

ABSTRACTS

BIOLOGICAL SCIENCES - TERRESTRIAL

RESPONSE OF BITTERBRUSH AND SCOULER'S WILLOW TO A SHELTERWOOD HARVEST AND PRESCRIBED BURN IN WESTERN MONTANA ^{TWS}

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In western Montana, fire suppression and selective logging in ponderosa pine (*Pinus ponderosa*) stands have resulted in conditions more conducive for shade-tolerant Douglas-fir (*Pseudotsuga menziesii*). This increase in tree density has changed the multi-resource values of these stands and altered ecosystem functions. To recreate park-like stands of ponderosa pine, shelterwood cutting and understory prescribed burning have been used as surrogates for pre-settlement ecological processes in the Lick Creek drainage of the Bitterroot Mountains, Montana. This paper, specifically, describes the response of the dominant browse species, antelope bitterbrush (*Purshia tridentata*) and Scouler's willow (*Salix scouleriana*),

following a fall shelterwood cut and spring prescribed burn. On a 50 ha site, the survival, vigor and browsing intensity of 1,856 bitterbrush and 871 willow were monitored for 2 years following a fall shelterwood cut and 2 spring burn treatments. Mortality related to mechanical damage associated with the shelterwood cut was 35 percent for bitterbrush and 13 percent for willow. Mortality related to fire damage was 72 percent for bitterbrush and 19 percent for willow. Vigor was highest for bitterbrush in the logged-only treatment, whereas willow was most vigorous in the logged and burned treatments. Preferential use by wild ungulates was observed on willow in the burn units and on bitterbrush in the shelterwood harvest units.

SUSTAINING ELK ON THE ROCKY MOUNTAIN FRONT: THE IMPORTANCE OF PRIVATE LANDS ^{TWS}

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Theodore Roosevelt Memorial
Ranch plays an important role in the

distribution of elk on the Rocky
Mountain Front, Montana. The ranch is

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^{MAS} Montana Academy of Sciences, Helena, MT, April 1995

^{TWS} Montana Chapter of the Wildlife Society, Billings, MT, March 1995

^{AFS} Montana Chapter of the American Fisheries Society, Chico Hot Springs, MT, February 1995

managed as a working cattle operation. The difference in seasonal distribution of cattle and elk allows both ungulate species to use the ranch with a minimum of competition for forage. Both the historic creation of state-managed winter ranges, current land use practices on private lands, and a conservative hunting regime have helped establish a healthy elk herd of about 500 animals north of the Teton River. Without extensive use of private lands, current elk numbers could not be maintained because public lands lack suitable winter habitats. The value of private lands as elk habitat is primarily a function of the type of land use. Livestock grazing managed below the full capability of the land to support a cattle operation throughout the year provide the most valuable elk habitat in this region. This form of ranching maintains healthy and productive grasslands that provide quality forage for both livestock and elk. Heavy use by both domestic and wild ungulates, however, has the potential to cause local

overuse that subsequently may result in a reduction in quality grasslands. Sportsmen's dollars have traditionally been spent to help purchase lands on the Rocky Mountain Front to preserve habitat for elk. On these lands, modern management practices include the use of cattle to maintain quality forage production for elk. This management strategy could also be applied to existing ranching operations and may accomplish similar results without the initial cost of land purchase. Such a conservation strategy, however, requires close cooperation between private landowners and the state wildlife management agency. Some form of compensation may be necessary to provide the incentive to initiate cooperation with some private landowners. Compensation could include an expansion of the existing landowner preference program for hunting permits or tax reductions for good stewardship programs of natural resources, among others.

BREEDING BIRD COMMUNITY EFFECTS OF BIG GAME HABITAT ENHANCEMENT IN LODGEPOLE AND PONDEROSA PINE FORESTS^{1MS}

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Point counts and cursory habitat surveys are being used to describe bird communities in forest stands being treated to increase forage production for big game. Our primary objectives are to describe and compare the presence, frequency and relative abundance of breeding species to habitat features in treated and untreated stands in order that we might better plan future efforts to meet a broader range of wildlife needs. Small (<8 ha) timber sale units in seral lodgepole pine/western larch stands along Hungry Horse Reservoir

