

# ABSTRACTS

## BIOLOGICAL SCIENCES – TERRESTRIAL

### ABSTRACTS OF THE 2006 ANNUAL MEETING OF THE MONTANA CHAPTER OF THE WILDLIFE SOCIETY

#### *WHO CAN BE TRUSTED WITH THE PUBLIC TRUST?*

FEBRUARY 21-24, 2006

HELENA, MONTANA

#### INTRODUCTION

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The Montana Chapter of The Wildlife Society is a professional society of resource managers, research scientists, educators, communications specialists, administrators and students. The principal objectives of The Wildlife Society are: (1) to develop and promote sound stewardship of wildlife resources and of the environments upon which wildlife and humans depend; (2) to undertake an active role in preventing human-induced environmental degradation; (3) to increase awareness and appreciation of wildlife values; and (4) to seek the highest standards in all activities of the wildlife profession. Society members are dedicated to sustainable management of wildlife resources and their habitats. Ecology is the primary scientific discipline of the wildlife profession, therefore, the interests of the Society embrace the interactions of all organisms with their natural environments. The Society recognizes that humans, as other organisms, have a total dependency upon the environment. It is the Society's belief also that wildlife, in its myriad forms, is basic to the maintenance of a human culture that provides quality living.

In an effort to explore our pledge to utilize the full extent of our professional expertise when addressing programs that have the potential to compromise what many generations of resource conservationists and managers have protected and passed to our custody, The Montana Chapter's 2006 Annual Meeting addressed the question, "Who Can Be Trusted With The Public Trust?" Our focus was on the North American Model of Wildlife Conservation. We were inspired to pursue this topic when the International Association of Fish and Wildlife Agencies (IAFWA) adopted a 'White Paper' entitled, The Value of the North American Model of Fish and Wildlife Conservation. This 'White Paper' relied on a wide variety of referenced material, and particularly on a paper titled Why Hunting Has Defined The North American Model of Wildlife Conservation, presented at the 66th North American Wildlife and Natural Resources Conference. Both of these papers distill the key components of the North American Model into seven basic principles. The first of the seven is: wildlife as a public trust resource.

Logic demanded that, since wildlife is a public trust, and those of us working for the public are the trustees then, the time had come for us to learn about the foundation of this relationship and our responsibilities as wildlife professionals. We have always simply accepted the fact that fish and wildlife in North America is a public rather than private

resource. However, as a matter of law and as a principle of importance, the rules and traditions of "wildlife as a public trust" were not presented to most of us in our training for the wildlife profession.

To that end, the Montana Chapter of The Wildlife Society dedicated its 2006 annual meeting to that topic. Montana may have been the first Chapter to address this issue. One of the authors of the IAFWA's 'White Paper' Joanna Prukop keyed our meeting and initiated the discussion of the history and value of this critical principle. A panel of experts further piqued our interest and challenged us to examine the concepts of Public Trust doctrine.

That wildlife that has been restored through the evolving force of the North American Model is once again drawing commercial interests back to capitalizing on the public's wildlife. Our diligence as wildlife professionals will continue to be tested as pressure to privatize wildlife is exerted. Our collective search for the foundational issues of our profession will continue to shape and strengthen us as wildlife professionals. To that end, the fascinating history of those who have established the framework for public ownership of wildlife deserves our continued attention. As members of the Montana Chapter of The Wildlife Society, we are resolved to help embed the principles of our trustee responsibilities as wildlife stewards into the missions and cultures of our agencies and organizations.

In addition to the plenary session, 28 scientific papers were presented, four working groups met, and two workshops were provided: "Weeds and Their Management – A Problem for Wildlife?", and "Hunting, Wildlife and Conservation in North America." The Honorable Pat Williams, nine-term Montana Congressman, addressed the Awards Banquet, and grounded our appreciation of the journey that natural resource conservation has taken through the political arena.

The Montana Chapter of The Wildlife Society herein provides the abstracts of its 2006 Annual Meeting with the intent of fostering exchange of ideas and information regarding wildlife sciences. Many of these abstracts reference ongoing research and management projects, and may include data that are not comprehensive or fully analyzed. Thus, these abstracts should not be cited in other works without permission of the author(s), whose contact information is provided. Our next annual meeting will be held 6-9 February 2007 at the GranTree Hotel in Bozeman, Montana, and will address: Developing Energy and Sustaining Natural Systems – How do we do it?

