parasitism/ nests-nesting/ pastures/ productivity/ public relations/ status/ wildlife/ federal programs/ wild birds/ nature conservation/ natural resources/ agricultural economics (general)/ land development, land reform, and utilization (macroeconomics)/ dickcissel/ grasshopper sparrow/ meadowlark/ brown headed cowbird/ upland sandpiper/ Kansas/ Riley County
Abstract: Most Conservation Reserve Program contracts expire in 1997 and approximately 70 per cent of CRP fields in Kansas may be converted into pastures. The authors compared bird use of CRP fields to their use of pastures. Total avian abundance was greater in pastures than on CRP fields. Data on five species using these habitats are provided.

292. **Winter avian community and sparrow response to field border width.**
Conover, Ross R.; Burger, L. Wes; and Linder, Eric T.
Journal of Wildlife Management 71(6): 1917-1923. (2007)
NAL Call #: 410 J827; ISSN: 0022-541X
Descriptors: conservation measures/ ecology/ man-made habitat/ land zones/ Aves: habitat management/ field border width/ effect on winter community structure/ community structure/ winter community structure/ field border width effects/ cultivated land habitat/ field border width effects on winter community structure/ Mississippi/ Sunflower County/ Aves/ birds/ chordates/ vertebrates
Abstract: Transformations of agricultural practices in the southeastern United States have drastically reduced preexisting quantities of strip-cover habitat along field margins. The National Conservation Buffer Initiative has promoted the establishment of herbaceous field borders to restore wildlife benefits once provided by such habitat. We evaluated effects of native warm-season grass field border establishment and width on winter bird response. Narrow (approx. 8-m) field borders represented a marginal improvement to non-bordered margins that were cropped ditch to ditch, whereas wide (approx. 30-m) borders significantly enhanced total avian conservation value, abundance, species richness, and sparrow abundance compared to non- or narrow borders. Furthermore, presence of wide borders altered bird use of row-crop fields. We observed increased sparrow (Emberizidae) abundances in agricultural fields adjacent to wide borders, which likely resulted from enhanced waste grain foraging opportunities. Given these benefits to wintering farmland birds, we advocate the integration of herbaceous field border habitat in agricultural landscapes, particularly borders of enhanced width.

293. **Winter bird use of Conservation Reserve Program fields harvested for biomass.**
Murray, Les D. and Best, Louis B.
Journal of the Iowa Academy of Science 113(1-2): 45-48. (2006)
NAL Call #: Q11.J68; ISSN: 0896-8381
Descriptors: conservation/ ecology/ man-made habitat/ land zones/ Aves: conservation measures/ Conservation Reserve Program fields/ habitat utilization/ winter habitat use/ cultivated land habitat/ Iowa/ Appanose/ Lucas/ Monroe and Wayne counties/ Aves, Galliformes, Phasianidae/ birds/ chordates/ vertebrates
Abstract: As Conservation Reserve Program (CRP) contracts expire, many fields may be returned to agricultural production. Growing switchgrass (Panicum virgatum) as a biomass fuel is an alternative to returning fields to rowcrops. CRP fields provide winter cover for birds, but the harvest of biomass Would remove most of the cover and affect bird use of the fields. We estimated winter bird abundances in nonharvested, total-harvested, and partially (strip) harvested switchgrass fields in southern Iowa. Song sparrows (Melospiza melodia) were observed only in strip-harvested fields and ring-necked pheasants (Phasianus colchicus) were observed only in nonharvested fields and uncut areas of strip-harvested fields. American tree sparrows (Spizella arborea) were observed in all three treatments, but abundances were not significantly different among treatments. Tree sparrows, however, were observed more often in uncut strips of strip-harvested fields than in cut strips, with 87% of observations in strip-harvested fields in uncut strips. Abundances in strip-harvested fields were in general higher than abundances in rowcrop and CRP plantings in other studies. Strip-harvested switchgrass fields may be more beneficial in winter than total-harvested fields, rowcrop, or idle CRP fields for some bird species.

Grazing Lands

294. **Above ground invertebrate responses to land management differences in a central Kansas grassland.**
Jonas, J. L.; Whiles, M. R.; and Charlton, R. E.
Environmental Entomology 31(6): 1142-1152. (2002)
NAL Call #: QL461.E532; ISSN: 0046225X
Descriptors: biological assessment/ Coleoptera/ Indicator species/ Orthoptera/ bioindicator/ biomonitoring/ community response/ community structure/ invertebrate/ land management/ community structure/ macroinvertebrate/ United States/ Andropogon gerardii/ Bromus inermis/ Coleoptera/ Orthoptera
Abstract: This article describes macroinvertebrate communities in a central Kansas grassland that were examined to assess their responses to differences in land management and explore their viability for biological assessment of grasslands. Canopy (drop-trap) and ground-dwelling (pitfall traps) communities were quantitatively sampled from June-September 1998 and 1999. The responses of the whole arthropod community and two focal groups, Coleopteran families and Orthopteran species, to three land use types (brome fields, old fields, and native prairies) were examined. Vegetation analyses reflected clear differences among land use types. Bromus inermis Leyss, an exotic grass, and Andropogon gerardii Vitman, a native grass, dominated brome fields and native prairie sites, respectively. Old fields were composed of a mixture of native and exotic plant species. Coleopteran family richness and diversity were significantly greater in native prairies than brome fields ($P < 0.05$), whereas orthopteran species richness and diversity peaked in brome fields. Diversity and richness of all arthropod groups examined were significantly, positively correlated with plant species

diversity and richness in drop-trap samples ($P < 0.05$). Coleopteran family diversity and richness in pitfall samples were positively correlated with abundance of native plants, but orthopteran species diversity and richness were negatively correlated with native plant abundance. Coleopteran and orthopteran responses to land use appeared linked to differences in management practices. Whereas coleopterans appeared most influenced by plant community composition, orthopterans showed sensitivity to mechanical disturbance associated with haying on native prairie. Plant and arthropod group diversities were not consistently correlated, demonstrating that arthropod groups can reflect differences in a landscape that may not be apparent from examining plant communities alone.

295. **Abundance and diversity of small mammals in exotic and reseeded native grasslands at Oakwood Lakes State Park.**
Gardner, Dawn M.; Jensen, Kent C.; Higgins, Kenneth F.; Hansen, Nicole K.; and Huehl, Abbigayil A.
Proceedings of the South Dakota Academy of Science 84: 109-117. (2005)
NAL Call #: 500 So82; ISSN: 0096-378X
Descriptors: conservation measures/ ecology/ community structure/ terrestrial habitat/ land zones/ Mammalia: habitat management/ small taxa/ exotic grasslands/ reseeded grasslands/ relative abundance/ native grasslands/ species diversity/ South Dakota/ Brookings County/ Oakwood Lakes Game Production Area/ Mammalia/ chordates/ mammals/ vertebrates
Abstract: Relative abundance and diversity of small mammal populations in exotic and reseeded native grassland plots were evaluated during the fall of 2004 at West Oakwood Lakes Game Production Area, Brookings County, South Dakota. Exotic grassland plots were defined as areas dominated by smooth brome (Bromus inermis) and Kentucky bluegrass (Poa pratensis). Big bluestem (Andropogon gerardii), Indiangrass (Sorghastrum nutans), and switchgrass (Panicum virgatum) dominated plots defined as reseeded native grassland. A total of 36 small mammals representing six species were captured over 727 operable trap nights in four grassland plots using Museum Special snap traps from 25 September to 1 October 2004. Shrew species (Blarina and Sorex spp.) comprised 57% and 73% of the total small mammal captures in the exotic and reseeded native plots respectively. Based on relative abundance there was significantly greater small mammal abundance in the exotic plots than in the reseeded native plots ($x^2 = 35.04$, $p < 0.0001$). Northern short-tailed shrew (Blarina brevicauda) ($x^2 = 11.36$, $p = 0.0008$) relative abundance was significantly greater in the reseeded native plots than in the exotic plots, whereas relative abundance of all other species, except the western harvest mouse (Reithrodontomys megalotis), were significantly greater in the exotic plots than in the reseeded native plots. Alpha diversity was significantly greater in the exotic plots than in the reseeded native plots ($x^2 = 22.21$, $p = 0.035$). However, Shannon-Wiener Index richness and evenness values were similar in the exotic and reseeded native plots. Our data indicates a higher relative abundance of small mammals and greater within habitat diversity in exotic grasslands than in reseeded native grasslands.

296. **Adaptive management of prairie grouse: How do we get there?**
Aldridge, C. L.; Boyce, M. S.; and Baydack, R. K.
Wildlife Society Bulletin 32(1): 92-103. (2004)
NAL Call #: SK357.A1W5; ISSN: 00917648
Descriptors: adaptive management/ Alberta/ Centrocercus urophasianus/ conservation plans/ grazing/ greater sage-grouse/ habitat/ Manitoba/ policy planning/ prairie sharp-tailed grouse/ Tympanuchus phasianellus/ gamebird/ grassland/ habitat conservation/ prairie/ species conservation/ wildlife management/ Canada/ Manitoba/ North America/ Centrocercus urophasianus/ Tympanuchus phasianellus
Abstract: Managing prairie grouse has been largely a reactive process without any "true" management experiments being implemented, thereby limiting our ability to learn from management and enhance conservation efforts for declining prairie grouse populations. In a few cases where the potential existed for a passive or active adaptive approach, monitoring was insufficient to detect effects of changes in management practices. Similar problems appear to occur at planning stages in attempts to implement adaptive management for prairie grouse populations, preventing proper consideration of sound adaptive experiments that advance learning. Successful adaptive management begins with stakeholder gatherings following a policy planning process, which includes many steps, beginning with goal identification and understanding of uncertainties and culminating in model simulations to understand potential management policies. By following this process, the opportunity to implement successful management experiments can be enhanced. We discuss the successes and failures of prairie grouse management using 2 case studies, 1 for prairie sharp-tailed grouse (Tympanuchus phasianellus) in Manitoba and 1 for greater sage-grouse (Centrocercus urophasianus) in southern Alberta. We describe ways in which active adaptive management could improve our understanding of prairie grouse population declines and outline a policy planning process that, if followed, will allow adaptive management to be successfully implemented, enhancing prairie grouse management and conservation.

