

**The Wildlife
Society**



IDAHO CHAPTER

**28TH ANNUAL MEETING
FEBRUARY 7-9, 1991
BOISE, IDAHO**

IDAHO CHAPTER - THE WILDLIFE SOCIETY

1991 ANNUAL MEETING

ACKNOWLEDGEMENTS

The Idaho Chapter wishes to recognize the substantial efforts of several individuals for making this meeting possible.

ED CHANEY

JACK CONNELLY

DAVE KOEHLER

SAM MATTISE

PAUL MOROZ

BILL MULLINS

ALAN SANDS

HELEN ULMSCHNEIDER

1991 Annual Meeting
of the
Idaho Chapter of The Wildlife Society

Red Lion, Downtowner
Boise, Idaho
February 7-9, 1991

Thursday, February 7

- 7:30-8:30 Registration
- 8:30-8:45 Opening Remarks - Jack Connelly, President, Idaho Chapter TWS
- 8:45-10:15 Panel Discussion - "Communications: How Do We Go Beyond Preaching to the Choir?"
Panel Chair:
 Ed Chaney, Eagle: Environmental Consultant and President, Chinook Northwest
Panel Members:
 Steve Bagwell, Boise: Editorial Page Editor, The Idaho Statesman
 Pat Ford, Boise: Freelance writer and former Executive Director, Idaho Conservation League
 William Goodnight, Boise: Chief, Bureau of Information and Education, Idaho Department of Fish and Game
 Bruce Reichert, Idaho City: Writer, Producer, and Host of OUTDOOR IDAHO on PBS
 Gary Richardson, Boise: Information Officer, Idaho Public Utilities Commission, and Environmental Activist
- 10:15-10:35 Coffee Break
- 10:35-11:55 Technical Session A - Big Game
Moderator - Chuck Harris, Idaho Department of Fish and Game
- 10:35 **AN OVERVIEW OF NORTH IDAHO WHITE-TAILED DEER INVESTIGATIONS.** PETER ZAGER, Idaho Department of Fish and Game, Lewiston.
- 10:55 **MULE DEER SURVIVAL IN RELATION TO POPULATION SIZE AND HUNTING EFFORT IN SOUTHEASTERN IDAHO.** CECIL G. BROWN, Idaho Department of Fish and Game, Pocatello.
- 11:15 **ELK DISTRIBUTION AND DAILY MOVEMENTS IN THE DESERT OF SOUTHEASTERN IDAHO.** DEBORAH C. STROHMEYER and J.M. PEEK, Wildlife Resources, University of Idaho, Moscow.

- 11:35 **HABITAT USE OF THE ROCKY MOUNTAIN BIGHORN SHEEP IN MORGAN CREEK, EAST-CENTRAL IDAHO.** GINA L. BALLARD and J.M. PEEK, Wildlife Resources, University of Idaho, Moscow.
- 11:55-1:15 Lunch Break
- 1:15-2:15 Technical Session B - Upland Game
Moderator - Helen Ulmschneider, U.S. Fish and Wildlife Service
- 1:15 **HABITAT CHARACTERISTICS OF SITES USED BY WINTERING SAGE GROUSE.** MARK D. ROBERTSON, KERRY P. REESE, Wildlife Resources, University of Idaho, Moscow, and JACK W. CONNELLY, Idaho Department of Fish and Game, Pocatello.
- 1:35 **PHEASANT NESTING ECOLOGY IN SOUTHERN IDAHO.** DAVID FELLELY and TOM MAEDER, Montana Cooperative Wildlife Research Unit, University of Montana, Missoula, MT.
- 1:55 **PREDATION RATES ON ACTUAL AND SIMULATED NESTS OF COLUMBIAN SHARP-TAILED GROUSE IN SOUTHEASTERN IDAHO.** ANTHONY D. APA and KERRY P. REESE, Wildlife Resources, University of Idaho, Moscow, and JACK CONNELLY Jr., Idaho Department of Fish and Game, Pocatello.
- 2:15-2:35 Coffee Break
- 2:35-4:30 Technical Session C - Raptors
Moderator - Steve Knick, Bureau of Land Management
- 2:35 **DISTRIBUTION AND STATUS OF FLAMMULATED OWLS (Otus flammeolus) ON THE SALMON NATIONAL FOREST.** ERIC C. ATKINSON and MELONIE L. ATKINSON, Idaho Department of Fish and Game, Boise.
- 2:55 **RED-TAILED HAWK PREDATION ON SNAKES: THE EFFECTS OF WEATHER AND SNAKE ACTIVITY.** SCOTT GROTHE, Department of Biological Sciences, Idaho State University, Pocatello.
- 3:15 **FOOD HABITS OF THE LONG-EARED OWL IN SOUTHWESTERN IDAHO: SEASONAL CHANGES AND COMPARISONS OF DIETS OF ADULTS AND YOUNG.** HELEN ULMSCHEIDER, US Fish and Wildlife Service, Boise.
- 3:35-3:45 Stretch Break