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## THE TALISMAN OF CONSERVATION

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There has been an awakening in the wildlife profession to the importance of the management practices that form the cornerstone of the North American Model of Restoration and Conservation. For too many years those of us working in this profession have taken for granted or have been ignorant of the fact that our social environment in the on-the-ground application of conservation is unique in the world. In Montana we are becoming increasingly aware of how extraordinary the people of this state are in finding practical and sound solutions to making wildlife fit on a landscape where people live, work, and recreate. Have you ever asked yourself what makes the North American Model tick in Montana? More importantly to all of us, have you ever asked yourself why Montana's application of the North American Model hasn't gone the way of neighboring states when it comes to population and habitat management? Montana's wildlife professionals have taken strong and effective stances on issues like pesticide applications, sagebrush control, ungulate [elk] feeding, land conservation, and other management practices such as population monitoring, wolf and bear management

plans, livestock grazing and so forth. Have these things happened because we are just that much better than other wildlife managers in other states, provinces, or countries? What impact has the U.S. Constitution had on our opportunities to do something different in the arena of conservation? Does it have to do with our Montana Constitution or our political heritage? What is the source of the passion in so many of our publics that they are compelled to simply show up and be heard? Is it the culture that we work in within the agencies? If so, how did it develop? Perhaps it is because we are the fourth largest state with a population under a million people, allowing a few to be more influential on decisions that effect restoration and conservation of species. Or, just maybe there is an unseen talisman at work, an obelisk representing something ancient and significant that has influenced the people, decisions, and politics? Does anyone know where the obelisk in Helena can be found that the Scottish Rite of Freemasonry likely erected in the process of making Helena the State's Capital and laying the cornerstone of its construction? Now be honest, talisman?, obelisk?, someone knows!

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## LENTIC HABITAT PATTERNS AND THE POPULATION STRUCTURE OF COLUMBIA SPOTTED FROGS IN SOUTHWESTERN MONTANA

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Beaver have long been recognized as animals with a unique ability to strongly alter their environment. historic pressure on beaver populations has altered the hydrology of many watersheds in southwestern Montana. At the same time amphibian populations dependent on lentic habitat in similar ecotypes are known or thought to be declining. While there are clearly multiple factors behind these declines, habitat fragmentation due to the loss of beaver-created habitat may be one of them. This study contrasts watersheds with and without beavers to investigate possible differences in habitat composition and configuration for pond-breeding amphibians. A database consisting of hundreds of randomly selected watersheds developed for monitoring lentic amphibian distribution was queried to examine the type, number, and distances between water bodies serving as potential breeding sites for Columbia spotted frogs (CSF). Beaver watersheds showed an increased number of lentic sites, CSF breeding sites, and surprisingly, an increased distance between CSF breeding sites. Three pairs of watersheds (beaver and non-beaver) were selected and tissue samples from all known CSF breeding sites were collected to examine differences in population structure. Individual samples were analyzed at eight microsatellite loci and estimates of mean population relatedness and genetic variation were inferred based on allele frequencies and heterozygosity. Levels of genetic variation within and between populations varied widely. Correlations between genetic variation and landscape composition and configuration were investigated.

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## FECUNDITY OF MONTANA WOLVERINES, 1986-2004

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Female reproductive tracts from wolverines harvested by trappers in Montana were examined for evidence of reproductive activity. Corpora luteal scars (CL) were used to determine potential fetus production for wolverines harvested within the state. CL counts were assessed and compared among the subpopulations described by Cegelski et.al. (2003) and between the northern and southern ecosystems of western Montana. Although statistically different ( $P < 0.05$ ) counts were not observed at the subpopulation level counts did differ between the two ecosystems. Variation in CL counts among subpopulations and between ecosystems was discussed.

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## JUST WHAT IS FAIR CHASE?

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Central to hunting in North America is the notion of fair chase. Aside from being safe and legal, hunters are also expected to be responsible and ethical. Within the framework set by laws and regulations, hunters are encouraged to voluntarily limit their actions to those that society finds acceptable. There are many suggestions and interpretations of what constitutes fair chase hunting, and most hunters consider themselves to be fair chase hunters. Yet, despite the central importance the concept has played in the history of recreational hunting and will play in its future, it's surprising how little the hunting community and state wildlife agencies have invested in developing this concept as a practical guide and ethical compass for hunters in the field. This void has led to a broadening of what constitutes acceptable hunter behavior in this country largely in response to advances in technology, science-based wildlife management, and the democratic ideal central to the North American model of wildlife conservation. Today, hunters and non-hunters alike lament the erosion of hunter behavior and ethics. The presenter attempts to define fair chase as a practical concept in hopes of advancing the use of it as a means to draw a distinction between practices that meet the standard of fair chase and those that don't. The presenter will include a discussion on the role of technology, the difference between what's legal versus what's ethical, and suggest criteria for determining whether a particular hunting method meets the standard of fair chase.