(Flathead NF) are being harvested and burned to produce shrubfields for elk forage production. Paired treatment/control points are being surveyed with 4 replicate counts per year. These units are primarily seed-tree or shelterwood cuts with retention of larger Douglas-fir, larch, and snags. We have collected 2 years of data, primarily pre- and immediately post-treatment. Along Lake Koocanusa (Kootenai NF), we are sampling in >100 larger (10-150 ha) treatment units of various (pre- and post-treatment) ages. These are

primarily in ponderosa pine/ Douglas-fir stands treated through combinations of overstory and understory removal and prescribed fire. Study design will allow comparison of the trade-offs between 5- and 10-min point counts, and 1-4 replications. This

monitoring work is part of our wildlife mitigation package for the habitat losses at these two hydroelectric facilities. We hope to add a nesting/ production component to this project within the next 2 years.

NATURAL AND EXPERIMENTAL PREVALENCE OF *FASCIOLA HEPATICA* IN LYMNAEID INTERMEDIATE HOSTS^{MAS}

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Fasciola hepatica, the common bile duct fluke of cattle and sheep, is an economically important parasite in Montana, resulting in the condemnation of livers in 17% of cattle at slaughter. Transmission of the disease is dependent upon the presence of snails of the genus *Lymnaea*, which serve as intermediate hosts for the parasite. There are several species of lymnaeids that are found in Montana, but none have been found naturally infected with *F. hepatica*. This is probably due to the low incidence of infection in snails and the difficulty in identifying early developmental stages of the parasite in the snail using conventional methods. Recently we have developed an assay

that uses RT-PCR to detect a fasciolid specific, small ribosomal subunit sequence from total snail RNA preparations, and have used this assay to test field collected snails for infection. Our results support the hypothesis that the natural prevalence of infection is low in the snail host, and we suspect that this is due to some form of resistance in snail populations. To test this, several species of lymnaeids were exposed to *F. hepatica* miracidia and tested at 6 hours and 5 days post exposure. Almost 100 percent of snails tested positive at 6 hours post exposure; however, in all but the most permissive snail, few infections were detectable at 5 days post exposure.

"...BUT SOME ARE MORE EQUAL THAN OTHERS: " MANAGING MULTIPLE "FEATURED" SPECIES UNDER ECOSYSTEM MANAGEMENT^{TWS}

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For much of its early history, wildlife management focused on single species management. Habitat goals were determined based on our understanding of the needs of a few

species, primarily game. In the last 2 decades, two changes have lead to a shift away from that approach. (1) Starting in the 1970s the number of featured species increased. Following

the passage of the Endangered Species Act, many rare or declining species were designated in some way. Other concepts emerged that led to designation of "indicator species", "keystone species," etc. On the Lolo NF there are 23 featured species (endangered, threatened, sensitive, indicator, and game species), all of which must be addressed in every project. (2) In the 1980s, many agencies adopted an "ecosystem management" approach, a two-phased approach including (a) "the coarse filter," based on the role and consequences of natural processes and (b) the "fine filter," based on the special

needs of featured species. Consequences of these changes include (1) potential for conflict between plans developed separately for different featured species, (2) potential for the "coarse filter" outcome to be overwhelmed by all the identified single-species needs, (3) practical problems of integrating the "coarse filter" and many individual species in analyzing projects. In this paper, we present a process to integrate the "coarse" and "fine filter" approaches, identify and resolve conflicts, and develop a habitat-based approach for each species.

LICHENOMETRIC EVIDENCE OF CHANGE IN STREAM CHANNEL DIMENSIONS^{MA5}

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This study examined the possibility that the lichen *Xanthoria elegans* has recently colonized a lower zone on a segment of Soda Butte Creek in Yellowstone National Park. At two sites on the Lamar River, thallus cover diminished monotonically to the lower limit of distribution (rates: 1.1 and 1.4 % /cm respectively); thalli were submerged by up to 1.5 m of water during flood. The monotonic decline in cover percent suggests equilibration to an environmental gradient. Along a segment of Soda Butte Creek, a zone of monotonic decline (3.1 % /cm) terminated above peak stage height.

Below the monotonic decline a few small thalli were evenly distributed in a zone 0.6 m wide. The upper monotonic zone was interpreted to be a relic distribution. The lower zone appears to be colonized recently enough that equilibration to new conditions has not occurred. Lichen distribution on the Soda Butte segment was interpreted to be caused by a drop in stage height due to a change in channel dimensions. Early this century, browsing by elk (*Cervus elaphus*) eliminated tall willow from the adjacent floodplain, possibly leading to an increase in erosion rate.