- 3:45 **NEST SITE CHARACTERISTICS OF NORTHERN SPOTTED OWLS IN SECOND GROWTH FORESTS OF NORTHWEST CALIFORNIA.** LEE B. FOLLIARD, KERRY P. REESE, Department of Fish and Wildlife Resources, University of Idaho, Moscow, and LOWELL V. DILLER, Simpson Timber Company, Arcata CA.
- 4:05 **BEHAVIOR OF NESTING PRAIRIE FALCONS (FALCO MEXICANUS).** A. HOLTHUIJZEN, Idaho Power Co., Environmental Affairs Dept., Boise.
- 4:25 **NEST BOXES: WINDOWS INTO THE TROPHIC DYNAMICS OF FOREST OWLS.** GREG HAYWARD, University of Idaho, Moscow, and ROGER ROSENTERER, Bureau of Land Management, Boise.
- 4:45 Adjourn - Evening free

Friday, February 8

- 8:30-11:30 Panel Discussion: "A Vision for Wildlife in the 90's"
 Panel Chair:
 Alan Sands, Boise: Bureau of Land Management, Idaho State Office
 Panel Members:
 Jana Nelson, Portland: U.S. Fish and Wildlife Service, Region 1
 Bill Burbridge, Ogden: U.S. Forest Service, Region 4
 Frank Fink, Boise: Soil Conservation Service, Idaho State Office
 Peter Paquet, Portland: Northwest Power Planning Council
 Tom Reinecker, Boise: Chief, Wildlife Bureau, Idaho Department of Fish and Game
 Ed Robertson, Boise: Businessman
 Allan Thomas, Boise: Bureau of Land Management, Idaho State Office
- 9:45-10:15 Coffee Break
- 11:30-1:00 Lunch Break
- 1:00-2:00 Technical Session D - Endangered Species
 Moderator - Jay Gore, U.S. Fish and Wildlife Service
- 1:00 **AN OVERVIEW OF SELKIRK GRIZZLY BEAR RESEARCH.** WAYNE L. WAKKINEN, Idaho Department of Fish and Game, Bonners Ferry.

- 1:20 **BALD EAGLE POPULATIONS IN THE 7 WESTERN STATES: PROSPECTS FOR DOWNLISTING.** KAREN STEENHOF, Raptor Research and Technical Assistance Center, Bureau of Land Management, Boise.
- 1:40 **ALTERNATIVE STRATEGIES OF WOLF RECOVERY IN CENTRAL IDAHO.** JEFFREY J. YEO and JAMES M. PEEK, Wilderness Research Center and Department of Fish and Wildlife Resources, University of Idaho, Moscow.
- 2:00-2:30 Coffee Break
- 2:30-5:00 Idaho Chapter Business Meeting
- 2:30-3:00 Meeting with Dean Sangrey, Executive Director of the Idaho Outfitters and Guides Licensing Board to discuss legal ramifications of trips offered for auction at the Idaho Chapter TWS Annual Meeting
- 3:00-5:00 General Business Meeting
- 5:00 Adjourn
- 6:00-
Midnight Social: Hors d'oeuvres, Auction and Raffle, and Live Music by the Mores Creek String Band (plus a visual "surprise")

Saturday, February 9

- 8:00-9:50 Technical Session E - Non-Game Species
Moderator - Wayne Melquist, Idaho Department of Fish and Game
- 8:00 **DISTRIBUTION AND ECOLOGY OF HARLEQUIN DUCKS IN IDAHO.** E. FRANCES CASSIRER, CRAIG R. GROVES, Idaho Department of Fish and Game, Nongame and Endangered Wildlife Program, Boise, and RICHARD L. WALLEN, Resource Management, Grand Teton National Park.
- 8:20 **HABITAT ASSOCIATIONS AND POPULATION TRENDS OF IDAHO'S NEOTROPICAL MIGRANT LAND BIRDS.** VICTORIA SAAB, US Forest Service, Intermountain Research Station, Boise.
- 8:40 **POPULATION TRENDS OF IDAHO AMPHIBIANS AS DETERMINED BY MAIL QUESTIONNAIRE.** CHUCK R. PETERSON, Department of Biological Sciences, Idaho State University, Pocatello, and CRAIG R. GROVES, Nongame and Endangered Wildlife Program, Idaho Department of Fish and Game, Boise.

9:00 **MIGRATING SHOREBIRD ABUNDANCE IN IDAHO.** DANIEL
TAYLOR and CHARLES TROST, Department of Biology,
Idaho State University, Pocatello.

9:20-9:40 Coffee break

9:40 **THE WINTERING AND FORAGING ECOLOGY OF THE TRUMPETER
SWAN, HARRIMAN STATE PARK OF IDAHO.** JEFFREY W.
SNYDER, Idaho State University, Pocatello.