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## FACTORS AFFECTING NEST SURVIVAL OF THREE SPECIES OF MIGRANT SONGBIRDS IN THE GREATER YELLOWSTONE ECOSYSTEMS

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Throughout the Greater Yellowstone Ecosystem (GYE), low-elevation deciduous aspen and cottonwood habitats are sources of high net primary productivity and species richness. However, high rates of human population growth and accelerated expansion of rural development and agriculture at low elevations favor the presence of nest predators and parasitic Brown-headed Cowbirds (*Molothrus ater*). This may threaten Neotropical migrant songbirds, whose breeding populations may depend on the productivity of low-elevation deciduous habitats. We searched plots of aspen and cottonwood in varying proximities to residential development across southwestern Montana and adjoining portions of Idaho for nests of Dusky Flycatchers (*Empidonax oberholseri*), Warbling Vireos (*Vireo gilvus*), and Yellow Warblers (*Dendroica petechia*). Our objective was to evaluate nest survival of these species across nest-level, patch-level, and landscape-level spatial scales to gain a better understanding of patterns of nest success and failure throughout the GYE landscape. Data will be presented showing how multiple spatial scales influence the nest survival of these three species, and results for each species were compared.

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## EVALUATING THE BASIS FOR WILDLIFE HABITAT PREFERENCES: A CAUTIONARY TALE

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Understanding why wildlife species select particular habitats over others is critical for differentiating between habitats of different value for management. We assume habitat preferences to reflect where fitness components such as reproductive success are maximized. However, many studies conclude that habitat preferences are unrelated to reproductive success. In birds, for example, many studies report neutral or even negative relationships between preferred nesting habitats and nest success. One potential explanation for these mismatches may be due to a lack of a priori hypotheses about specific habitat attributes and why they should be important based on the ecology of the species. We tested two hypotheses for why microhabitat structure may influence rates of nest predation in a songbird species that breeds in Montana, the Brewer's Sparrow (*Spizella breweri*). Our spatially and temporally replicated data from natural nests as well as a microhabitat manipulation experiment show clear support for the hypothesis that nest predation is lower in areas where predators must search among a greater number of potential nest sites, and no support for the alternative hypothesis focusing on the total amount of foliage with nest patches. We emphasize the utility of specific, a priori hypotheses and experimental manipulations for uncovering why habitat attributes should influence fitness outcomes in studies of habitat selection.

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## EVALUATION THE PREY BASE FOR LYNX: SNOWSHOE HARE ABUNDANCE, HABITAT USE, AND POPULATION DYNAMICS IN GLACIER NATIONAL PARK

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Glacier National Park supports a population of the federally Threatened Canada lynx (*Lynx canadensis*). However, little is currently known about their principal prey, snowshoe hares (*Lepus americanus*), in Glacier that makes it difficult to assess which habitats in the Park may be suitable for lynx. Understanding two particular habitat patterns in Glacier would be especially insightful in providing information for management decisions involving lynx. First, snowshoe hare responses to post-fire regeneration are not well known; yet fires are a regular occurrence in parts of West Glacier. Second, many more lynx have been documented in the patchy forest habitats of East Glacier than in the mosaic of mature and post-fire regenerating stands in West Glacier. It is not known whether snowshoe hare populations show a similar distribution in the Park. In summer 2005 we implemented a 3-year study on snowshoe hare abundance, distribution, and habitat use in Glacier, relying in part on a non-invasive genetic sampling approach that could be of general benefit initiating monitoring programs in National Parks. Our preliminary data suggest that snowshoe hare populations in Glacier National Park are highly concentrated in the southern third of the Park and occur in very low densities elsewhere. Park areas affected by the 1988 Red Bench fire and more recent fires show limited forest regeneration and do not appear to support current snowshoe hare populations. A non-invasive genetic sampling approach shows some promise for providing better hare density estimates compared to live-trapping methods in areas of low hare densities (<0.3 hares/ha).

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## FLAMMULATED OWL DISTRIBUTION AND DETECTIONS IN MONTANA: RESULTS FROM A REGION-WIDE SURVEY

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The Flammulated Owl is a Montana Species of Concern and a Sensitive Species for the USDA Forest Service (USFS). Prior to summer 2005, this species of owl had not been systematically surveyed across the forested landscapes of Montana, and there have been questions about the extent of its distribution. This past summer, the Avian Science Center and the USFS used GIS modeling to locate survey areas in potential habitat on 12 Forests in Montana and North Idaho and then surveyed for owls using broadcast calls. We set up and ran 267 survey routes and detected almost 250 unique owls. Approximately 2/3 of the owls were detected only after playing the calls. We found Flammulated Owls on all but three forests (Gallatin, Lewis and Clark and Custer National Forests), and located them in a number of new areas. For example, we found 41 owls on the Helena Nation Forest where previously there were few records. For those Forests with owls, the probability of presence on a transect (adjusted for detection) varied from 12 percent to 75 percent. We also examined habitat characteristics surrounding the survey routes. All detections and non-detections are mapped and available for viewing on our new ArcIMS web site [http://avianscience.dbs.umt.edu/arcims\\_info.htm](http://avianscience.dbs.umt.edu/arcims_info.htm). Through this past season's efforts we have developed a Flammulated Owl protocol for future survey work.