297. **Agricultural and recreational impacts of the Conservation Reserve Program in rural North Dakota, USA.**
Bangsund, D. A.; Hodur, N. M.; and Larry Leistritz, F.
Journal of Environmental Management 71(4): 293-303. (2004)
NAL Call #: HC75.E5J6; ISSN: 03014797.
Notes: doi: 10.1016/j.jenvman.2003.12.017.
Descriptors: economic impacts/ farmland retirement/ rural economies/ Conservation Reserve Program/ North Dakota
Abstract: The Conservation Reserve Program (CRP), created in 1985, provides conservation benefits and agricultural supply control through voluntary, long-term retirement of crop land. While the effects of the CRP on the agricultural sector are well understood, the implications of its conservation benefits for rural economies remain largely undocumented. To quantify the effects on rural economies, this study addressed the net economic effects of decreased agricultural activity and increased recreational activity associated with the CRP in six rural areas of North Dakota from 1996 to 2000. Based on the level of economic activity

that would have occurred in the absence of the program, net revenues from CRP land if returned to agricultural production in the six study areas were estimated at $50.2 million annually or $37 per acre of land currently enrolled in the CRP. Recreational (hunting) revenues as a result of the CRP in the study areas were estimated at $12.8 million annually or $9.45 per CRP-acre. The net economic effect of the CRP (lost agricultural revenues and gains in recreational expenditures) indicated that several areas of the state are not as economically burdened by the CRP as previous research has suggested. In addition, the net economic effects of the program would appear more favourable if revenues from all CRP-based recreation were included. The degree that recreational revenues offset agricultural losses might be further enhanced by enterprises that capitalize on the economic opportunities associated with expanded recreational activities on CRP lands.

298. **Allocating forage among wild and domestic ungulates: A new approach.**
Johnson, B. K.; Ager, A.; Crim, S. A.; Wisdom, M. J.; Findholt, S. L.; and Sheehy, D.
In: Proceedings of a symposium on sustaining rangeland ecosystems.Eastern Oregon State College, La Grande, Oregon. Edge, W. D. and Olsen-Edge, S. L. (eds.); Vol. Special Report 953.
Corvallis, Ore.: Oregon State University Extension Service; pp. 166-169; 1996.
NAL Call #: 100 Or3M no.953
Descriptors: resource allocation/ stocking rate/ computer software/ simulation models/ geographical information systems/ grazing/ wild animals/ grasslands/ rangelands/ range management/ models/ grazing behavior
Abstract: The allocation of rangeland forage between domestic and wild ungulates is discussed and none of the methods tried are considered satisfactory. The difficulty of combining static and dynamic environmental factors on a seasonal basis to quantify and predict the distribution of ungulates and vegetation is described. A case study is presented using computer-aided spatial analysis models and linear programming formulation to allocate forage among elk (Cervus elaphus), mule deer (Odocoileus hemionus) and cattle. The results were displayed on 3-dimensional computer-generated images to show where forage was removed by each animal species on a monthly basis.

299. **Altered rangeland ecosystems in the interior Columbia Basin.**
Bunting C. S. C.; Kingery, J. L.; Hemstrom, M. A.; Schroeder, M. A.; Gravenmier, R. A.; and Hann, W. J.
Portland, OR: Pacific Northwest Research Station, Forest Service, U.S. Department of Agriculture; General Technical Report-PNW 553, 2002. 67 p.
Notes: 08874840 (ISBN).
http://www.fs.fed.us/pnw/pubs/gtr553/
Descriptors: altered rangelands/ Columbia sharp-tailed grouse/ greater sage grouse/ potential vegetation types/ rangeland ecosystems/ restoration/ environmental disturbance/ habitat restoration/ human activity/ land management/ rangeland/ United States/ Animalia/ cellular organisms/ Centrocercus urophasianus/ Phasianidae/ Salvia/ Tympanuchus phasianellus
Abstract: A workshop was held to address specific questions related to altered rangeland ecosystems within the interior Columbia Basin. Focus was primarily on public lands administered by the Forest Service and Bureau of Land Management. Altered ecosystems were considered to be those where human-induced or natural disturbances are of sufficient magnitude to affect ecosystem processes, causing long-term loss or displacement of native community types and loss of productivity, making it difficult or impossible to restore these ecosystems to historical conditions. Seventeen rangeland potential vegetation types (PVT) were indentified by the Interior Columbia Basin Ecosystem Management Project and briefly described. Reasons that rangeland ecosystems are altered include presence of invasive species, uncharacteristic grazing effects, climatic change, change in fire regime, and other factors related to human presence. However, primary causes of alteration and restoration potential differ among PVTs. Some altered rangeland ecosystems may be restored by stabilizing ecosystem processes, restoring native plant communities, reducing the spread of invasive species, or conserving existing biota. In some altered conditions, these options have a relatively high probability of success over the short term with low to moderate cost at the site scale. However, in other altered areas, restoration options are expensive, have a low probability of success, and require long timeframes. Restoration of rangeland PVTs is also necessary for the survival of some animal species whose populations are in decline such as the Columbian sharp-tailed grouse and greater sage grouse.

300. **An annotated bibliography on the interaction of range management (livestock grazing, brush management and prescribed burning) or nonmanagement with wildlife habitat and wildlife.**
Kozicky, Edward L.; Fulbright, Timothy E.; and Texas Fisheries and Wildlife Division, Wildlife Section
Austin, Tex.: Texas Parks and Wildlife Dept., 1991. 293 p.
Notes: Meeting abstract.
NAL Call #: SF85.K69 1991
Descriptors: fires-burns/ grazing/ habitat alterations/ habitat management/ range management/ wildlife/ wildlife management/ range ecology/ wildlife habitat improvement/ natural resources

301. **Ant biodiversity in semiarid landscape mosaics: The consequences of grazing vs. natural heterogeneity.**
Bestelmeyer, Brandon T. and Wiens, John A.
Ecological Applications 11(4): 1123-1140. (2001)
NAL Call #: QH540.E23; ISSN: 1051-0761
Descriptors: commercial activities/ conservation measures/ land and freshwater zones/ Formicidae: farming and agriculture/ grazing/ habitat management/ community structure/ arid rangelands/ Colorado/ New Mexico/ terrestrial habitat/ Weld County, Colorado/ Dona Ana County, New Mexico/ Socorro County, New Mexico/ vegetation structure/ Formicidae/ Formicoidea, Aculeata, Apocrita, Hymenoptera, Insecta/ arthropods/ hymenopterans/ insects/ invertebrates

Abstract: The conservation of biodiversity in landscape mosaics requires an understanding of the impacts of human land use within mosaic elements and an evaluation of the biological uniqueness of different elements. We address these issues by examining patterns of ant diversity in three semiarid rangeland landscapes used predominantly for grazing. These landscapes lie along a regional gradient from shortgrass steppe through a transitional zone to desert grassland, along which climate and ant species composition vary. Within each landscape, we compared the effects of grazing and natural variation in soils and vegetation on ant diversity and community composition. Grazing had little effect on ant richness, diversity, or composition at the transitional zone or the desert grassland site, but ungrazed areas at the shortgrass steppe site had a higher overall richness and favored the abundance of some species. Some samples of saltbush (Atriplex canescens) shrubland were similar to ungrazed samples in richness and species composition. In both the transitional zone and the desert grassland, creosotebush (Larrea tridentata)-dominated habitats harbored comparatively species-rich and distinct ant communities. In addition, mesquite (Prosopis glandulosa) coppice dunes at the desert grassland site favored the abundance of several species that were rare across the site. Canonical correspondence analysis revealed that variation in soil strength and texture best explained community variation at the shortgrass steppe site, whereas soil texture and associated differences in shrub density best explained differences in composition at the transitional and desert grassland sites. The characterization of habitats based upon vegetation classification did not adequately reflect environmental variation that was important to ants in shortgrass steppe, but reflected important soil textural variation in the transitional and desert grassland sites. These results suggest that ant conservation in these semiarid rangelands should emphasize patterns of variation in soil properties. The results add to a growing consensus that a variety of variables determined by the responses of several focal taxa may be needed to characterize biodiversity patterns.