10:00 **BEHAVIORAL RESPONSES OF NESTING TUNDRA SWANS TO
HUMAN DISTURBANCE AND IMPLICATIONS FOR NEST
PREDATION ON THE ARCTIC NATIONAL WILDLIFE REFUGE.**
MATTHEW J. MONDA and JOHN T. RATTI, Department of
Fish and Wildlife Resources, University of Idaho,
Moscow, and THOMAS R. MCCABE, Alaska Fish and
Wildlife Research Center, Fairbanks.

10:20-10:30 Stretch Break

10:30-12:00 General Session F - Habitat
Moderator - Raul Morales, Bureau of Land Management

10:30 **THE IDAHO HABITAT IMPROVEMENT PROGRAM.** STEVE
SCHMIDT, Idaho Department of Fish and Game, Idaho
Falls, and MIKE TODD, Idaho Department of Fish and
Game, Jerome.

10:50 **STATUS OF PURPLE LOOSESTRIFE ON THE MIDDLE SNAKE
RIVER.** NANCY K. COLE and KRIS TIMMERMAN, Idaho
Power Company, Environmental Affairs Department,
Boise.

11:10 **REDSTEM SEEDLING ESTABLISHMENT IN BRACKEN FERN ON
THE WILLOW CREEK BURN.** JAMES M. PEEK and JEFF YEO,
Department of Fish and Wildlife Resources and
Wilderness Research Center, University of Idaho,
Moscow.

11:30 **ASPEN STAND WATER DEVELOPMENT FOR WILDLIFE.** WILLIAM
E. RICE, Bureau of Land Management, Burley.

11:50 Trumpeter Swan Management Update
Ruth Shea, Idaho Department of Fish and Game

12:10 Awards and Closing Remarks

12:30 Adjourn

A B S T R A C T S

AN OVERVIEW OF NORTH IDAHO WHITE-TAILED DEER INVESTIGATIONS

PETER ZAGER, Idaho Department of Fish and Game, Lewiston ID 83501.

Formal investigations into white-tailed deer ecology began in north Idaho in 1984 when a checkstation was established at Priest River. Since then, an M.S. thesis on whitetail habitat use, movements, and home ranges in the cedar/hemlock zone was completed and we continue to monitor mortality rates and causes in the Priest River drainage. A second M.S. student is investigating the relationship between forest management and whitetail habitat use in the same area. In 1990, a companion project was launched along the South Fork of the Clearwater River, a drier area with more open habitats. An M.S. student has completed his first field season investigating summer/fall habitat use, movements, and home ranges. Mortality rates and causes are also being monitored. An evaluation of white-tailed deer fecundity completed in 1990 showed north Idaho deer were moderately productive.

MULE DEER SURVIVAL IN RELATION TO POPULATION SIZE AND HUNTING EFFORT IN SOUTHEASTERN IDAHO

CECIL G. BROWN, Idaho Department of Fish and Game, Pocatello, ID 83204.

Radio-collars were attached to 107 mule deer between 1985 and 1989 in southeastern Idaho. During this period 49 does were monitored through hunting season for 102 deer years and 49 bucks were monitored over 59 deer years. In conjunction with a series of mild winters Unit 73 deer populations increased from approximately 18,000 deer in the fall of 1985 to approximately 33,000 deer in the fall of 1989. Buck seasons remained constant at 19 days while antlerless deer were legal for 5 days from 1985 through 1987, and then increased to 26 days in 1988 and 26 days with a second antlerless deer tag available in 1989. Daily survival of radio-collared does was correlated with antlerless deer population ($r^2 = 0.961$) and seasonal survival rates were correlated with antlerless deer population/hunter effort ($r^2 = 0.915$). Survival of radio-collared bucks was not correlated with deer population or hunter effort parameters ($P \geq 0.10$). Antlerless deer harvest was related to population size, season, and hunter effort (all $p \leq 0.10$). Antlered harvest was not significantly related with any tested parameters except harvest of adult bucks with number of hunters ($r = 0.965$) and hunter days ($r = 0.924$). Buck daily survival rates were lower on weekend days (0.89) than on week days (0.98) ($P \leq 0.001$) but doe survival was not significantly different between weekend and week days ($P \geq 0.136$). Survival of 2 1/2 year old bucks did not differ from bucks > 3 1/2 years old ($P \geq 0.45$).

ELK DISTRIBUTION AND DAILY MOVEMENTS IN THE DESERT OF SOUTHEASTERN IDAHO

DEBORAH C. STROHMEYER and J.M. PEEK, Wildlife Resources, University of Idaho, Moscow, ID 83843.