**AN ASSESSMENT OF RELATIVE BIRD ABUNDANCE
IN TWO RIPARIAN AREAS WITH DIFFERING GRAZING HISTORIES
ON THE CHARLES M. RUSSELL NATIONAL WILDLIFE REFUGE ^{TWS}**

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We conducted surveys for breeding birds in riparian zones of two perennial streams on the Charles M Russell National Wildlife Refuge in north-central Montana during June 1994. One drainage, Siparyann Creek, had a history of intensive livestock use while the other drainage, Rock Creek, had a history of lesser use including no grazing and spring-only grazing in recent years. Few trees or shrubs were present along Siparyann Creek while plains cottonwood (*Populus deltoides*)

and willow (*Salix spp.*) were common along Rock Creek. Thirty bird species were observed along 15 transects in Siparyann Creek, and an average of 12.2 individual birds were recorded per transect. Thirty-two bird species were observed along 20 transects in Rock Creek averaging 20.2 individual birds per transect. Bird species associated with grasslands dominated in Siparyann Creek, while bird species associated with forested riparian habitats dominated in Rock Creek.

TRACKING ELK HUNTERS WITH GPS ^{TWS}

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As a part of a study of elk hunting techniques and hunter behavior, we used battery powered GPS units to record hunter locations at 15 second intervals during 29 hunting expeditions in 1993. GPS units were carried in a back pack with the antenna protruding on a short cable. At the end of the hunting day, data were downloaded to a PC and converted to UTM coordinates. Subsequent analysis within a GIS system enabled us to determine time and motion budgets for hunter effort, estimate the departure distance from roads and hunting camps, and evaluate the influence of closed roads on hunting technique. Hunter locations were

overlaid on other GIS layers to determine time spent in different vegetation types, and topographic situations selected for hunting. In this paper we discuss logistics and limitations and present some preliminary results. Although our sample size is very limited at this time, we expect to detect differences in hunting technique between bow hunters and rifle hunters, evaluate the influence of various vegetation types and topography on hunters, and eventually develop mathematical models to predict the influence of hunter density on elk vulnerability.

**THE U. S. FISH AND WILDLIFE SERVICE ECOSYSTEM APPROACH
FOR THE UPPER MISSOURI/YELLOWSTONE RIVER
AND COLUMBIA RIVER BASIN ECOSYSTEMS^{TWS}**

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The U. S. Fish and Wildlife Service (USFS) has adopted an Ecosystem Approach to Fish and Wildlife Conservation. The Ecosystem Approach is defined as "Protecting or restoring the function, structure, and species composition of an ecosystem, recognizing that all components are interrelated." In simple terms it's an attitude - a way of thinking about the "whole" environment within a geographical area that ultimately determines how the USFS plans and acts, in conjunction with partners, in managing biological systems and resources. An ecosystem approach will enable the USFS to more effectively address its mission, "To conserve, protect, and enhance fish and wildlife and their habitats for the continuing benefit of the American people". The USFS will continue to emphasize its legal mandated responsibilities (e.g. migratory birds, anadromous fish, endangered species, wetlands and the National Wildlife Refuge System). The USFS identified 52 ecosystems across the United States. This delineation is based on U.S. Geological Survey

watersheds. Two of these ecosystems occur in Montana, the Upper Missouri and Yellowstone River Ecosystem and the upper Columbia Basin Ecosystem. Ecosystem teams have been formed to develop, refine and implement the ecosystem approach. Team members include representatives from all USFS programs to promote cross program collaboration. The Montana ecosystems teams have identified six priority issues including; 1) Biological Monitoring, 2) Outreach, 3) Habitat Restoration and Enhancement, 4) Law Enforcement, 5) Candidate T&E Species, and 6) Native Aquatic Species. Partnerships are crucial in the ecosystem approach. The USFS recognizes it is only one of many players in any ecosystem project. We need assistance from the States and other partners to more effectively accomplish our mission. In turn, we hope to offer support to other organizations with complementary objectives. Our ability to strengthen and/or develop partnerships will be the true measure of success. We invite your comments, discussion, and involvement.