302. **Aplomado falcons and grazing: Invoking history to plan restoration.**
Truett, Joe C.
Southwestern Naturalist 47(3): 379-400. (2002)
NAL Call #: 409.6 So8 ; ISSN: 0038-4909
Descriptors: Cynomys ludovicianus/ Sciuridae/ Rodentia/ Falco femoralis septentrionalis/ Falconiformes/ Falconidae/ wildlife management/ grazing/ grazing management/ prey biomass/ Arizona/ farming and agriculture/ food supply/ grasslands/ ecosystems/ New Mexico/ stocking-transplanting/ techniques/ Southeast/ Southwest/ wildlife-human relationships/ commercial enterprises/ conservation/ wildlife management/ disturbances/ land zones/ nutrition/ Aplomado falcon/ black-tailed prairie dog/ extermination-endanger/ habitat management/ brood-egg/ agriculture/ prairie/ historic/ food/ ecological requirements/ northern Aplomado falcon/ black-tailed prairie dog
Abstract: The federally endangered northern aplomado falcon (Falco femoralis septentrionalis) disappeared as a breeder from its historic nesting range in the southwestern United States in the early to middle 1900s. Since 1995, a small breeding population has been restored to former range in South Texas grasslands, and interest has escalated in restoring the bird to northern Chihuahuan Desert grasslands in southeastern Arizona and southwestern New Mexico. In these latter areas, intensive livestock grazing and associated shrub (brush) encroachment have been theorized to have contributed importantly to the bird's demise, and thus grazing management has been identified as an important restoration issue. A review of the bird's abundance in the context of the grazing history of these areas suggests it was common when grazing, both by livestock and black-tailed prairie dogs (Cynomys ludovicianus), was intense and widespread (1880s-1920s) in the bird's habitat. It declined in abundance and disappeared coincident with declines in livestock abundance and the extirpation of prairie dogs (1930s-1940s). Most locations where observers historically encountered the bird had little brush at the time of its demise. In the Chihuahuan Desert grasslands of Arizona, New Mexico, and West Texas where the bird occurred historically, the avian prey base is presently an order of magnitude or more lower than that in higher-rainfall habitats of the bird in eastern Mexico and South Texas. The avian prey base is similarly depauperate where 2 small populations of aplomado falcon exist in Mexico's northern Chihuahuan Desert, and the bird's reproductive success there is lower than that in eastern Mexico. The historic extirpation of prairie dogs caused a reduction in the prey biomass available to diurnally feeding raptors such as the aplomado falcon. Efforts to restore the falcon to Chihuahuan Desert grasslands in the United States ideally should include monitoring the responses of released birds to levels of grazing, to shrub abundance, to prey abundance, and to black-tailed prairie dog colonies should any exist in release areas.

303. **Application of the fire-grazing interaction to restore a shifting mosaic on tallgrass prairie.**
Fuhlendorf, S. D. and Engle, D. M.
Journal of Applied Ecology 41(4): 604-614. (2004)
NAL Call #: 410 J828; ISSN: 0021-8901
Descriptors: Bos bison/ Bovidae/ Artiodactyla/ conservation/ terrestrial ecology/ ecosystem management/ fire-grazing interaction
Abstract: 1. Management of rangelands has long operated under the paradigm of minimizing spatially discrete disturbances, often under the objective of reducing inherent heterogeneity within managed ecosystems. Management of grazing animals has focused on uniform distribution of disturbance, so that no areas are heavily disturbed or undisturbed (i.e. management to the 'middle'). 2. A model of the fire-grazing interaction argues that grazing and fire interact through a series of positive and negative feedbacks to cause a shifting mosaic of vegetation pattern across the landscape. This interaction was important in the evolution of species in the North American Great Plains grasslands. This approach has the potential to serve as an ecological-based model for management of grasslands with a long evolutionary history of grazing. 3. We compared a heterogeneity-based approach, in which fire is applied to discrete patches, with typical homogeneity-based land management in the North American Great Plains, to determine if patch burning followed by focal grazing creates a shifting mosaic pattern of vegetation structure and composition. 4. Our data suggest that spatially discrete fires promote focal grazing, where grazing animals devote 75%

of grazing time within the one-third of the area that has been burned within the past year. These focal disturbances cause local changes in the plant community and increase patch-level heterogeneity across landscapes. As the focal disturbance is shifted to other patches over time, successional processes lead to changes in local plant communities and the patchwork landscape can be described as a shifting mosaic. 5. A patch-dynamic approach can be accomplished in the tallgrass prairie through applying spatially discrete fires and allowing animals free access to a diversity of landscape elements that vary in time since focal disturbance. This increases heterogeneity across the landscape, a variable that has been shown to be critical to some wildlife species as well as the structure and function of grassland ecosystems. 6. Synthesis and applications. Our study demonstrates that the fire-grazing model may be useful for generating heterogeneity in grassland management. Discrete fires are applied to patches, and patchy grazing by herbivores promotes a shifting vegetation mosaic across the landscape. Furthermore, application of the model has the potential of increasing the area of rangelands under management for conservation purposes, because livestock production is maintained at a level similar to traditional management. So, by managing transient focal patches that move through the landscape, heterogeneity has the potential to be a central paradigm for managing landscapes for multiple objectives, such as biodiversity and agricultural productivity.

304. **Are prescribed fires endangering the endangered Silphium borer moth (Papaipema silphii)?**
Andrew, Carrie and Leach, Mark K.
Ecological Restoration 24(4): 231-235. (2006);
ISSN: 1522-4740
Descriptors: conservation measures/ ecology/ population dynamics/ terrestrial habitat/ abiotic factors/ physical factors/ land zones/ Papaipema silphii: habitat management/ prescribed burning/ endangered status/ population density/ prescribed burning effects/ prairie/ grassland/ prairie habitat/ fire/ Wisconsin/ Insecta, Lepidoptera, Glossata, Heteroneura, Noctuoidea, Noctuidae/ arthropods/ insects/ invertebrates/ Lepidopterans
Abstract: The silphium borer moth (Papaipema silphii), a rare endemic insect in midwestern prairies, completes one life cycle per year and has a short dispersal distance. The moth eggs are presumably laid in the duff near host Silphium plants. Silphium species distributions are primarily restricted to fragmented prairie patches, commonly in upland habitats that can burn more intensely than lowland patches. Thus, these moths must cope with existence in a fire-prone environment. Currently, there is controversy regarding how prescribed fire affects the sustainability of prairie invertebrate populations. We counted larval densities of silphium borer moths within thirty-four 0.1-ha plots in three isolated southern Wisconsin prairies with different burn patterns. The median density of larvae was significantly lower in the rotationally burned prairie than in one of the prairies that has been repeatedly burned edge-to-edge. Larval densities did not differ significantly between recently burned and recently unburned plots. These findings suggest that prescribed fires are not endangering the silphium borer moth, regardless of burn method, at least at these three sites. However, more studies at more locations are needed. We still recommend burning only two-thirds of isolated prairies every year.

305. **Assemblages of breeding birds as indicators of grassland condition.**
Browder, S. F.; Johnson, D. H.; and Ball, I. J.
Ecological Indicators 2(3): 257-270. (2002);
ISSN: 1470160X.
Notes: doi: 10.1016/S1470-160X(02)00060-2.
Descriptors: grassland birds/ North Dakota/ northern Great Plains/ point counts/ Prairie Pothole Region/ aerial photography/ biodiversity/ environmental impact/ vegetation/ wetlands/ breeding birds/ ecology/ avifauna/ bioindicator/ breeding population/ grassland/ habitat type/ index of biotic integrity/ United States
Abstract: We developed a measure of biological integrity for grasslands (GI) based on the most influential habitat types in the Prairie Pothole Region of North Dakota. GI is based on proportions of habitat types and the relationships of these habitat types to breeding birds. Habitat types were identified by digital aerial photography, verified on the ground, and quantified using GIS, We then developed an index to GI based on the presence or abundance of breeding bird species. Species abundance data were obtained from 3 min roadside point counts at 889 points in 44, 4050 ha study plots over a 2-year period. Using a modified North American Breeding Bird Survey protocol, species were recorded in each of four quadrants at each point. Fifty species selected for analysis included all grassland species that occurred in at least 15 quadrants and all other bird species that occurred in at least 1 % of quadrants. We constructed preliminary models using data from each of the 2 years, then tested their predictive ability by cross-validation with data from the other year. These cross-validation tests indicated that the index consistently predicted grassland integrity. The final four models (presence and abundance models at 200 and 400 m scales) included only those species that were statistically significant ($P \leq 0.05$) in all preliminary models. Finally, we interpreted the components of the indices by examining associations between individual species and habitat types. Logistic regression identified 386 statistically significant relationships between species and habitat types at 200 and 400m scales. This method, though labor-intensive, successfully uses the presence of grassland-dependent species and absence of species associated with woody vegetation or cropland to provide an index to grassland integrity. Once regional associations of species with habitat types have been identified, such indices can be applied relatively inexpensively to monitor grassland integrity over large geographic areas. Indices like the ones presented here could be applied widely using bird abundance data that are currently being collected across the United States and southern Canada through the North American Breeding Bird Survey.