During the past several years, the number of elk residing on the Idaho National Engineering Laboratory has increased. These elk exist in non-traditional, sagebrush-dominated habitat. We began a radio-telemetry study in the spring of 1989. Summertime data indicate that elk cope with both the high desert temperatures and human disturbance by becoming more nocturnal. These elk appear to have larger home ranges than that found in other elk herds. Large home range sizes are partly explained by juxtaposition of resources.

HABITAT USE OF THE ROCKY MOUNTAIN BIGHORN SHEEP IN MORGAN CREEK, EAST-CENTRAL IDAHO

GINA L. BALLARD and J.M. PEEK, Wildlife Resources, University of Idaho, Moscow ID 83843.

Relocations of radio-collared bighorn sheep (Ovis canadensis) during 1989 and 1990 were used to determine sheep habitat use on the winter-spring range. Habitat use was significantly different between males and females for all variables measured. Management implications include the possible need for reevaluation of habitat enhancement and protection efforts based on these differences in habitat use between the sexes.

HABITAT CHARACTERISTICS OF SITES USED BY WINTERING SAGE GROUSE

MARK D. ROBERTSON, KERRY P. REESE, Wildlife Resources, University of Idaho, Moscow, ID 83843, and JACK CONNELLY Jr., Idaho Department of Fish and Game, Pocatello, ID 83204.

Habitat characteristics were measured at sage grouse (Centrocercus urophasianus) use and random sites during the winters of 1988, '89 and '90 in southeastern Idaho to determine attributes of winter habitat. Winters were mild during the first and last field seasons and the winter of '89 was considered moderate. Also, a prescribed fire in August of '89 modified a portion of the habitat prior to the winter of '90. Multivariate analysis of variance indicated numerous significant interactions ($P \leq 0.05$) between years, between use and random locations and between burned and unburned sites for vegetal and climatic variables. The major management implication is the need to redefine winter habitat based on conditions that exist during severe winters because vegetal characteristics of use sites are affected by varying snow depths.

PHEASANT NESTING ECOLOGY IN SOUTHERN IDAHO

DAVID FELLE and TOM MAEDER, Montana Cooperative Wildlife Research Unit, University of Montana, Missoula, MT.

Pheasant hens were transmittered at 3 locations in southern Idaho during the winter and spring of 1990. Data were collected on nesting success and brood survival. A total of 59 nests were located with 43% overall nesting success. Loss of nests occurred from predation (18% of total nests), irrigation

flooding (7%), alfalfa swathing (14%), abandonment (11%), and unknown causes (7%). Hay alfalfa and idle ground were most preferred nesting habitat but idle ground and grain habitats had the highest rate of successful nesting attempts. Data were also collected on nesting success of transplanted wild hen pheasants and brood habitat use.

PREDATION RATES ON ACTUAL AND SIMULATED NESTS OF COLUMBIAN SHARP-TAILED GROUSE IN SOUTHEASTERN IDAHO

ANTHONY D. APA and KERRY P. REESE, Wildlife Resources, University of Idaho, Moscow, ID 83843, and
JACK CONNELLY Jr., Idaho Department of Fish and Game, Pocatello, ID 83204.

In the spring of 1990 artificial nests were used to test the hypothesis that nest predation rate declines with distance from the lek. Nests were constructed and chicken eggs were placed in each nest around 4 active sharp-tailed grouse leks at 6 increasing distances from the lek and checked at night during 2 time periods, Phase I (late April to early May) and Phase II (mid- to late-June), and after 1, 3, 6, and 9 days of exposure. Microhabitat measurements were taken at actual and simulated nests. Daily survival rates of artificial nests were higher during Phase I than Phase II independent of distance from the lek and days of exposure. Survival increased with distance from leks and after the third day of exposure. No vegetation structure differences were found between artificial nest sites, therefore eliminating vegetation structure as a reason for differences in predation rate.

DISTRIBUTION AND STATUS OF FLAMMULATED OWLS (Otus flammeolus) ON THE SALMON NATIONAL FOREST

ERIC C. ATKINSON and MELONIE L. ATKINSON, Idaho Department of Fish and Game, Boise, ID 83707.

From early May to late July 1990, we conducted twenty nocturnal call surveys on the Salmon National Forest. Sixty-seven territorial male Flammulated Owls were located in Douglas fir, ponderosa pine, and mixed coniferous forest stands. These stands were multi-storied with some mature trees usually present. Additionally, the territories were often adjacent to more open areas such as old burns, grassy hillsides, natural clearings, or clearcuts. Density estimates ranged from 0-1.25 singing males /40 ha (ave. = 0.41). Densities were significantly lower on the Salmon and Cobalt Ranger Districts than on the North Fork Ranger District, roughly corresponding to south and north of the main Salmon River, respectively. Territorial males were clumped in their distribution with apparently suitable habitat unoccupied. Male Flammulated Owls were present by the second week of May. One nest cavity was discovered in a Douglas fir snag; the young fledged between 19 and 22 July.

