n=231). Overall, calf survival was high (95%, 99% for 1999 and 2000 respectively), with relatively few mortalities (n=9, n=5) among the marked population. Natural calf mortality (pneumonia, unknown causes, fire mortality), wolf-caused calf mortalities represented 64% and 29% of deaths (n=14), respectively during the two grazing-seasons. The Jureano Mountain wolf pack was deemed responsible for 2 of 3 unmarked calf deaths on the DMA. An additional six mortalities (2 in 1999 and 4 in 2000) attributed to wolves were discovered on a neighboring pasture. The fate of 33 missing calves on the DMA was unknown at the conclusion of the study. Detection rates for all causes of mortalities (marked and unmarked calves) were low within the DMA (1 of 2.3 mortalities) and similar to detection rates for wolf-caused calf mortality (1 of 2.3). Detection rates of wolf-caused mortality dropped considerably (1 of 5.7) when marked calves were removed from this estimate. Calves selected by wolves were significantly younger than average ($p < 0.05$), indicating that ranchers should consider altering calving periods to favor older calves in areas with wolves. Calf vulnerability to predation appeared to be correlated with spatial proximity to wolf home ranges and rendezvous sites. Wolf control actions coupled with natural and illegal mortality rates apparently reduced the rate of wolf-caused calf mortality.

WINTER PREDATION AND INTERACTIONS OF COUGARS AND WOLVES IN THE CENTRAL IDAHO WILDERNESS, Jim Akenson and Holly Akenson, Taylor Ranch, Idaho.

The Hornocker Wildlife Institute, in cooperation with the University of Idaho, Nez Perce Tribe and Idaho Department of Fish and Game, is in the third winter of a 4-year predation study. The objectives are to determine the predation behavior of cougars and wolves, to document interactions between these two predators, and to evaluate the influence of these species on ungulates. The study area is the Big Creek drainage in the heart of the Frank Church River of No Return Wilderness. Access in this rugged and remote country is by hiking, snowshoeing, or on muleback. The effects of cougar and wolf predation on elk and deer populations and the effects of wolves and cougars on each other will be fully evaluated following completion of all field research. During winters of 1999 and 2000 we have evaluated 86 carcasses on the Big Creek winter range. So far, deer were favored as prey by cougars, but deer and elk were killed in proportion to their abundance by wolves. Elk calves were more vulnerable to predation than elk cows, although deer fawns were not selected for over adult deer. Incisor tooth aging of 1999 elk carcasses revealed that most elk that died during winter were very old-aged cow elk (12-19 years old), although we found that over 95% of live cow elk sampled on the Big Creek winter range in spring 2000 were pregnant. A majority of the deer carcasses were located in lower Big Creek while most of the elk carcasses were found in upper Big Creek. We documented variation in individual cougar and wolf food habits. During winter 2000 we completed 3 predation sequences on cougars. We have not determined a predation rate for the wolf pack, since we were unable to obtain sequential wolf locations every day due to the short time the pack spent on kills and its wide ranging movements.

Several natural factors have influenced this research including winter weather severity, and large-scale fire. Winter 2000 was less severe than winter 1999, which allowed ungulates to utilize a larger winter range. In winter 2000, the Chamberlain wolf pack spent a significant amount of time on the upper elevation periphery of the Big Creek winter range, and only occasionally hunted the core winter range area that they used in winter 1999. Less overlap occurred between radio-collared wolves and cougars in winter 2000 than 1999. Preliminary observations indicate that the presence of wolves in a cougar's home range affects the movements of that cougar. During August 2000 a large-scale forest fire burned more than half of the study area. We are observing major changes in ungulate utilization of the winter range so far in 2001 as a result of the fires. The ecological effects of fire on cougar and wolf predation, and ungulate movements and population dynamics will be explored during the remainder of this study.

SELKIRK ECOSYSTEM PREDATOR/PREY COMPLEX: WOODLAND CARIBOU, WHITE-TAILED DEER, MULE DEER AND COUGARS. Wayne Wakkinen, Idaho Dept. Fish and Game, Bonners Ferry, ID; Jon Almack, Wash. Dept. Fish and Wildlife, Metaline Falls WA; Donald Katnik and Hugh Robinson, Wash. State Univ., Pullman.

The last population of woodland caribou (*Rangifer tarandus*) in the contiguous U.S. has been declining despite efforts to recover it through augmentation. Predation, primarily by cougars (*Puma concolor*) in the summer is the proximate factor in the decline. In an attempt to understand the predator/prey relationships affecting caribou, we radio-collared 28 cougars, 52 caribou, 43 mule deer (*Odocoileus hemionus*), and 28 white-tailed deer (*O. virginianus*) in or adjacent to the caribou recovery zone. Caribou declined, mule deer were stable to slightly declining, and whitetails increased during the study period. Caribou chose areas with low levels of forest fragmentation at relatively high elevations throughout the year. Cougars chose a highly fragmented forest setting at low elevations in the winter and switched to areas of low fragmentation at higher elevations in the summer. While nearly all cougars made seasonal shifts to higher elevations during late summer, less than half had home ranges that overlapped caribou. Whitetail mortality was highest in the winter. Caribou and mule deer mortality occurred primarily in late summer. White-tailed deer may support high densities of cougars in the winter that negatively affect caribou and mule deer in the summer. Management implications of these findings will be discussed.

WOLF DEPREDATION MANAGEMENT, Carter Niemeyer, U.S. Fish and Wildlife Service, Snake River Basin Field Office, 1375 South Vinnell Way, Boise, ID 83709

Depredation on livestock was the principal factor responsible for the deliberate extirpation of wolves (*Canis lupus*) from the western United States by 1930. Throughout history, man and wolves have competed for prey species. Since the 1960s, public opinion has changed about wolves and wolf management. Wolf management today is a controversial and complex issue that requires intense human social skills and revised control tools that are publicly acceptable. Comprehensive wolf management policy with public involvement is critical. Control techniques should be effective and applied humanely. New strategies to manage wolf predation will be evaluated.

EVIDENCE FOR COMPETITION BETWEEN MULE AND WHITE-TAILED DEER POPULATIONS IN NORTH-CENTRAL WASHINGTON DURING THE PAST 18 YEARS. Garton, E. O., M. Murphy, S. Judd and K. Hennings. Fish and Wildlife Dept., Univ. of Idaho, Moscow, ID 83844 and Fish and Wildlife Dept., Colville Confederated Tribes, PO Box 150, Nespelem, WA 99155.

The decline of mule deer populations in the Western United States during the past decade has rapidly become a major source of concern for biologists, managers, conservationists and hunters. Typical hypotheses to explain these declines focus on the effects of predators, weather conditions or habitat modifications. Little discussion is directed to the effects of potential competitors, yet in large portions of the mule deer range they occupy the same areas as other ungulates such as white-tailed deer and elk. We evaluated 18 years of aerial surveys for mule and white-tailed deer conducted on the Colville Indian Reservation from 1982 to 2000 for evidence of competition between these two populations using a simple discrete time population growth and competition model. These data provide strong evidence for competition between these two species of deer. Our approach provides estimates of the magnitude of the negative impact of white-tailed deer on mule deer populations and vice versa. A similar approach could be used to estimate the impacts on mule deer by elk and other potential competitors.

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