306. **Assessing grassland restoration success: Relative roles of seed additions and native ungulate activities.**
Martin, Leanne M. and Wilsey, Brian J.
Journal of Applied Ecology 43(6): 1098-1109. (2006)
NAL Call #: 410 J828; ISSN: 0021-8901
Descriptors: Artiodactyla/ Bovidae/ Cervidae/ Bos bison/ Cervus elaphus/ Bison bison/ Cervus canadensis/ habitat use/ grasslands/ ecosystems/ grassland restoration/ wildlife-habitat relationships/ Iowa/ Jasper County, Walnut Creek watershed/ land zones/ native ungulate activity/ seed/ seed addition/ seedling emergence/ tallgrass prairie restoration/ diversity/ grazing/ net primary productivity/ tallgrass prairie/ bison/ wapiti/ habitat management/ vegetation/ ethology/ food/ experiment/ fence/ productivity
Abstract: 1. Grassland restorations often lack rare forb and grass species that are found in intact grasslands. The possible reasons for low diversity include seed limitation, microsite limitation and a combination of both. Native ungulates may create microsites for seedling establishment in tallgrass prairie restorations by grazing dominant species or through trampling activities, but this has never been tested in developing prairies. 2. We experimentally tested for seed and microsite limitation in the largest tallgrass prairie restoration in the USA by adding rare forb and grass seeds in two trials inside and outside native ungulate exclosures. We measured seedling emergence because this stage is crucial in recruiting species into a community. We also measured light, water and standing crop biomass to test whether resource availability could help to explain seedling emergence rates. 3. Ungulates increased light availability for each sampling time and also increased above-ground net primary productivity (ANPP) during summer. 4. Seedling emergence of rare prairie forbs and grasses was consistently greater when we added seeds. 5. Seedling emergence was conditionally greater with a combination of seed additions and grazing, but grazing alone was unable to increase emergence. 6. When ungulates increased seedling enhancement, the mechanism was partially associated with increased water and light availability. 7. Exotic and cosmopolitan weed seedling emergence was not affected by grazing. 8. Synthesis and applications. These results suggest that tallgrass prairie restorations are primarily seed limited and that grazing alone may not be able to increase seedling emergence of rare species without the addition of seeds. Therefore, adding seeds to grassland restorations may increase seedling emergence of rare species, and mimicking effects of grazing may increase emergence when seeds are added.
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307. **Assessment of grassland ecosystem conditions in the southwestern United States: Wildlife and fish.**
Finch, Deborah M.
Provo, UT: Rocky Mountain Research Station, Forest Service, U.S. Department of Agriculture; General Technical Report-RMRS 135, 2005. 168 p.
Notes: Volume 2.
Descriptors: conservation measures/ ecology/ terrestrial habitat/ land zones/ Pisces: habitat management/ ecology/ freshwater habitat/ United States, southwest/ Pisces/ chordates/ fish/ vertebrates
Abstract: This report is volume 2 of a two-volume ecological assessment of grassland ecosystems in the Southwestern United States. Broad-scale assessments are syntheses of current scientific knowledge, including a description of uncertainties and assumptions, to provide a characterization and comprehensive description of ecological, social, and economic components within an assessment area. Volume 1 of this assessment focused on the ecology, types, conditions, and management practices of Southwestern grasslands. Volume 2 (this volume) describes wildlife and fish species, their habitat requirements, and species-specific management concerns, in Southwestern grasslands. This assessment is regional in scale and pertains primarily to lands administered by the Southwestern Region of the USDA Forest Service (Arizona, New Mexico, western Texas, and western Oklahoma). A primary purpose of volume 1 is to provide information to employees of the National Forest System for managing grassland ecosystems and landscapes, both at the Forest Plan level for Plan amendments and revisions, and at the project level to place site-specific activities within the larger framework. This volume should also be useful to State, municipal, and other Federal agencies, and to private landowners that manage grasslands in the Southwestern United States.
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308. **Assessment of native species and ungulate grazing in the southwest: Terrestrial wildlife.**
Zwartjes, P. W.; Cartron, J. L. E.; Stoleson, P. L. L.; Haussamen, W. C.; and Crane, T. E.
Provo, UT: Rocky Mountain Research Station, Forest Service, U.S. Department of Agriculture; General Technical Report-RMRS 142, 2005. 78 p.
Notes: 02775786 (ISSN).
Descriptors: Arizona/ grazing effects/ New Mexico/ range management/ terrestrial wildlife/ ungulate grazing/ wildlife management
Abstract: Range managers in the Southwestern States are increasingly being required to develop management strategies that take into consideration the conservation of wildlife populations. However, information on many aspects of the fundamental biology and impacts of grazing on individual species is still lacking in the scientific and government literature. This report documents a project designed to assemble this information for terrestrial wildlife in Arizona and New Mexico that have the potential to be negatively impacted by grazing or range management practices. To achieve this, a two-stage panel process was developed that employed a variety of wildlife experts to create a list of potentially vulnerable species and to develop an informational database. Panelists first reviewed and assessed all terrestrial vertebrates in the region to develop an initial list. In the second stage, the panelists refined the list, reviewed published information drafted into individual species accounts, and then augmented these accounts with information from their own experience and observations. The resulting database contains accounts for 305 species and subspecies of amphibians, reptiles, birds and mammals, including a computer database that allows managers to search and query the species accounts based on geographic distribution as well as shared ecological and life history characteristics.

309. **Associations of grassland birds with landscape factors in southern Wisconsin.**
Ribic, C. A. and Sample, D. W.
American Midland Naturalist 146(1): 105-121. (2001)
NAL Call #: 410 M58; ISSN: 00030031
Descriptors: avifauna/ density/ grassland/ habitat type/ United States/ Ammodramus savannarum/ Dolichonyx oryzivorus/ Passerculus sandwichensis/ Sturnella magna
Abstract: We investigated the association of grassland birds with field- and landscape-level habitat variables in south-central Wisconsin during 1985-1987. Landscape-level variables were measured and digitized at 200, 400 and 800 m from the perimeter of 38 200 m × 100 m strip transects. A mixture of field and landscape variables was associated with the density of savannah sparrow (Passerculus sandwichensis) and grasshopper sparrow (Ammodramus savannarum). Only landscape variables were associated with the density of bobolink (Dolichonyx oryzivorus), eastern meadowlark (Sturnella magna) and all birds that were grassland species of management concern. Field size was not an important predictor of bird density. Cover-type diversity of the surrounding area was commonly selected in the models for three species and all birds that were grassland species of management concern. Higher bird densities in the transects were associated with landscapes where the cover types were less diverse. Landscapes with low cover type diversity were dominated by grassland, pasture and hay. Field habitat, mean patch size of cover types and distance to woody vegetation were the next most common predictors of avian density. The density of some grassland birds increased as nonlinear woody features such as woodlots and shrub carrs decreased in patch size, decreased in total amount in the landscape and increased in distance from a transect. However, density of other species was positively associated with linear woody features such as the total amount and nearness of hedgerows. The composition of the surrounding landscape, at least out to 800 m, is important in grassland bird management.

310. **Assuring the future of prairie grouse: Dogmas, demagogues, and getting outside the box.**
Applegate, R. D.; Williams, C. K.; and Manes, R. R.
Wildlife Society Bulletin 32(1): 104-111. (2004)
NAL Call #: SK357.A1W5; ISSN: 00917648
Descriptors: dogma/ planning/ policy/ prairie grouse/ research/ Tympanuchus spp./ gamebird/ grassland/ policy development/ prairie/ species conservation/ wildlife management/ North America/ Tympanuchus
Abstract: We discuss the necessity of a paradigm shift among managers toward dealing with the recovery and management of prairie grouse (Tympanuchus spp). To assure the future of these species, we will need to test dogmatic assumptions about grouse and their management and challenge the demagogues who insist on perpetuating untested "principles." Tolerance for descriptive and qualitative studies is needed. Additionally, managers will need to remove themselves from the box and embrace landowners, theoretical biologists, economists, human-dimensions researchers, marketing and advertising specialists, and many other professionals outside the normal sphere of wildlife management. There is crucial need for a willingness to devise, test, and apply innovative ideas that are not normally considered in the management of grouse species, especially applying management to large areas within ecosystems. A comprehensive plan is needed to guide rangewide prairie grouse management. Planned management systems are needed to provide operational guidance in implementing species plans.

311. **Attitudes of Vermont dairy farmers regarding adoption of management practices for grassland songbirds.**
Troy, A. B.; Strong, A. M.; Bosworth, S. C.; Donovan, T. M.; Buckley, N. J.; and Wilson, M. L.
Wildlife Society Bulletin 33(2): 528-538. (2005)
NAL Call #: SK357.A1W5; ISSN: 00917648
Descriptors: agricultural management practices/ attitudinal surveys/ Champlain Valley/ dairy farms/ forage crops/ grassland songbirds/ hayfields/ agricultural management/ dairy farming/ environmental management/ farmers attitude/ management practices/ songbirds/ Vermont/ Aves/ Passeri
Abstract: In the northeastern United States, most populations of grassland songbirds occur on private lands. However, little information exists about the attitudes of farmers toward habitat management for this guild. To address this information gap, we surveyed 131 dairy farmers in Vermont's Champlain Valley to assess current hayfield management practices and farmers' willingness to adopt more "bird-friendly" practices. Our results showed a clear trend toward earlier and more frequent hayfield cuts. Farmers indicated they have little flexibility to alter the timing of their cuts on most of their land. However, many farmers (49%) indicated a willingness to adopt alternative management practices on at least a small portion of their land. Combined with the fact that many farmers characterized parts of their land as "wasteland," or economically unproductive land, this result suggests that some leeway exists for increasing songbird habitat quality on at least portions of dairy farms. Although significant differences existed in the amount of land for which farmers were willing to adopt alternative management based on herd size, acreage, and experience, the directionality of these relationships could not be established except tentatively for herd size, in which case it appeared that farmers with smaller herds were more likely to dedicate a greater percentage of their land to alternative management. The results of this study likely have relevance to dairy farms throughout the northern-tier dairy states. Given the increasing trend for agricultural land to be converted into housing, we recommend that extension and education efforts target farmers with large hayfield acreages, encouraging the maintenance of high-quality habitat for grassland songbirds.

312. **Avian community responses to fire, grazing, and drought in the tallgrass prairie.**
Zimmerman, John L.
In: Ecology and conservation of Great Plains vertebrates/ Knopf, Fritz L. and Samson, Fred B.; Series: Ecological Studies 125.
New York: Springer-Verlag, 1997; pp. 167-180.