RED-TAILED HAWK PREDATION ON SNAKES: THE EFFECTS OF WEATHER AND SNAKE ACTIVITY

SCOTT GROTHE, Department of Biological Sciences, Idaho State University, Pocatello, ID 83201.

Annual Summary. Snakes are important prey for red-tailed hawks (Buteo jamaicensis). In 1990, I examined the dynamics of red-tailed hawk predation on snakes during this raptors' nesting period on the Snake River Birds of Prey Area in southwestern Idaho. I measured the rate of hawk predation on snakes through direct observation of prey deliveries to 2 red-tailed hawk nests from 8 May to 21 June. I experimented with time-lapse photography of prey deliveries to determine if this method of observation would be viable. Body temperature and activity patterns of 5 gopher snakes (Pituophis melanoleucus) implanted with activity and temperature-sensitive radio transmitters were recorded from 25 April to 26 June with telemetry equipment. A weather station collected meteorological data from 15 April to 26 June for analysis of the effects of weather on snake activity and red-tailed hawk predation.

One hundred eighty-nine hrs of red-tailed hawk nest observations were made. Observed prey deliveries show that snakes made up 42% (30 of 72) of observed prey items delivered to the nest or eaten away from the nest by the adult hawks. These 30 snakes made up approximately 65% of the hawks' total observed diet biomass. Gopher snake activity and body temperature were recorded for 1785 hrs from 25 April to 26 June.

During the 1991 red-tailed hawk nesting season, data will be collected using methods previously described. I will then analyze the 1990 and 1991 data to determine: 1) How weather conditions and snake activity affect red-tailed hawk predation on snakes, and 2) How weather conditions affect species of prey and their times of delivery to the nest, and how this varies throughout the day and season.

FOOD HABITS OF THE LONG-EARED OWL IN SOUTHWESTERN IDAHO: SEASONAL CHANGES AND COMPARISONS OF DIETS OF ADULTS AND YOUNG

HELEN ULMSCHNEIDER, Raptor Research Center, Boise State University, Boise, ID 83725.

I analyzed 4638 prey items from Long-eared Owls in the Snake River Birds of Prey Area, Idaho, collected from March 1988 to December 1989. The most common prey taxa were Peromyscus maniculatus (36%), Perognathus parvus (23%), and Dipodomys ordii (23%). Dipodomys contributed the most biomass (38%). The proportions of Dipodomys and Peromyscus were highest in winter and spring, while Perognathus was highest in summer. Marks (1984) suggested that the shift to Perognathus in the summer was owing to juvenile hunters choosing smaller prey. This hypothesis was discounted on the basis of timing of the shift compared to telemetry data on the hunting behavior of juvenile owls.

NEST SITE CHARACTERISTICS OF NORTHERN SPOTTED OWLS IN SECOND GROWTH FORESTS OF NORTHWEST CALIFORNIA

LEE B. FOLLIARD, KERRY P. REESE, Department of Fish and Wildlife Resources, University of Idaho, Moscow ID 83843, and LOWELL V. DILLER, Simpson Timber Company, Arcata CA 95521.

Our objective is to describe nest site characteristics of northern spotted owls (Strix occidentalis caurina) in second growth forests of northwest California and to determine which factors may be important determinants of use. During the spring and summer of 1990, we located 165 northern spotted owls on privately-owned, second growth coastal forests. In some areas the habitat was highly fragmented by clear-cut logging practices. Of 50 pairs of owls intensively studied, 33 (66%) were found nesting and 73% (N=24) of them successfully fledged at least 1 owlet. We located 30 spotted owl nests, 27 of which were in second growth forest and the remaining 3 in patches of older trees (200+ years). Spotted owls used platform type nests most frequently (53%), followed by nests placed in tree deformities (47%), such as cavities and broken-tops. Nest trees were quite variable in size and ranged from young second growth to old residual trees. The average dbh and height of nest trees was 120 cm and 37.2 m, respectively. Twenty-two habitat variables were measured at nest sites and random sites to allow for statistical comparison. Univariate tests of habitat variables, thus far analyzed, show similar means for nest and random sites ($P > 0.05$). Preliminary analysis of the data using principal components analysis revealed nest site selection of a smaller subset of the available habitat structure within the nesting forest stand. Due to the favorable growing conditions of the coastal redwood zone, suitable spotted owl habitat probably regenerates more quickly after timber harvest than occurs in other regions of the birds' range.

BEHAVIOR OF NESTING PRAIRIE FALCONS (FALCO MEXICANUS).