NORTHERN REGION LANDBIRD MONITORING PROGRAM^{TWS}

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Since 1990, the Forest Service Northern Region has been developing a

program to monitor birds across Forest System lands, and 1994 was the first

season of full-scale implementation. Over 6,000 sampling points were visited on 13 forests in order to examine distributions and landscape-scale habitat relationships of diurnal landbirds. Ten-minute point counts were spaced at 300 m intervals on transects along forest roads and trails.

Ocular vegetation plots were conducted at each point to describe cover type and general habitat structure. Landscape relationships will be examined with the use of Landsat satellite imagery of vegetation cover in cooperation with the Montana Spatial Analysis Lab at the University of Montana.

STUDIES ON THE PHENOTYPIC VARIABILITY OF THE FUNGUS *BEAUVERIA BASSIANA* CULTURES DURING PILOT SCALE PRODUCTION ^{MAS}

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For the past 10 years Mycotech Corporation has been developing fungi for commercialization as insect control agents. Fungal candidates are chosen on the basis of virulence, safety for humans and non-target organisms, and satisfactory production characteristics. It is important that a fungal culture maintain its phenotypic characters, particularly those characters affecting production efficiency and efficacy. Genetic profile (RFLP or RAPD-PCR pattern) of the parent and subcultures is only one criterion for selection. Phenotypical measurements (eg. spore production, stability under different storage regimes and virulence for the

target insect) also must be evaluated during commercial scale-up of a fungal product. The experiment described in this paper is part of an evaluation of phenotypic differences arising from mutation and selection during subculturing and pilot scale production of an isolate of *Beauveria bassiana*. Five slant cultures of the fungus *B. bassiana* Mycotech Strain BB726 produced by subculture from the same parent culture were evaluated for sporulation efficiency during parallel benchscale production, conidial stability at 32° C, and virulence for a target insect, the grasshopper, *Melanoplus sanguinipes*.

CONSERVATION OF PRAIRIE ECOSYSTEMS IN NORTH AMERICA ^{TWS}

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This presentation reviews the status and trends of North American prairie, their endemic biota, and sums current, major conservation efforts. The largest vegetative province in North America is the native prairie, and grasses as an integral component of prairies inhabit the continent (and worldwide) in

greater abundance than any other comparable group of plants. Estimates suggest that European settlement declines in native prairie range as high as 99 percent, and the potential for species loss, both plant and animal, is high. More subtle impacts in the loss of prairie, for example, loss of the highly

developed ecotypic differentiation, often go undetected. Endemism is high in prairie given the long evolutionary history of grasslands. Grassland bird species have shown more consistent and steeper, geographically widespread declines than any other grouping in North America; 55 grassland species in the United States are listed as threatened or endangered and one-third of the species considered endangered by the Committee on the Endangered Wildlife in Canada are found on grasslands. Developing ecosystem assessments and conservation strategies are difficult,

given approximately 98 percent of lands historically native prairie are in private ownership. Nevertheless, the first broadscale ecosystem management effort--The Great Plains Initiative--continues with more recent initiatives by the USDA Forest Service, National Biological Survey, and Environmental Protection Agency. Over a half century has passed since Weaver (1954, North American Prairie) noted that the disappearance of a major unit of vegetation--the North American Prairie is an event worthy of recognition if not action.

INDICATORS OF PLANT AND GRASSHOPPER COMMUNITY COMPOSITION IN MONTANA AND COLORADO ^{MAS}

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Grasshopper communities in the Great Plains display broad species heterogeneity. Descriptive data on grasshopper communities are needed for grasshopper control efforts to be tailored to local differences in species composition. The project objectives were to examine differences in the plant and grasshopper communities of Montana and Colorado, and to identify factors which influence grasshopper community composition in the two states. Plant and grasshopper species were sampled at 80 sites in Montana and 90 sites in Colorado in 1992. Species proportions and percentages were analyzed using detrended correspondence analysis (DCA). Percent bare ground, litter, total cover, proportions of grasses and forbs, and plant height were not useful in

distinguishing among plant communities in either state. Individual plant species DCA did detect differences among plant communities. Plant and grasshopper community compositions differed significantly between the two states, with *Buchloe dactyloides* and *Bouteloua curtipendula* distinguishing Colorado sites. Spearman rank correlations found grasshopper DCA results for Montana were correlated with percent bare ground, mode plant height, and plant species which increase with grazing. Such factors are thus important in determining grasshopper community composition, though they are not useful in distinguishing among plant communities. The value of collecting these data depends on the resolution and variables of interest.