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## BIRDS ALTER HABITAT SELECTION AND PARENTAL CARE BEHAVIORS IN RESPONSE TO EXPERIMENTALLY REDUCED NEST PREDATION RISK

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Avian life history theory has long assumed that nest predation plays a minor role in shaping reproductive strategies. Yet, this assumption remains conspicuously untested by broad experiments that alter environmental risk of nest predation, despite the fact that nest predation is a major source of reproductive failure. We examined whether parents can assess experimentally reduced nest predation risk, preferentially settle in safer environments, and adjust their reproductive strategies to maximize their fitness in these environments. We experimentally reduced nest predation risk and show that 8 species of migratory passerines prefer to nest in areas with reduced risk of nest predation. Parents of 12 species of passerines nesting in these safer environments increased investment in their young through increased egg size, clutch mass, and the rate they fed nestlings, and they also increased investment in female condition by increasing the rates that males fed incubating females at the nest, and decreasing the time that females spent incubating. These results demonstrate that birds can assess nest predation risk at large and that nest predation plays a key role in the expression of avian habitat selection and reproductive strategies.

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## YELLOWSTONE BISON POPULATION DYNAMICS: AN INTEGRATED ANALYSIS

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Rigorous vital rate estimation is essential to parameterize population models to gain ecological and management insights. Bison in Yellowstone National Park (YNP) have increased from just 46 in 1902 to nearly 5000 today, but this conservation success is overshadowed by controversy. YNP bison are infected with brucellosis, and the State of Montana is concerned about potential economic consequences if domestic livestock outside YNP contracted the disease. To understand drivers of bison population dynamics and potential effects of vaccination programs, we evaluated a Leslie matrix model parameterized with survival and reproduction estimates from 7 years of telemetry studies (1995-2001). We also analyzed 28 years of early-season calf:adult ratios (1970-1997) and 9 years of late-season calf:adult ratios (1997-2005). Covariates considered included snowpack, drought, elk, and bison density. Adult female survival was high (0.96) and static. Birth rates varied by brucellosis exposure and age structure, with lower birth rates in primiparous individuals. Early- and late-season calf:adult ratios were negatively correlated with snowpack ( $r^2 = 0.26-0.60$ ,  $P < 0.05$ ). Integrating these vital rates into a matrix model resulted in a growth rate estimate of  $\lambda = 1.10$ ,

closely corroborating an estimate of  $\lambda=1.09$  from count data.  $\lambda$  was highly elastic to adult survival (0.52), moderately elastic to juvenile survival (0.36), and slightly elastic to fecundity (0.12). Simulating the effects of brucellosis eradication through vaccination programs resulted in  $\lambda=1.13$ , roughly a 3% increase. We concluded brucellosis eradication could further increase bison population growth rates and potentially exacerbate conflicts outside YNP.

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## THE MADISON-FIREHOLE ELK HERD: SWITCHING FROM BOTTOM-UP TO TOP-DOWN REGULATION?

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Understanding the relative strength of resource limitation (bottom-up) and predation (top-down) in regulating populations is a prominent research theme in ecology. This question is particularly relevant for areas such as the northern Rockies where society generally supports large predator restoration efforts, but also demands robust ungulate populations. We conducted a 15-year, telemetry-based study (>380 animal years) of the nonmigratory Madison-Firehole elk (*Cervus elaphus*) herd, which inhabits the west-central portion of Yellowstone National Park, to gain insight into these population processes without the confounding effects of human harvest. Prior to wolf (*Canis lupus*) colonization (1991-1997) there was little annual variation in reproduction (0.83-0.96, CV = 0.06) or survival (0.81-1.00, CV = 0.08) for adult females, but recruitment was highly variable (<1-38 calves/100cows, CV = 0.73). Nearly all documented mortality was starvation, with snowpack severity explaining much of this variation. Population estimates during 1965-1997 fluctuated near a dynamic equilibrium of approximately 600 animals, leading us to conclude that the herd was strongly bottom-up regulated prior to wolf restoration. Following wolf colonization (1998-2004), starvation was extremely rare and predation became the overwhelming cause of mortality. Survival and recruitment rates decreased substantially (after accounting for the effects of winter severity), suggesting a significant component of wolf predation was additive. This top-down influence of wolf predation is contributing to decreasing elk numbers and, likely, a substantially lower equilibrium density for elk.