A. HOLTHUIJZEN, Idaho Power Co., Environmental Affairs Dept., Boise, ID 83707.

From 1984 through 1987, 52 prairie falcon nesting attempts were observed in southwestern Idaho for 613 days. Nest sites were observed during preincubation (91 days), incubation (267 days), and brood rearing (255 days) until young were 35 days. Observations were made from sunrise to sunset. Mated pairs occupied nest sites and copulated up to 5 weeks prior to egg laying. Eggs were incubated 97% of the day after the 1st week of incubation, mostly by the female (63%). Females usually incubated at night. Brooding, mainly by the female, declined from 89% at hatch to 8% when the young were 15 days. The female brooded the young at night until they were 21 days. Males delivered 76% of all prey. Prey delivery rates by male falcons were about 4 times higher during brood rearing than during either preincubation or incubation. During preincubation males spent 63% of the day away from the nest site, declining to 42% during incubation, but increasing once more to 63% during brood rearing. In contrast, females spent 15% of the day away from the nest site during preincubation and incubation, but 54% during brood rearing.

NEST BOXES: WINDOWS INTO THE TROPHIC DYNAMICS OF FOREST OWLS.

GREG HAYWARD, University of Idaho, Moscow ID 83843, and ROGER ROSENTERER, Bureau of Land Management, Boise ID 83706.

Nest boxes provide an efficient tool to view the biology of forest-cavity dwellers and their prey. In central Idaho, a system of boxes established to monitor population trend of boreal owls has experienced high occupancy rates by a variety of wildlife. In 1990, 34.4% of the boxes were used by wildlife. Boreal owls used 5.3%, saw-whet owls 3.1%, flying squirrels 18%, and pine squirrels 8% of 437 boxes examined in June. Examination of contents of the nest boxes reveals a complex set of direct and indirect ecological interactions ranging from predation to mutualism. Our observations at nest boxes indicate ties between arboreal lichen, flying squirrel, red-backed vole, and owl populations. These relationships demonstrate the unexpected importance of lichens to boreal owl populations and hint at the importance of old growth forests and structural diversity to these wildlife species.

AN OVERVIEW OF SELKIRK GRIZZLY BEAR RESEARCH

WAYNE L. WAKKINEN, Idaho Department of Fish and Game, Bonners Ferry, ID 83805.

Grizzly bear research has been conducted in the Selkirk Mtns. of northern Idaho since 1983. Twenty-eight bears have been captured a total of 46 times. Selkirk bears use low elevation meadows during the spring, feeding primarily on new grasses and plant bulbs. They move to higher elevations in the summer, feeding on new plant growth, bulbs, and ground squirrels. Huckleberries provide the mainstay of the diet in late summer and early fall. Selkirk grizzlies den up in late October, and emerge in late March to April. Mean

litter size of the marked bears was 2.14 cubs. The youngest female known to reproduce was 7.5 years old. The median age of radio-marked bears in 1989 was 9.5 for males and 11.5 for females. Several marked bears are over 25 years old. Six of 8 mortalities have been attributed to illegal hunter-kill. Human-caused mortality may be a limiting factor to maintaining a self-sustaining population in the Selkirks. Future research will emphasize development of a non-intrusive population monitoring technique, and management will concentrate on habitat protection and access limitation.

BALD EAGLE POPULATIONS IN THE 7 WESTERN STATES: PROSPECTS FOR DOWNLISTING

KAREN STEENHOF, Raptor Research and Technical Assistance Center, Bureau of Land Management, Boise, ID 83705.

By 1990 the number of bald eagle nesting pairs in the 7-state Pacific Recovery region had reached 861, a 211% increase since 1985. The Recovery Plan's criteria for reclassification from endangered to threatened have been met, and 3 of 4 criteria for removal from the threatened/endangered category have been reached. Downlisting appears justified, but eagles are still "threatened" because 1) they are not well-distributed throughout the region; 2) productivity is depressed in certain areas; and 3) habitat is not yet secure. A decision to downlist should be accompanied by review and revision of the existing recovery plan, continued funding of research and annual monitoring, and more aggressive habitat protection.

ALTERNATIVE STRATEGIES OF WOLF RECOVERY IN CENTRAL IDAHO

JEFFREY J. YEO and JAMES M. PEEK, Wilderness Research Center and Department of Fish and Wildlife Resources, University of Idaho, Moscow, ID 83843.

We developed a policy analysis of 3 alternative strategies for recovering gray wolves in central Idaho. Biological and management implications of wolf recovery are discussed based on data from wolf ranges in Canada and the United States and simulation models of wolf predation on big game populations of western Montana and the Yellowstone ecosystem. The probable effects of wolf recovery on big game populations, livestock, timber harvest, recreation, and access management in central Idaho are presented.

DISTRIBUTION AND ECOLOGY OF HARLEQUIN DUCKS IN IDAHO

E. FRANCES CASSIRER, CRAIG R. GROVES, Idaho Department of Fish and Game, Nongame and Endangered Wildlife Program, Boise ID 83707, and RICHARD L. WALLEN, Resource Management, Grand Teton National Park, WY 83012.