Notes: ISBN 0387948023; ISSN 0070-8356.
NAL Call #: QH540.E288 v.125
Descriptors: conservation/ drought/ fire/ forest fragment/ grazing/ Great Plains/ tallgrass prairie/ terrestrial ecology

313. **Avian community structure among restored riparian habitats in northwestern Mississippi.**
Smiley, Peter C.; Maul, Jonathan D.; and Cooper, Charles M.
Agriculture, Ecosystems and Environment 122(2): 149-156. (2007)
NAL Call #: S601.A34; ISSN: 0167-8809
Descriptors: conservation measures/ ecology/ terrestrial habitat/ land zones/ Aves: habitat management/ restored riparian habitat/ community structure/ riparian habitat/ community structure in restored habitat/ Mississippi/ Yazoo River watershed/ community structure among restored riparian habitat/ Aves/ birds/ chordates/ vertebrates
Abstract: Riparian zones and agricultural fields adjacent to incised streams in northwestern Mississippi are impacted by gully erosion initiated by runoff flowing over unstable streambanks. Currently, installation of erosion control structures (drop pipes) at the riparian zone-agricultural field interface halts gully erosion and simultaneously establishes one of four riparian habitat types. Avian communities were compared among four types of restored habitats and among four seasonal periods in northwestern Mississippi from June 1994 to May 1996. Fifty-seven species were observed among riparian habitats, of which 49% were neotropical migrants. Habitat type and season significantly affected species richness, abundance, and diversity. Species richness, abundance, and diversity increased as habitat area, pool volume, and vertical structure of woody vegetation increased among riparian habitat types. Additionally, species richness, abundance, and diversity increased during spring and fall. The influence of habitat type on avian species richness, abundance, and diversity did not differ among seasons. Present drop pipe installation practices focus on erosion control without consideration of habitat creation. Installation practices can be altered to more effectively incorporate habitat creation to provide the greatest ecological benefits for avian communities within impacted riparian zones. Published by Elsevier B.V.

314. **Avian nest success in relation to past grazing regimes in a montane riparian system.**
Ammon, Elisabeth and Stacey, Peter B.
Condor 99(1): 7-13. (1997)
NAL Call #: QL671.C6; ISSN: 0010-5422
Descriptors: livestock grazing regime/ montane riparian system/ nest predation rates/ nest success/ terrestrial ecology/ vegetation composition/ vegetation structure
Abstract: One possible link between livestock grazing and bird population declines is variation in nest predation rates. To explore this possibility we documented vegetational differences in a montane riparian community subdivided by a fence, one side of which traditionally has been summer-grazed, and the other side rested from grazing for 30 years. We found that ground vegetation was more abundant, willows (Salix spp.) less abundant, and vertical vegetational diversity was lower on the grazed relative to the rested side. Predation rates on real nests were higher on the grazed side compared to the rested side. Artificial nests were placed (1) in mixed conifer vegetation to mimic the most common nest types currently present in the riparian zone, (2) in streamside willows that differed in abundance across the fence, and (3) in old-willow remnants distant from the stream, which were equally abundant on both sides of the fence. All artificial above-ground nests, and ground nests in the old-willow experiment, suffered greater predation rates on the grazed compared to the rested side. Thus, livestock grazing may not only affect availability of nesting substrates for riparian birds by reducing streamside vegetation, but could influence bird populations by facilitating nest predation, possibly by increasing detectability of nests or through changes in predator assemblage.

315. **Avian reproductive success in restored grasslands: Measuring the success of a restoration effort.**
Dunning, John B.; Wee, Bryan; and Houston, Alexandra.
In: 87th Annual Meeting of the Ecological Society of America and the 14th Annual International Conference of the Society for Ecological Restoration, Tucson, Arizona, USA; August 04-09, 2002.; Vol. 87.; pp. 344; 2002.
Descriptors: reproduction/ terrestrial ecology: ecology, environmental sciences/ wildlife management: conservation/ avian reproductive success/ breeding success/ grassland restoration effort success

316. **Avian response to landscape change in fragmented southen Great Plains grasslands.**
Coppedge, Bryan R.; Engle, David M.; Masters, Ronald E.; and Gregory, Mark S.
Ecological Applications 11(1): 47-59. (2001)
NAL Call #: QH540.E23 ; ISSN: 1051-0761
Descriptors: bird communities/ neotropical migrant species/ conservation/ aerial photography/ Juniperus spp/ plains/ prairies/ agricultural conservation programs
Abstract: We examined the dynamics of avian communities associated with fragmented grasslands in Oklahoma USA, using long-term (1965-1995) raw (stop-level) data from the Breeding Bird Survey (BBS). Aerial photography was used to document changes in land cover type and landscape pattern as affected by woody plant (mostly Juniperus virginiana L.) encroachment and concurrent cropland conversions to agricultural grassland under the Conservation Reserve Program (CRP). Rank trend analysis identified species with significant population trends, and canonical correspondence analysis (CCA) was used to identify important environmental gradients froma group of descriptive habitat variables that included land cover type composition and indices of vegetation cover, landscape pattern, and grassland patch structure. Avian community structure shifted along gradients of increasing woody plant cover and indicators of continuing landscape fragmentation. Open-habitat generalists, woodland, and successional scrub species generally increased, whereas many grassland species decreased. In some instances, neotropical migrants responded positively to increasing woody vegetation. Some grassland birds also showed a positive response to increases in agricultural grassland, but only in areas of severe juniper encroachment. Most grassland species exhibited consistent declines related to the influx of woody vegetation and associated landscape

changes. Woody plant encroachment into southern Great Plains grasslands already fragmented by agricultural activity represents a conservation management dilemma. Although woody vegetation in remnant native prairies may provide habitat for some declining neotropical migrants that require shrubby areas, grassland structure and suitability is compromised for many declining grassland-endemic birds. Cropland conversion to agricultural grassland does appear to provide suitable for some grassland species. However, this benefit appears to be limited to areas where woody plant invasion into grasslands is relatively advanced, and may have only a temporary effect, as most CRP areas are likely to return to agricultural production in the near future. Changes are needed in grassland management practices to restrict woody plant encroachment and fragmentation; otherwise, continued declines in grassland bird populations can be expected.

317. **Avian response to warm-season grass use in pasture and hayfield management.**
Giuliano, W. M. and Daves, S. E.
Biological Conservation 106(1): 1-9. (2002)
NAL Call #: S900.B5; ISSN: 00063207.
Notes: doi: 10.1016/S0006-3207(01)00126-4.
Descriptors: abundance/ birds/ disturbance/ grassland/ reproduction/ agricultural management/ avifauna/ conservation management/ pasture/ plant community/ reproduction/ United States/ Ammodramus/ Ammodramus savannarum/ Andropogon/ Andropogon gerardii/ Aves/ Dactylis/ Dactylis glomerata/ Galliformes/ Melospiza melodia/ Panicum/ Panicum virgatum/ Passeridae/ Poaceae/ Pooecetes/ Spizella/ Spizella passerina/ Spizella pusilla
Abstract: Populations of most avian species associated with grasslands have declined in North America over the last few decades. These declines may be related, in part, to changes in species composition and management of pastures and hayfields. The incorporation of native, warm-season grasses into pasture and hayfield management has been suggested as a means of providing suitable habitat for birds in agricultural areas. To examine this, we compared avian abundance, richness, and reproductive success in warm- [i.e. switchgrass (Panicum virgatum) and big bluestem (Andropogon gerardii)] and cool-season grass [i.e. orchardgrass (Dactylis glomerata)] fields on private farms in southwest Pennsylvania. Point counts, nest monitoring, and vegetation sampling were conducted on nine pairs (warm- and cool-season grass) of fields in 1996, and 12 pairs of fields in 1997. Compared with cool-season grass fields, warm-season grass fields supported a greater abundance and richness of birds, including several declining species [e.g. song sparrows (Melospiza melodia), field sparrows (Spizella pusilla), chipping sparrows (Spizella passerina), grasshopper sparrows (Ammodramus savannarum), and vesper sparrows (Pooccetes gramineus)]. Additionally, due to lower nest destruction and depredation rates, birds in warm-season grass fields had greater nest success and fledge rates. The positive response of birds to the use of warm-season grasses in pastures and hayfields appears to be due to the increased availability of undisturbed cover. Thus, the establishment of warm-season grasses in pastures and hayfields should be an avian conservation and management priority. Convincing farmers to use warm-season grasses in their fields should not be difficult, as several state and federal programs fund their establishment, and the use of these grasses increases forage production and farm income.

318. **Avian responses to late-season grazing in a shrub-willow floodplain.**
Stanley, Thomas R. and Knopf, Fritz L.
Conservation Biology 16(1): 225-231. (2002)
NAL Call #: QH75.A1C5 ; ISSN: 0888-8892
Descriptors: late season grazing: avian response/ shrub willow floodplain: habitat
Abstract: Riparian vegetation in western North America provides important habitat for breeding birds and valuable forage for grazing livestock. Whereas a number of studies have documented the response of riparian vegetation to the removal of cattle, few have experimentally evaluated specific grazing systems. We evaluated the responses of vegetation and breeding birds to two cycles of late-season (August-September) grazing followed by 34 months of rest on the Arapaho National Wildlife Refuge, Colorado. We used a before-and-after control-impact (BACI) design, with two control (ungrazed) and two treatment (grazed) pastures composing the experimental units. Vegetation characteristics and bird densities were quantified on sample plots prior to and following two cycles of the treatment. We found no statistical differences in vegetation change and few differences in bird-density change among pastures. Inspection of means for pastures, however, suggests that changes in shrub vigor and spatial pattern differed among ungrazed and grazed pastures and that changes in population density for three of the nine bird species and three guilds studied differed among pastures. Our results suggest that habitat for grazing-sensitive birds may be restored while still allowing late-season grazing, although the rate at which species are recovered will be slower than if all cattle are removed.