DAILY ACTIVITY PATTERNS OF WESTERN TOADS ON THE TARGHEE NATIONAL FOREST, IDAHO^{TWS}

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Populations of many amphibian species appear to be declining in locations all over the world, including the Pacific Northwest. For example, many populations of the western toad (*Bufo boreas*) have undergone decline or local extinction throughout much of their range. Answers to questions about amphibian decline and plans to conserve species such as *Bufo boreas* require knowledge of the natural history and normal behavior of healthy animals, preferably in their natural environments. With the use of radio transmitters (1.8 g, externally mounted), we conducted a focal-animal study on the daily activity pattern and movements of individual free ranging *Bufo boreas*. This study was conducted during July and August of 1994 and 1995 on the Targhee National Forest, Idaho. We observed four adult male toads each year. Observation periods were three hours and occurred throughout the 24 hour day. Dependent

variables included activity index (number of active minutes per total minutes), distance moved (cm per total minutes), and number of feeding strikes (strikes per total minutes). Independent variables included hour of day, air temperature, and relative humidity. Considerable individual variance existed between toads. Surface activity rate peaked between 2100 and 2400 hours. Surface activity occurred over a broad range of temperatures (-2°C to 27°C) and occurred over a broad range of relative humidity (60%-100%). Distance moved increased during the night as toads moved from a daily retreat site to water or warm substrate. Most movements took place between 5°C and 16°C with low distance movement above 16°C. Movements increased as relative humidity increased above 75 percent. Feeding strike rate peaked during mid-day and occurred over a broad range of temperatures and relative humidities.

PRELIMINARY ANALYSIS OF FOREST STRUCTURE USED BY FLAMMULATED OWLS IN A MANAGED MONTANA LANDSCAPE^{TWS}

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During 13 May-16 July, 1994, 593 points were surveyed for flammulated owls (*Otus flammeolus*) along 299 km (180 mi) of transect on the Bitterroot National Forest, Montana. Transects

were located primarily in ponderosa pine (*Pinus ponderosa*)/Douglas-fir (*Pseudotsuga douglasii*) forest on the west side of the Bitterroot River between Lolo and Sula, Montana. Approximately 50

flamulated owls were detected along 11 transects between Darby and Sula. In an attempt to explain the distribution of flamulated owls along occupied transects, I compared forest structure data collected in 11.3 m fixed-radius circular plots centered on owl singing locations and unoccupied random plots. Flamulated owls were positively associated with the number of snags >15 in dbh, ponderosa pine trees >15 in dbh, canopy height, live basal area, and percent cover of dry forest indicator species (*Antennaria racemosa*, *Balsamorhize sagittata*, *Festuca idahoensis*). Conversely, they were negatively associated with number of Douglas-fir trees <9 in dbh, trees other than ponderosa pine or Douglas-fir, and percent cover of moist forest indicator

species (*Galium triflorum*, *Linnaea borealis*, *Thilictrum occidentale*, and *Vaccinium spp.*) These variables were collectively represented by cover type, with owls using mature and old ponderosa pine/Douglas-fir forest types rather than young or moist forest types. In future analyses, I will use a Geographic Information System to determine whether broad-scale habitat variables, such as the percent of the landscape covered by each forest type, explain which transects contained flamulated owls. Results of this study are expected to provide a greater understanding of flamulated owl habitat use and provide managers with information needed to manage for this species at a variety of spatial scales.

HUMANITIES AND SOCIAL SCIENCES

THE CONCEPT OF ETHNICITY: WHAT WEIGHT IS ETHNICITY? ^{MAS}

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Where one belongs, where one can retreat, where one can find familiarity; this is one's ethnicity. The concept of ethnicity can be considered to be the an extrapolation of the family or the most basic unit of biological and social reproduction. Although identity is the central concept, it is ethnicity that often

supplants this notion because it is often assigned from outside the group or from within as a response to pressures from without. With borders being questioned everyday, ethnic affiliation, with its many levels of application, becomes hyperstragetized, hyperinflated, and superimposed.