Distribution and breeding ecology of harlequin ducks (Histrionicus histrionicus) in Idaho were studied from 1987 through 1990. Harlequins spent one to six months in Idaho, primarily between April and September. Harlequin ducks were observed or reported on 38 streams in northern, north-central and southeastern Idaho. Breeding was confirmed on 13 streams from the Lochsa River north to the Canadian border. Individually marked ducks exhibited fidelity to streams and mates. Body weight and average brood size in Idaho were similar to that observed in other Rocky Mountain populations but pair density and percent of pairs successfully breeding appeared to be low. In 1990 the Idaho population was probably less than 100 individuals.

HABITAT ASSOCIATIONS AND POPULATION TRENDS OF IDAHO'S NEOTROPICAL MIGRANT LAND BIRDS

VICTORIA SAAB, US Forest Service, Intermountain Research Station, Boise ID 83702.

Eighty-seven (36%) of Idaho's 241 breeding bird species are neotropical migrant land birds, those species that breed in North America and winter in tropical America. In recent years, there has been concern over apparent declines in some populations of neotropical migrants breeding in eastern North America. Data from the US Fish and Wildlife Service Breeding Bird Survey (BBS) from 1980-89, indicate that in Idaho 4 species have significant declines ($P < 0.05$), 22 have nonsignificant declines, and 21 have nonsignificant increases in their populations. Causes for the declines have been attributed to deforestation on their wintering grounds in the tropics and fragmentation of their breeding habitat in North America. Most of Idaho's migrant land birds are associated with riparian (52%), mixed woodlands (47%), and coniferous (37%) habitats, with some overlap among these 3 categories. Three of four species showing significant declines are associated with shrub-steppe habitat on their breeding grounds. The BBS is not particularly suited for monitoring population changes in forest interior or riparian associated species because the survey is conducted by vehicle on secondary roads.

POPULATION TRENDS OF IDAHO AMPHIBIANS AS DETERMINED BY MAIL QUESTIONNAIRE

CHUCK R. PETERSON, Department of Biological Sciences, Idaho State University, Pocatello ID 83204, and CRAIG R. GROVES, Nongame and Endangered Wildlife Program, Idaho Department of Fish and Game, Boise ID 83707.

Amphibian populations appear to be declining worldwide, particularly in western North America. Relatively little is known about amphibian populations

in Idaho. Consequently, in the summer of 1990, we sent out approximately 400 questionnaires requesting information of the distribution and population status of Idaho amphibians. The questionnaires were mailed to fisheries and wildlife biologists, land managers, conservation officers, academicians, and other interested persons throughout the state. Ninety questionnaires were returned and provided distributional data for all 15 species of Idaho amphibians, including observations of previously unknown localities for several species. About 35 of the respondents commented on population trends. Their remarks were based mostly on casual observations. Over 50% of the comments indicated decreases in population sizes; approximately 40% indicated stable populations; and less than 10% judged populations to be increasing. Northern leopard frogs (Rana pipiens) appear to be the most affected species. Many declines appear to have occurred within the past several years but declines over longer periods (e.g., 20 years) were also described. Drought was suggested as a probable cause of declines by seven respondents and habitat alteration by three others.

MIGRATING SHOREBIRD ABUNDANCE IN IDAHO

DANIEL TAYLOR and CHARLES TROST, Department of Biology, Idaho State University, Pocatello ID 83201.

Based on weekly counts at American Falls Reservoir and Lake Lowell during fall migration, and infrequent counts at other wetlands, most shorebird species were found to be much more abundant than previously recorded. The most abundant species was Western Sandpiper with over 10,000 sometimes found. Species found in the thousands included Killdeer, American Avocet, Baird's Sandpiper, Long-billed Dowitcher, and Wilson's Phalarope. Thirty-one other species were found in lesser numbers. The numbers of Killdeer, Lesser Golden-plover, Semipalmated Sandpiper, Baird's Sandpiper and Pectoral Sandpiper were among the largest known for the Intermountain West, and except for Killdeer, these were eastern species with large populations migrating through the Great Plains.

THE WINTERING AND FORAGING ECOLOGY OF THE TRUMPETER SWAN, HARRIMAN STATE PARK OF IDAHO

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During the 1987/1988 and 1988/1989 winters, Trumpeter Swan (Cygnus buccinator) and aquatic macrophyte abundance and distribution, as well as river ice formation and deformation, were quantified along a 14.9 km reach of the Henry's fork of the Snake River in southeast Idaho. I found significant differences in the distribution of total swans, adults and cygnets among 17 river sections. Collared Canadian Trumpeter Swans were not randomly distributed at the wintering ground, but consistently occupied river sections in east Harriman State Park, which suggests site tenacity as well as possible

social relationships among wintering Trumpeter Swan families and individuals for known feeding and roosting sites. Eight species of aquatic macrophytes were identified in the river sections using 1,171 samples along 68 transects. I found highly significant differences in percent cover among species and river sections. Ice formation at the wintering ground may affect swan roosting and feeding sites, concentrating them at springs or deep channeled river sections devoid of macrophytes. During December, January, and February 1988-89, low discharges from the Island Park Dam and consistent periods of below-zero air temperatures combined to freeze 94% of the wintering ground and restricted Trumpeter Swans from feeding on aquatic macrophytes. I collected 53 swan carcasses between 4 February and 25 April 1989. The swans are now concentrated in a few small wintering grounds. New learned winter migration paths must be fostered among successive generations along with adequate protection of current and future wintering grounds to protect the swans.