319. **Avian use of recently evolved riparian habitat on the lower Snake River, Washington.**
Rocklage, A. M. and Ratti, J. T.
Northwest Science 74(4): 286-293. (2000)
NAL Call #: 470 N81; ISSN: 0029344X
Descriptors: avifauna/ habitat management/ habitat use/ riparian zone/ United States
Abstract: Since 1975 the U. S. Army Corps of Engineers has managed and irrigated 440 ha along the lower Snake River in Washington as mitigation for four dams constructed 1962-1975. We investigated avian use of irrigated Habitat Management Units (HMUs), compared to non-irrigated sites and streams that entered the fiver. We conducted bird surveys at 25 sites in summer and fall 1997 and in spring 1998. We compared avian abundance, species richness, and species diversity among habitats and seasons. We detected an average of 169 birds and 33 species at HMUs, 120 birds and 28 species at non-irrigated sites, and 63 birds and 23 species along streams in all three seasons. We detected an average of 29 species/site in summer, 31 in fall, and 22 in spring. Species diversity, as measured by the Shannon-Wiener function, was higher in summer, indicating that large flocks of a few species were common in fall and spring. These data demonstrated that the lower Snake River is an important stopover site for migrating

birds. We detected an average of 30 more bird species than a study conducted on the same area in 1974. The increase in species richness is attributed to the development of HMUs and to natural succession of palustrine vegetation since dam construction. Future potential changes in reservoir levels, such as breaching of dams, will undoubtedly affect bird communities along the lower Snake River in all seasons. However, our data demonstrated that habitat perturbations can be partially mitigated by habitat enhancement and management.

320. **Benefit of permanent non-fire refugia for Lepidoptera conservation in fire-managed sites.**
Swengel, Ann B. and Swengel, Scott R.
Journal of Insect Conservation 11(3): 263-279. (2007)
NAL Call #: QL362.J68 ; ISSN: 1366-638X
Descriptors: conservation measures/ terrestrial habitat/ land zones/ Lepidoptera: habitat management/ Permanent non fire refugium management in fire managed sites/ grassland/ prairie habitat/ Wisconsin/ Insecta/ arthropods/ insects/ invertebrates/ Lepidopterans
Abstract: From the early 1990s through 2005, we conducted butterfly transect surveys annually at the same sites in three regions of Wisconsin. We compared specialist butterfly population indices at three sites where a permanent non-fire refugium (a unit kept unburned through cycles of rotational fire elsewhere in the site) was established during this study to indices at comparison sites (which had consistent management throughout this study) in the same region. At Crex Meadows (12,180 ha), all significant changes in specialist numbers skewed toward relatively higher abundance in the refugium (14 ha, last burned in 1988) during the later period (1998-2005) versus 10 comparison subsites (fire-managed in both periods) than expected from observations in the earlier period (1991-97). The same pattern occurred in the refugium (4 ha) at Bauer-Brockway (125 ha), after the rest of that unit (9 ha) had its first management fire. Population trends were positive in these refugia, while the comparison sites usually had less favorable trends, or otherwise had similar trends. At Muralt Bluff (25 ha), regal fritillaries (Speyeria idalia) were more concentrated in the refugium (3 ha, last burned in 1991) during the earlier period but were more abundant in both periods in the refugium than the other units there (fire-managed in both periods). In the earlier period at Muralt Bluff, this species significantly declined, the opposite trend of comparison sites (which always had never-burned refugia), but significantly increased in the later period, similar to comparison sites. The refugium did not benefit Ottoe skipper (Hesperia ottoe), which declined significantly in the earlier period and was not recorded in the later period. Formerly burned units began functioning as refugia only >6-8 years after last fire and continued to increase in benefit for years after that. In fire-managed and fire-prone sites, we recommend the creation of permanent non-fire refugia for Lepidoptera conservation, placed where the most specialists will benefit and managed unintensively (e.g. mowing) if needed.

321. **Benefits of Farm Bill grassland conservation practices to wildlife.**
Haufler, Jonathan B. and Ganguli, Amy C.
In: Fish and Wildlife Response to Farm Bill Conservation Practices; Bethesda, MD: The Wildlife Society, 2007.
ftp://ftp-fc.sc.egov.usda.gov/NHQ/nri/ceap/fwfb5.pdf
Descriptors: Farm Bill/ conservation practices/ Farm Bill/ terrestrial habitat/ wildlife species/ wildlife management
Abstract: This publication provides details on conservation practices applied to rangelands with prescribed grazing, prescribe d burning, range planting, and restoration of declining habitats showing some of the greatest benefits to wildlife. Prescribed grazing has been shown to produce both positive and negative responses by wildlife. Prescribed burning has also been shown to have both positive and negative effects, but benefits generally outweigh detriments of this practice. Range planting and restoration of declining habitats have been shown to benefit wildlife, but determining appropriate comparisons can be problematic. Grassland ecosystems have been found to need greater heterogeneity and better representation of historical ecosystem diversity, challenges that make comparisons to “native” ecosystem conditions complex. Additional practices including fencing, brush management, tree planting and shelterbelts, and pest management can all be used to improve wildlife habitat, although each can also cause problems for wildlife in certain situations. Bird responses to practices have received the greatest attention, with generally inadequate information available for most other taxa. Even for birds, considerable information is lacking including effects of practices on many species, effects of surrounding landscape factors on wildlife responses, and responses in reproductive rates or survival rates to various practices. Yet, rangeland practices offer some of the greatest potential for conservation benefits to wildlife. Grassland ecosystems and wildlife are considered among the most at risk, and rangeland practices can be used to maintain, enhance, and restore needed plant communities and habitat conditions.

322. **Benefits of protective fencing to plant and rodent communities of the western Mojave Desert, California.**
Brooks, Matthew L.
Environmental Management 19(1): 65-74. (1995)
NAL Call #: HC79.E5E5 ; ISSN: 0364-152X
Descriptors: alien grass/ annual plant biomass/ community diversity/ desert ecosystem/ desert tortoise research natural area/ forb biomass/ human disturbance/ Kern County/ livestock grazing/ Merriami's kangaroo rat/ method/ protective effect
Abstract: Human disturbance in the western Mojave Desert takes many forms. The most pervasive are livestock grazing and off-highway vehicle use. Over the past few decades several areas within this region have been fenced to preclude human disturbance. These areas provide opportunities to study the impact of human activities in a desert ecosystem. This paper documents the response of plant and small mammal populations to fencing constructed between 1978 and 1979 at the Desert Tortoise Research Natural Area, Kern County, California. Aboveground live annual plant biomass was generally greater inside than outside the fenced plots during April 1990, 1991, and 1992. The alien grass Schismus barbatus was a notable exception, producing more biomass in the unprotected area. Forb biomass was greater than that of alien annual grasses inside the fence during all three years of the study.

Outside the fence, forb biomass was significantly higher than that of alien grasses only during spring 1992. Percent cover of perennial shrubs was higher inside the fence than outside, while no significant trend was detected in density. There was also more seed biomass inside the fence; this may have contributed to the greater diversity and density of Merriam's kangaroo rats (Dipodomys merriami), long-tailed pocket mice (Chaetodipus formosus), and southern grasshopper mice (Onychomys torridus) in the protected area. These results show that protection from human disturbance has many benefits, including greater overall community biomass and diversity. The significance and generality of these results can be further tested by studying other exclosures of varying age and configurations in different desert regions of the southwestern United States.

323. **Benefits of rotational grazing and dense nesting cover for island-nesting waterfowl in southern Quebec.**
Lapointe, S.; Giroux, J. F.; Belanger, L.; and Filion, B.
Agriculture, Ecosystems and Environment 78(3): 261-272. (2000)
NAL Call #: S601.A34; ISSN: 0167-8809
Descriptors: grazing/ nests/ agricultural practices/ wildlife management/ environment management/ nature conservation/ aquatic birds/ breeding sites/ islands/ population density/ population structure/ dominant species/ habitat improvement/ vegetation cover/ herbivores/ agriculture/ man-induced effects/ Anatidae/ Anas strepera/ Anas acuta/ Canada, Quebec/ Canada, St. Lawrence R./ Canada/ ducks/ cattle grazing/ rotational grazing/ dense nesting cover/ northern pintail/ gadwall
Abstract: Intensification of agricultural practices is an important factor responsible for the decline of duck populations throughout North America. More than 200 islands covering a total of 5000 ha are found in the St. Lawrence River between Montreal and Trois-Rivieres in southern Quebec. The value of these islands as duck nesting habitat, however, is often limited by cattle grazing. The effects of two types of habitat improvements, rotational grazing and establishment of dense nesting cover (DNC), on island-nesting waterfowl was studied from 1992 to 1994. Four treatments were compared: idle fields with no vegetation improvement but exclusion of cattle, improved pastures with seeding of forage plants for cattle, DNC fields with improved cover for ducks and exclusion of cattle and unimproved pastures used after the duck nesting season. Before habitat improvements, grazing by cattle reduced dry mass of green vegetation by 53% relative to ungrazed plots. No difference was found in the biomass of live (green) and dead (residual) vegetation among the islands' sections before treatments. Nest density and the number of expected nests based on the area covered by each habitat were also similar among sections before treatment. Gadwall (Anas strepera L.), mallard (Anas platyrhynchos L.), and pintail (Anas acuta L.) were the most abundant species nesting on the islands and this was not affected by treatments. Two years after habitat improvements, the number of duck nests increased. Idle fields and 2-year old DNC had greater visual obstruction, more residual vegetation and more litter. Densities of 2.8 and 7.0 nests ha^{-1} with 69 and 82% Mayfield nest success were recorded in the idle and DNC fields, respectively. Nest success was low in improved pasture where a large proportion of nests were trampled (33%) or depredated (28%). Fencing permitted growth of emergent vegetation which enabled over-water nesting by ducks. These results indicate that with appropriate management, coexistence of cattle and nesting waterfowl is possible on islands of the St. Lawrence River.