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## HABITAT SUITABILITY FOR THE COLUMBIAN SHARP-TAILED GROUSE ON THE FLATHEAD INDIAN RESERVATION

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The Columbian sharp-tailed grouse (*Tympanuchus phasianellus columbianus*) is an important species to the Salish, Pend O'reille and Kootenai people that has suffered tremendous declines over the past century with 1978 being the last documented recording on tribal lands. An understanding of the quantity and quality of Columbian sharp-tailed grouse (CSTGR) habitat on tribal lands is critical in order to increase the probability of successful reintroduction of this species. Presently, we have completed a habitat assessment of Ferry



Basin using a hybrid approach of field data collection and a combination of several remote sensing platforms. Riparian draws were delineated using high resolution 1m/4m multi-spectral spring IKONOS imagery. Grasslands systems were delineated using multi-temporal (spring, summer, and fall) 15m ASTER imagery. The fused product was then used as inputs into existing habitat suitability index (HSI) models to determine the amount and quality of habitat that is available on Flathead Indian Reservation. The most suitable habitats had areas and HSI values that ranged from 738 ha above 0.3 to 1603 ha above 0.4 across the models used. Current habitat and management does not warrant reintroduction of CSTGR without implementing a restoration plan.

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## FALL MIGRATION OF COMMON LOONS AFTER STAGING ON FLATHEAD LAKE

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Each year hundreds of common loons (*Gavia immer*) stage on Flathead Lake during their fall migration. Banding data has provided information on winter locations and a few stop locations in between. Documenting the timing, route, duration and destinations are goals of this project. In October 2005 four adults were captured and surgically implanted with intra-abdominal Argos PTT-100 satellite transmitters (Microwave Telemetry, Inc.). Modifications of each PTT included doubling the battery capacity and fusing attachment materials to the exterior (final weight 65g). Transmitter duty cycles were 8 hours on and 26 hours off during the first six weeks to intensely monitor migration timing. Along with the PTTs, each bird was banded with USDI Fish and Wildlife Service and color bands. Updated information on loon movements was made accessible by using Satellite Tracking and Analysis Tool (STAT). After release, each individual occupied separate locations of Flathead Lake. While one loon departed within the first week after surgery, three individuals remained on Flathead Lake until early November. These final three loons left Flathead Lake within a 24-hour period coinciding with the first snowfall in the Mission Valley. Two general routes have led to four separate winter locations. Total displacement ranged between 1070 and 2587 km for each of the loons. Each transmitter should remain in operation for the next fourteen months.

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## BREEDING ECOLOGY OF COMMON LOONS IN NORTHWEST MONTANA

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Northwest Montana is home to the largest population of breeding Common Loons (*Gavia immer*) west of the Mississippi River. Montana Fish, Wildlife and Parks' annual loon day surveys show that the population consists of ~150-200 adults, including breeding adults and non-nesting birds, which produce ~30 to 50 chicks annually. Montana's Common Loon population exists along the extreme southern fringe of the species range in the western United States. Recreational use and home building on loon nesting lakes in northwest Montana has increased significantly in the last decade. The potential impacts of these habitat changes to Common Loon nest survival and chick survival are uncertain. To better understand how

human disturbance and natural habitat variability are affecting nest survival and chick survival we intensively monitored Common Loon nesting attempts during two consecutive field seasons. Most current loon research has focused on habitat aspects specific to nest sites and chick rearing areas. We collected physical habitat data and development/recreation data not only at the nest-level scale but also at the lake- and landscape-level scales. Results and their implications for management will be presented.

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## EFFECTS OF POST-FIRE FUELS TREATMENTS ON VERTEBRATE COMMUNITIES IN SOUTHEASTERN MONTANA

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Federal policy calls for the removal of coarse woody debris (CWD) following forest wildfire in an attempt to reduce fire hazard. Many small mammal and cavity nesting bird species rely on CWD for cover, foraging habitat, and breeding sites in the post-fire environment. The response of small vertebrates to the removal of CWD is unknown. We investigated how post-fire salvage logging in a southeastern Montana ponderosa pine (*Pinus ponderosa*) forest affected small mammal and cavity-nesting bird populations in 2004 and 2005. We used point counts and distance sampling methods to estimate the density of cavity nesting birds on control ( $n = 16$ ), salvage ( $n = 19$ ), and reforestation ( $n = 8$ ) treatments. We also used Mayfield estimates to compare nest survival of cavity nesting birds between control ( $n = 2$ ) and salvage ( $n = 2$ ) treatments. We used live traps arranged in trapping webs ( $r = 130$  m) to estimate density on control ( $n = 2$ ), salvage ( $n = 2$ ), and reforestation ( $n = 2$ ) treatments using distance sampling methods. Small mammal density was greatest on the reforestation treatment in both years. Small mammals may have benefited from higher volume of ground CWD created by harvest operations. Density of cavity nesters was greatest on the control treatment. Nest survival was similar between treatments, but abundance of active cavities was greater on the control treatment where average snag size was larger. Small vertebrates appear to require CWD and adequate amounts should be retained following wild fire to maintain populations.