BEHAVIORAL RESPONSES OF NESTING TUNDRA SWANS TO HUMAN DISTURBANCE AND IMPLICATIONS FOR NEST PREDATION ON THE ARCTIC NATIONAL WILDLIFE REFUGE

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Tundra swan (Cygnus columbianus) populations have not declined as observed for trumpeter swans (C. buccinator) in the past 120 years, partly due to the remoteness of their arctic breeding grounds. With increased human activities on tundra swan nesting areas, associated with the petroleum industry, an assessment of the vulnerability of nesting swans to human disturbance is needed. During our study of tundra swans on the Arctic National Wildlife Refuge we found that swans are particularly sensitive to human disturbance during incubation. Swans frequently depart from their nests when observers were > 500 m away. Swans did not cover eggs with nest material prior to departure, making eggs more vulnerable to thermal stress and avian predation. Swans did not return to their nests while we were within view of the nest (often > 2 km for > 30 minutes). Over our 3-year study, avian predators (glaucous gulls [Larus hyperboreus] and jaeger spp. [Stercorarius spp.]) were suspected of 7 total clutch losses and 13 partial clutch losses. The frequency of avian predation on nests and the absence of egg covering suggests that disturbance during incubation may have a negative impact on swan reproduction.

THE IDAHO HABITAT IMPROVEMENT PROGRAM

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The Idaho Department of Fish and Game's Habitat Improvement Program (HIP) has now been active for just over 3 years. During this time public interest has been very high and 995 upland game bird and 493 waterfowl projects have been signed covering approximately 28,000 acres. These projects have included developing or protecting nesting cover (19,105 acres), food plots (2735

acres), winter cover (1720 acres), shallow water ponds (494 acres) and 1458 waterfowl nesting structures. Projects have developed habitat for pheasants (78% of total), gray partridge (51%), ducks (44%), quail (33%), geese (27%), chukar (6%) and 90% of the projects were on private land. Funds expended on projects have totalled approximately \$1,000,000 by the Department and \$1,000,000 by project cooperators. The cooperator figure includes only out-of-pocket costs and does not include the cost of the private landowner's labor or the cost of removing land from other income-producing uses. The dramatic decline of some upland game birds in Idaho was the original reason HIP was developed but improved communication and cooperation with private landowners has also been a major benefit to the Department and wildlife in Idaho.

STATUS OF PURPLE LOOSESTRIFE ON THE MIDDLE SNAKE RIVER

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Purple loosestrife (Lythrum salicaria), a perennial wetland plant recognized by its bright, magenta flowers, is a noxious weed that can displace native wetland habitat and can result in reduced productivity of waterfowl and aquatic furbearers. In August 1990, Idaho Power Company conducted a purple loosestrife survey along 77 miles of the Snake River in southwestern Idaho. Seventy-one populations were found; 82% of the populations consisted of ≤ 5 individuals. Because populations of purple loosestrife expand exponentially, wetlands in the study reach may be at risk. Control efforts undertaken by public and private landowners can maximize eradication if initiated promptly. Several states with serious infestation problems have initiated large-scale experimental control efforts that include a wide variety of eradication methods. To date, direct spraying appears to be the most effective means of repression for large areas. Land managers, weed control specialists, and private landowners need to work together to create a comprehensive strategy for purple loosestrife eradication and control while populations are containable and costs are minimal.

REDSTEM SEEDLING ESTABLISHMENT IN BRACKEN FERN ON THE WILLOW CREEK BURN

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We evaluated density of redstem ceanothus seedlings in three plot sizes and correlated this with density of bracken fern stems. Study area was the Willow Creek burn of September 1988, in the Fish Creek drainage of the Lochsa River. No inverse correlations between redstem seedling density and bracken fern density were found. Reasons for this are presented, and a discussion of plot size for monitoring this sort of vegetation is included. Implications of this work for monitoring vegetation response to habitat manipulations are discussed.

ASPEN STAND WATER DEVELOPMENT FOR WILDLIFE

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A new technology is being developed to obtain water from aspen stands to enhance wildlife habitat. The paper will present the preliminary results of this technology and provide topographical, vegetative and soils criteria for evaluating aspen stands to be developed. Benefits and costs are briefly discussed.