324. **Big game-livestock relationships study: Vegetal change in the absence of livestock grazing on deer winter range in Red Butte and Emigration Canyons, Utah.**
Austin, D. D. and Urness, P. J. Utah State Dept. Natural Resources, 1985. 18 p.
Descriptors: cover/ deer, mule/ grazing/ history/ interspecies relationships/ oak/ vegetation/ wildlife-habitat relationships/ wildlife-livestock relationships/ Utah/ Red Butte Canyon/ Emigration Canyon/ Wasatch Mountains
Abstract: Objective was to determine change, if any, in the vegetation of Emigration Canyon resulting from withdrawal of livestock grazing in contrast to Red Butte Canyon that has been ungrazed since 1905.

325. **Big sagebrush: A sea fragmented into lakes, ponds, and puddles.**
Welch, B. L.
Provo, UT: Rocky Mountain Research Station, Forest Service, U.S. Department of Agriculture; General Technical Report-RMRS 144, 2005. 218 p.
Notes: 02775786 (ISSN).
Descriptors: Artemisia tridentata/ canopy cover relationships/ distribution/ fire interval/ nutritive value
Abstract: Pioneers traveling along the Oregon Trail from western Nebraska, through Wyoming and southern Idaho and into eastern Oregon, referred to their travel as an 800 mile journey through a sea of sagebrush, mainly big sagebrush (Artemisia tridentata). Today approximately 50 percent of the sagebrush sea has given way to agriculture, cities and towns, and other human developments. What remains is further fragmented by range management practices, creeping expansion of woodlands, alien weed species, and the historic view that big sagebrush is a worthless plant. Two ideas are promoted in this report: (1) big sagebrush is a nursing mother to a host of organisms that range from microscopic fungi to large mammals, and (2) many range management practices applied to big sagebrush ecosystems are not science based.

326. **Biodiversity across a rural land-use gradient.**
Maestas, J. D.; Knight, R. L.; and Gilgert, W. C.
Conservation Biology 17(5): 1425-1434. (2003)
NAL Call #: QH75.A1C5 ; ISSN: 08888892
Descriptors: biodiversity/ domestic species/ ecological impact/ land use change/ native species/ ranching/ urban development/ Canis familiaris/ Canis latrans/ Felis catus
Abstract: Private lands in the American West are undergoing a land-use conversion from agriculture to exurban development, although little is known about the ecological consequences of this change. Some nongovernmental organizations are working with ranchers to keep their lands out of development and in ranching, ostensibly because they believe biodiversity is better protected on ranches than on exurban developments. However, there are several assumptions underlying this

approach that have not been tested. To better inform conservation efforts, we compared avian, mesopredator, and plant communities across the gradient of intensifying human uses from nature reserves to cattle ranches to exurban developments. We conducted surveys at randomly selected points on each type of land use in one Colorado watershed between May and August of 2000 and 2001. Seven bird species, characterized as human commensals or tree nesters, reached higher densities (all $p < 0.02$) on exurban developments than on either ranches or reserves. Six bird species, characterized as ground and shrub nesters, reached greater densities (all $p < 0.015$) on ranches, reserves, or both of these types of land use than on exurban developments. Domestic dogs (Canis familiaris) and house cats (Felis catus) were encountered almost exclusively on exurban developments, whereas coyotes (Canis latrans) were detected more frequently ($p = 0.047$) on ranchlands than exurban developments. Ranches had plant communities with higher native species richness and lower non-native species richness and cover than did the other types of land use (all $p < 0.10$). Our results support the notion that ranches are important for protecting biodiversity and suggest that future conservation efforts may require less reliance on reserves and a greater focus on private lands.

327. **Biodiversity attributes of different sward structures in grazed grassland.**
McIntyre, S.
Ecological Management and Restoration 6(1): 71-73. (2005); ISSN: 1442-7001
Descriptors: biodiversity/ grass sward/ grasslands/ grazing/ habitats/ nature conservation/ plant ecology/ wild animals/ wildlife conservation/ invertebrates/ vertebrates
Abstract: This paper discusses the effects of grazed grassland structure on plant biodiversity, and vertebrate and invertebrate habitats. It is concluded that the presence of all structural types is optimum for the conservation of biodiversity, although the extent of tall patches is likely to be limiting to biodiversity conservation, owing to the large number of species preferring tall grassland structure and the tendency for these habitats to be eliminated by grazing.

328. **Biogeographic and conservation implications of late quaternary pygmy rabbits (Brachylagus idahoensis) in eastern Washington.**
Lyman, R. L.
Western North American Naturalist 64(1): 1-6. (2004)
NAL Call #: QH1.G7; ISSN: 15270904
Descriptors: agriculture/ biogeography/ Brachylagus idahoensis/ conservation/ grazing/ pygmy rabbit/ Washington/ Bos taurus/ Oryctolagus cuniculus/ Vertebrata
Abstract: Five implications of a biogeographic model of pygmy rabbits (Brachylagus idahoensis) in eastern Washington proposed in 1991 are confirmed by 11 new late-Quaternary records. Pygmy rabbits from eastern Oregon colonized eastern Washington during the late Pleistocene and occupied their largest range during the middle and late Holocene. Disjunction of the eastern Washington population from that in eastern Oregon occurred during at least the late Holocene. Nineteenth-century cattle grazing and 20th-century agricultural practices reduced habitat preferred by pygmy rabbits. Conservation of the small remaining population of pygmy rabbits will necessitate altered land use practices.

329. **Bird and small mammal populations in a grazed and ungrazed riparian habitat in Idaho.**
Medin, D. E. and Clary, W. P.
Ogden, Utah: US Department of Agriculture, Forest Service, Intermountain Research Station; Research Paper INT-425, 1990. 10 p.
Notes: ISSN 0886-7380.
NAL Call #: A99.9 F764U
Descriptors: wildlife/ birds/ mammals/ habitats/ rangelands/ riparian buffers/ grazing/ Idaho
This citation is from AGRICOLA.

330. **Bird responses to harvesting switchgrass fields for biomass.**
Best, Louis B. and Murray, Les D.
Transactions of the North American Wildlife and Natural Resource Conference 69: 229-235. (2004)
NAL Call #: 412.9 N814; ISSN: 0078-1355
Descriptors: commercial activities/ conservation measures/ reproduction/ ecology/ community structure/ man-made habitat/ land zones/ Aves: farming and agriculture/ biomass/ harvest/ switchgrass/ nesting success/ habitat management/ reproductive productivity/ relative abundance/ cultivated land habitat/ Iowa/ Southern Iowa Drift Plain/ Aves/ birds/ chordates/ vertebrates

331. **Birds as grazing indicator species in southeastern Arizona.**
Bock, C. E. and Webb, B.
Journal of Wildlife Management 48(3): 1045-1049. (1984)
NAL Call #: 410 J827; ISSN: 0022-541X
Descriptors: Eremophila alpestris/ Aimophila cassinii/ Chondestes grammacus/ Ammodramus savannarum/ grassland/ density/ habitat/ environmental condition

332. **Birds of southwestern grasslands: Status, conservation, and management.**
Merola-Zwartjes, M.
In: Assessment of grassland ecosystem conditions in the southwestern United States: Wildlife and fish - Volume 2, Gen. Tech. Rep. RMRS-GTR-135: Vol. 2/ Finch, Deborah M., editor; Fort Collins, CO: U.S. Forest Service, 2004. 71-140.
Notes: ISSN: 0277-5786.
Descriptors: grasslands/ ecological assessment/ United States, southwestern region/ ecosystem conditions/ wildlife/ fish/ birds/ mammals/ Arizona/ New Mexico/ grassland avifauna/ desert grasslands/ grassland bird species
Abstract: In the Southwestern United States, the grassland avifauna is collectively composed of a mixture of species found primarily in desert grasslands, shortgrass steppe, wet meadows, and alpine tundra (as used here, desert grasslands incorporate both arid grasslands and desert shrub grasslands). Of these habitats, desert grasslands and shortgrass steppe are the most extensive and support the greatest number of grassland bird species. Desert grasslands are patchily distributed across the southern

halves of New Mexico and Arizona, and shortgrass steppe is a component of the Great Plains system that in the Southwest region extends across the eastern half of New Mexico into the panhandles of Texas and Oklahoma. Alpine tundra and particularly wet meadows are limited in geographic extent and support relatively few species of grassland birds in this region (see chapter 2 for detailed maps of the distribution of grassland types). Though their geographic extent may vary, all of these grassland systems provide habitat for distinctive grassland bird species in the Southwest and are therefore worthy of management concern.
This citation is from Treesearch.

333. **Bobwhite habitat use under short duration and deferred-rotation grazing.**
Wilkins, R. N. and Swank, W. G.
Journal of Range Management 45(6): 549-553. (1992)
NAL Call #: 60.18 J82 ; ISSN: 0022-409X.
http://jrm.library.arizona.edu/Volume45/Number6/azu_jrm_v45_n6_549_553_m.pdf
Descriptors: Colinus virginianus/ habitats/ grazing/ semiarid zones/ rangelands/ wildlife management/ population density/ Texas
Abstract: A study was conducted in the South Texas Plains to contrast the short-term impacts of short duration grazing (SDG) and deferred-rotation grazing (DG) systems on habitats for northern bobwhites (Colinus virginianus). Foliar cover, species richness, and structural attributes of the vegetation were compared at radio-location sites (quail-used) and sites along random transects (available) within and between the 2 grazing systems. Quail-used sites were characterized by increased species richness, forb cover, and bare ground and decreased plant height and litter accumulations. Principal components analysis revealed that available sites on the SDG during the fall and winter were scored higher along a habitat gradient which had greater species richness and forb cover combined with diminished litter accumulations. This habitat gradient explained 41% of the variation in the ground layer variables. In addition, mark-recapture studies suggested positive population responses on the SDG during the first year following its initiation. Short-term improvements in bobwhite habitats may be realized by initiating SDG on some semiarid rangelands.
This citation is from AGRICOLA.