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## A LONGITUDINAL STUDY OF PROSPECT HILL VIRUS PREVALENCE IN MICROTUS POPULATIONS IN MONTANA

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Prospect Hill virus is a strain of hantavirus carried by meadow voles. As yet, no clinical disease has been described for the virus although antibodies to PHV have been found in humans. To improve our understanding of this virus and its potential effects on *Microtus* populations, we conducted studies of population dynamics and PHV antibody prevalence in *Microtus* populations for 11 years on 12 mark-recapture grids in Montana. Monthly numbers of *Microtus* ranged from zero to over eighty on 1 hectare grids. PHV antibody averaged about 11 percent. *Microtus* populations occurred sporadically alternately diapering from grids and then reappearing in high densities. *Microtus* were always sympatric deer mice (*Peromyscus maniculatus*) that carry Sin Nombre virus that can infect humans.

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## UNDERSTANDING THE INTERACTIONS OF POPULATION ECOLOGY, DISPERSAL AND MAINTENANCE OF HANTAVIRUS (SIN NOMBRE VIRUS) INFECTION IN DEER MICE

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The deer mouse (*Peromyscus maniculatus*)-Sin Nombre Virus (SNV) system provides an excellent opportunity to develop specific models that will be useful in explaining rodent-borne disease ecology as well as human exposure risk in other systems. Descriptive data concerning population dynamics and habitat associations are crucial to provide the input for a predictive model. However, little data exists related to dispersal among sylvan deer mouse populations, especially in association with SNV. Through dispersal, deer mice enter peridomestic settings and move SNV among populations. In June 2004, sylvan dispersal experiments were initiated (in coordination with experimental studies on dispersal into peridomestic settings) in anticipation of acquiring data related to sylvan deer mouse dispersal as related to SNV. Experiments were conducted at two locations in Montana where pairs of trapping grids (100 traps, 1 ha in size) are located through an on-going Centers for Disease Control and Prevention (CDC) sponsored longitudinal hantavirus study. Ten trap lines (25 traps/line, 360m long) were run at evenly spaced intervals perpendicular to the paired grids. Trapping between grids provides one way of assessing (minimum estimate) dispersal from each of the two grids and allows us to describe characteristics of animals leaving the grids and their antibody prevalence. From June 2004 through October 2005, > 21,700 trap nights were conducted at the Cascade and Polson trap sites. Over 2200 small mammals were captured, including over 150 dispersing deer mice (7%). Although not definitive, initial results indicated that dispersing individuals have a propensity to be adult males, which corresponds to biases that have been associated with SNV antibody positive deer mice.

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## STATUS OF SWIFT FOX IN NORTH EASTERN MONTANA; PRELIMINARY RESULTS OF THE 2005/2006 INTERNATIONAL SWIFT FOX CENSUS

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Swift fox (*Vulpes velox*) historically ranged throughout eastern Montana. However, their numbers were substantially reduced in the early part of the twentieth century and the species was declared extinct in Montana in 1969. Captive raised and translocated wild-born foxes were released annually on the Canadian prairies adjacent to Montana from 1983 through 1997. Reports of swift fox south of the Canadian border and documented swift fox reproduction in Montana led to a cooperative census of the species between Canadian partners and Montana during the winter of 2000/01. The cooperative census was repeated in 2005-2006. The Montana study area included 80 townships and 104 townships north of the Milk River extending from Havre to Opheim in 2000-20001 and 2005-2006, respectively. A single transect consisting of six Tomahawk live traps placed at one-kilometer intervals was set in each township. Traps were set at dusk, checked at midnight and checked and tripped at dawn.

Each transect was run for three consecutive nights. Trapped foxes were transferred to handling bags, manually restrained, morphological data and hair samples collected. Trapping began in November and ended in February during both censuses. Sixty-six townships in 2000/01 census and 91 townships in 2005/06 were surveyed for swift fox. In 2000/01, a total of 1188 trapnights resulted in the capture of 38 different swift fox (31 trapnights/fox or 3.2 foxes/100 trapnights). The total population occupying the Montana study area was estimated at 221 swift foxes. Preliminary results of the 2005-2006 census were presented.

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## SAGE GROUSE WINTER FEEDING SITE SELECTION: DOES PLANT CHEMISTRY MATTER?

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Greater sage grouse (*Centrocercus urophasianus*) are associated with sagebrush (*Artemisia* spp.) throughout the year for both cover and food, but dietary specialization is a major reason why sage grouse survival is so closely linked to available sagebrush habitat. Sagebrush constitutes almost 100 percent of their diet during the winter. Compared to alternate winter forages (such as dried grasses), sagebrush leaves are relatively high in crude protein content. However, it is also highly defended by compounds such as the volatile oils that give sagebrush its distinctive smell. Unlike other grouse, sage grouse lack a muscular grinding gizzard, which may be an adaptation to limit the release of plant defensive compounds that are stored in glandular trichomes on the leaf surface. Unlike ruminant mammals, avian herbivores are constrained by body size and weight requirements for flight, and so lack large digestive structures to efficiently digest leaves. For sage grouse, the lack of mechanical disruption of leaves in the gizzard in addition to detoxification costs associated with plant secondary compounds may further reduce digestive efficiency. Yet, despite these challenges, sage grouse juveniles continue to grow over the winter and adults maintain body mass even in areas known for harsh conditions. The goal of this study was to determine if sage grouse were selectively feeding in winter on sagebrush plants with higher protein levels and lower levels of defensive compounds. In collaboration with a winter demography study, sage grouse hens were radio-collared in the spring and fall of 2004. Each month from October 2004 to March 2005, I randomly selected a sub-group of those hens to follow to feeding sites. At those sites and at randomly selected available sites, I recorded slope, sagebrush cover and height, and collected sagebrush leaf samples that were later analyzed for fiber, crude protein, and monoterpene content. It may be that sage grouse do so well on a strict sagebrush diet by simply choosing to feed at sites with nutritionally higher quality sagebrush.

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## ROOST-SITE SELECTION AND POTENTIAL PREY SOURCES AFTER WILDLAND FIRE FOR TWO INSECTIVOROUS BATS IN WESTERN MONTANA

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Wildland fire creates a unique habitat used by a diverse range of organisms. Improper post-fire management of public land can eliminate the positive benefits of fire to wildlife. This research focused on characterizing roost sites at multiple spatial scales and sampling potential prey sources for two insectivorous bat species, the little brown bat (*Myotis lucifugus*) and the long-eared Myotis (*Myotis evotis*), in recently burned forest. Wildland fire seems to create a superabundance of roosting sites and insect prey. Removing trees, important roost structures, may decrease both mammalian and avian insect predators for the apparent insect explosion one-year post fire. This research will give land managers an important tool for retaining the forest elements essential for bats and minimize any negative impacts to bats in post-fire management plans.

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## EFFECTS OF HUNTING ON SAGE GROUSE POPULATION DYNAMICS: AN UPDATE FROM A CASE STUDY IN SOUTH-CENTRAL MONTANA

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Sage grouse (*Centrocercus urophasianus*) have been extirpated in five states and one province, and their populations have reportedly declined over the remainder of their historical range. Much research has been conducted to determine rates of their reproduction and survival, but the effects of hunting on population dynamics has been less studied. Both additive and compensatory mortality hypotheses have been suggested for sage grouse, but compelling evidence for either hypothesis is lacking. To assess the effect of harvest on population dynamics and the relationship between harvest and these competing hypotheses, we radio-marked and monitored sage grouse on two sites, one open and one closed to hunting, in south-central Montana from spring 2003 through the end of the sage grouse harvest season in 2005. We monitored the level, timing, and, whenever possible, the causes of female mortality each year. We also monitored reproductive effort and success in these birds. This allowed us to compare productivity between the two sites, which will especially be of interest should we find evidence that density was reduced by harvest on the hunted site. Preliminary results were presented regarding the levels of female mortality during hunting season, breeding effort and success, and overall mortality of females for all three years of the study. Possible explanations for the absence of hunter-bagged radio-marked birds were discussed.

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## GETTING TO KNOW YOU: GRAY WOLVES IN MONTANA AND THE FWP PROGRAM

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In 2005, Montana Fish, Wildlife & Parks and the USDI Fish and Wildlife Service finalized a cooperative agreement that paved the way for FWP to begin implementing as much of the state's approved wolf plan as allowed by federal regulations. Agency-wide the transition has been underway for over a year. Part of the effort has been to learn more about basic wolf ecology and pack dynamics in Montana by summarizing monitoring information collected over the last 20 years. Data will be presented on average pack sizes through time, pack tenure, wolf mortality in 2005, territory characteristics, diseases documented, differences between northwest and southwest Montana, and livestock depredations. Other FWP program activities will be summarized.

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## RESULTS FROM PASSIVE AND BROADCAST SURVEYS FOR BLACK-BACKED AND THREE-TOED WOODPECKERS

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Black-backed and Three-toed Woodpeckers are inconspicuous, relatively uncommon species that are frequently associated with, and may even depend on, burned forest. Obtaining sufficient sample sizes in order to understand the pre and post-fire conditions needed by these and other fire-dependent species is a persistent problem, and so in 2005 we used both passive and broadcast acoustical surveys to detect woodpeckers. Passive surveys consisted of 10-minute point counts and broadcast surveys consisted of playing the drum and call sequence for both Black-backed and Three-toed Woodpeckers. We visited forested areas burned by 15 individual fires in the late summer of 2003 on four National Forests and Glacier National Park. We detected a total 190 Black-backed Woodpeckers and 229 Three-toed Woodpeckers across 1388 sampled points. While Black-backed and Three-toed Woodpeckers were detected on a similar proportion of points surveyed with either point counts or broadcast surveys, both species were detected on a higher proportion of points at the subset of 241 points where we

conducted both types of surveys. Further, at those points where we first conducted a point count and then followed up with a broadcast survey, over 50 percent of detections were picked up only by the playback survey. These results suggest that broadcast surveys do increase the likelihood of detecting these rare woodpeckers, when they are present.

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## A NON-INTRUSIVE, ALTERNATIVE METHOD FOR ASSESSING CHICK SURVIVAL IN GREAT SAGE GROUSE

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Accurate measurement of key vital rates is essential for assessing and mitigating human impacts on populations of sensitive and declining species. Concern for greater sage grouse (*Centrocercus urophasianus*) in the face of historical population declines and continuing threats to the birds and their habitat has prompted extensive research into this species' demography. Although recruitment is thought to be a limiting factor in some sage grouse populations, few estimates of chick survival for this species are available. Two major techniques have been used to assess chick survival: daytime flush counts and radio-marking. Here, we present and describe a third non-intrusive alternative: spotlight counts on brood hens. We used both spotlight counts and daytime flush counts to assess survival of sage grouse chicks and broods in the Powder River Basin over the three years 2003-2005. Because of differences in how sage grouse chicks behave during the day and at night, detectability of chicks tends to be higher at night. Spotlight counts and spotlight and flush counts in combination both resulted in higher estimates of chick and brood survival at 35 days than flush counts alone. We encourage future studies of sage grouse to incorporate spotlighting as a new technique for measuring chick and brood survival. We discuss pros and cons of the three methods and additional research that would improve our understanding of chick and juvenile survival in sage grouse.

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## HABITAT USE AND SURVIVAL OF MALE GREATER SAGE GROUSE IN SOUTHWESTERN MONTANA

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Greater sage grouse (*Centrocercus urophasianus*), the largest North American grouse species, can be found in sagebrush habitats throughout the western United States. However, for much of the 20th century, sage grouse populations have been declining over their entire range. Conversion and degradation of sage grouse habitat likely contribute most to sage grouse population declines. For this reason, management agencies must know key habitats used by sage grouse. This study was undertaken to better understand the habitat needs and survival rate of male sage grouse in southwestern Montana. Radio telemetry was used to monitor marked birds and obtain locations for habitat measurements. Actual use and random available vegetation plots were measured using standard vegetation sampling methods, i.e., line-intercept and Daubenmire methods. Preliminary results were presented.

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## WOVERINE REPRODUCTIVE DEN AND KIT RENDEZVOUS SITES IN GLACIER NATIONAL PARK, MONTANA

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In addition to natal and maternal den sites, successful wolverine (*Gulo gulo*) reproduction requires refugia for kit security as females forage and/or mate in areas away from their dependant offspring. These refugia, or rendezvous sites, may provide kits with protection from predation and thermal loss. During summer 2004, we followed 2 transmittered kits as they moved within their mother's core home range to various rendezvous sites in the alpine/subalpine ecotone of Glacier National Park, Montana. The two male kits were instrumented on 6 May 2004 after locating them with their mother at a maternal den. Subsequent locations of kits found that the female had cached them in various structures including downed trees, boulder talus, glacial moraine, and broken cliffs. We documented 10 such sites during 5 months (7 May-22 Sep) of monitoring. GIS and LandSat attributes were analyzed for each site and results are presented to include: aspect, elevation, ground cover, slope, habitat type, structure type and distance to avalanche. Similar analysis was also performed for two natal and three maternal dens. Photos of den and rendezvous sites are presented. Additional time budget analysis covering 12 hrs (0800-2000) of active transmitter duty for the same 5-month period showed the female's attendance to kits fluctuated on a 3-4 hr cycle. Dispersal movement of two subadult male wolverine is discussed and preliminary fine-scale GPS location data are presented.

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## HISTORY OF COLUMBIAN SHARP-TAILED GROUSE IN THE TOBACCO VALLEY, MONTANA

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The first written records of sharp-tailed grouse (*Tympanuchus phasianellus columbianus*) in the Tobacco Valley in northwest Montana appear in 1861 with a gap until the 1920's. Long-time local residents have memories of abundant sharp-tails in the first half of the 1900's. Montana Fish, Wildlife and Parks records begin in 1960. Lek surveys documented a steady decline from 1976-1987 when only three males danced on one lek. Beginning in 1987, restoration efforts began as a cooperative effort among local interested individuals, The Nature Conservancy, Montana Natural Heritage Program, Montana Fish Wildlife and Parks, British Columbia Ministry of Environment, and USDA Forest Service. Between 1987 and 1997, 139 sharp-tails were transplanted to the Tobacco Valley from two locations in British Columbia and 1 in Idaho. Capture, transport, and release techniques are presented. Transplanted birds from British Columbia had satisfactory survival rates and resulted in higher counts on leks. A variety of reasons led to the cessation of transplant efforts. The last lek activity was observed in 2000 although birds were occasionally reported over the next few years. Habitat conservation efforts have been limited.