334. **The Botteri's sparrow and exotic Arizona grasslands: An ecological trap or habitat regained?**
Jones, Z. F. and Bock, C. E.
Condor 107(4): 731-741. (2005)
NAL Call #: QL671.C6; ISSN: 00105422
Descriptors: Botteri's sparrow/ ecological trap/ exotic grasses/ habitat quality/ habitat structure/ livestock grazing/ reproductive success/ Aimophila botterii/ Aves/ Eragrostis/ Passeridae/ Poaceae/ Sacaton/ Sporobolus wrightii
Abstract: The Botteri's Sparrow (Aimophila botterii) is a bird of tall grasslands that temporarily disappeared from Arizona following heavy livestock grazing in the 1890s. Its return was noted first in sacaton (Sporobolus wrightii), an uncommon native floodplain tallgrass often >2 m in height, and subsequently in stands of exotic lovegrasses (Eragrostis spp.) spreading into adjacent uplands that otherwise supported shorter native grasslands. We examined whether the exotic grasslands provided suitable breeding habitat for Botteri's Sparrows, compared to native grasslands. We counted birds for three years on 18 plots, monitored 314 nests on 323 home ranges, banded 583 birds, and measured vegetation on plots and home ranges, and at nests and fledgling locations. Abundance and site fidelity were positively associated with grass height and cover, being greatest in sacaton, intermediate in exotics, and lowest in native upland grasslands. The three habitats did not differ in young fledged per capita. Vegetation cover on Botteri's Sparrow home ranges did not differ from the surrounding available habitat, but locations of flightless recently fledged young included taller and more dense vegetation than either nest sites or random locations, especially in sparsely vegetated native grasslands. These results suggest that fledglings required substantial cover to avoid predation while they completed development. Far from being an ecological trap, the exotic lovegrasses apparently are providing essential cover for the Botteri's Sparrow in Arizona, perhaps allowing it to regain an abundance similar to what existed regionally prior to overgrazing of the late 19th Century. © The Cooper Ornithological Society 2005.

335. **Breeding biology of Henslow's sparrows on reclaimed coal mine grasslands in Kentucky.**
Monroe, M. S. and Ritchison, G.
Journal of Field Ornithology 76(2): 143-149. (2005)
NAL Call #: 413.8 B534; ISSN: 02738570
Descriptors: Ammodramus henslowii/ breeding/ Henslow's sparrow/ nesting/ reclaimed surface mine/ vegetation
Abstract: Populations of Henslow's Sparrows (Ammodramus henslowii) are declining, and loss of habitat is a likely factor. Coal mine reclamation has created grassland habitat in Kentucky and elsewhere, and information is needed concerning the use of these areas by Henslow's Sparrows. We compared the behavior and ecology of populations on reclaimed sites and non-mined sites in west-central Kentucky during the 2000 and 2001 breeding seasons. Territories were smaller on the reclaimed sites than unmined sites, perhaps due to differences in habitat quality. Insect sweeps revealed more prey biomass on reclaimed sites than unmined sites. Twenty-eight of 48 nests (58%) fledged at least one young, and nesting success was similar on reclaimed and unmined sites. Mean clutch size was 3.75, with no difference between reclaimed and unmined sites. Similarly, the mean number of fledglings per nest was similar on reclaimed and unmined sites. Multivariate analysis revealed differences in the characteristics of vegetation on reclaimed areas and unmined areas. Reclaimed areas had more grass cover and greater vegetation density, probably due to differences in management history (i.e., mowing or burning) and species composition. Our results indicate that the nesting success of Henslow's Sparrows on reclaimed surface mines in Kentucky is comparable to that on unmined areas. As such, the thousand of hectares of reclaimed surface mines in Kentucky and elsewhere could play an important role in stabilizing populations of Henslow's Sparrows.

336. **Breeding bird abundance and habitat on two livestock grazing regimes in North Dakota.**
Buskness, Natoma A.; Murphy, Robert K.; Higgins, Kenneth F.; and Jenks, Jonathan
South Dakota Academy of Science: Proceedings 80 (2001)
NAL Call #: 500 SO82; ISSN: 0096-378X
Descriptors: birds/ breeding/ wildlife habitat/ prairies/ North Dakota
Abstract: To help sustain prairie wildlife habitat on privately owned lands in North Dakota, prescribed rotational grazing (RG) systems have been implemented as part of the Prairie Pothole Joint Venture (PPJV) of the North American Waterfowl Management Plan. However, impacts of these systems on nongame breeding birds are unmeasured. During 1996 and 1997 we assessed the relative abundance, species richness, and habitat of breeding birds especially passerines on five PPJV-prescribed RG pastures in central and northwestern North Dakota. Each RG pasture was paired with a nearby traditional, continuous-grazed (CG) pasture for comparison. Using 5-minute point counts on 100-m radius plot to survey breeding birds, we recorded 30 species in 1996 and 29 species in 1997. We detected no differences in relative abundance or species richness between grazing regimes in 1996 (P = 0.29 and 0.58), but relative abundance and species richness were greater on RG pastures than on CG pastures in 1997 (P = 0.08 and 0.04), a relatively dry year. A group of five species (savannah sparrow [Passerculus sandwichensis], grasshopper sparrow [Ammodramus savannarum], western meadowlark [Sturnella neglecta], bobolink [Dolichonyx oryzivorus], Baird's sparrow [Ammodramus bairdii]) considered sensitive to heavy grazing in previous studies had a higher collective mean abundance on RG than on CG in 1997 ($\bar{x}$ = 4.29 and 2.75 breeding pairs/point count, P = 0.03). Litter depth also was greater on RG than on CG in 1997 ($\bar{x}$ = 2.4 and 1.4 cm, P = 0.04). PPJV grazing systems help conserve native prairie by improving its economic viability without diminishing habitat values for grassland passerines, and in dry years may enhance breeding bird habitat compared to that on traditional grazing systems especially for grazing-sensitive species such as bobolink and Baird's sparrow.

337. **Breeding bird communities of Midwestern prairie fragments: The effects of prescribed burning and habitat area.**
Herkert, J. R.
Natural Areas Journal 14: 128-135. (1994)
NAL Call #: QH76.N37
Descriptors: wildlife habitat/ breeding birds/ agricultural practices/ fire
Abstract: Compared the effects of habitat area and prescribed burning on breeding bird communities using Midwestern prairie fragments.

338. **Breeding bird community responses to a small shrubland-to-prairie restoration.**
Lerczak, Thomas V.
Transactions of the Illinois State Academy of Science 97(2): 135-140. (2004)
NAL Call #: 500 IL6; ISSN: 0019-2252
Descriptors: conservation measures/ ecology/ terrestrial habitat/ land zones/ Aves: habitat management/ community structure/ breeding community/ grasslands/ tallgrass prairie/ shrubland conditions/ Illinois/ Mason County/ shrubland restoration/ birds/ chordates/ vertebrates
Abstract: Fifteen-minute point counts were used to sample bird communities within and adjacent to a 6-ha site at the 169-ha Revis Hill Prairie Nature Preserve, in Mason County, central Illinois. In 1994 and 1995, the study site was dominated by shrublands (primarily Maclura pomifera, Crataegus spp., Cornus spp., and Gleditsia triacanthos) surrounded by second-growth woodland. Counts were repeated in 2001 and 2002 after 3 ha of shrubland had been restored to tallgrass prairie (dominated by Andropogon gerardi, Sorghastrum nutans, and Solidago canadensis). For all years, 43 bird species were recorded and categorized as grassland (5), shrubland (12), or woodland (26) species. The Brown-headed Cowbird (Molothrus ater) was the most numerous species. An Index of Similarity comparing bird communities among all years ranged from 0.70 to 0.80, indicating a consistent similarity among pre- and post-restoration bird communities, both of which were dominated by birds characterized as woodland and shrubland species. Birds detected by sight alone indicated few species, other than the American Goldfinch (Carduelis tristis) and Common Yellowthroat (Geothlypis trichas), actually seemed to use the prairie restoration. Because true grassland birds tend to require large blocks of habitat, this small prairie restoration provides inadequate grassland breeding habitat. Resource managers should consider such effects during the planning phases of small restoration projects, especially if their goals are to serve more than botanical interests.

339. **Breeding bird response to cattle grazing of a cottonwood bottomland.**
Sedgwick, J. A. and Knopf, F. L.
Journal of Wildlife Management 51(1): 230-237. (1987)
NAL Call #: 410 J827; ISSN: 0022-541X
Descriptors: breeding/ birds/ cattle/ grazing/ cottonwood/ fences
Abstract: We studied avian habitat relationships and the impact of grazing on breeding densities of selected migratory birds in a plains cottonwood (Populus sargentii) bottomland in northeastern Colorado. Five 16-ha plots served as controls and 5 were fenced and fall-grazed October-November 1982-84 following a season of pre-treatment study in the spring of 1982. We focused our analysis on bird species directly dependent on the grass-herb-shrub layer of vegetation for foraging, nesting, or both. The guild included house wren (Troglodytes aedon), brown thrasher (Toxostoma rufun), American robin (Turdus migratorius), common yellowthroat (Geothlypis trichas), yellow-breasted chat (Icteria virens), and rufous-sided towhee (Pipilo erythropthalmus). Moderate, late-fall grazing had no detectable impact on calculated densities of any of the 6 species, implying that proper seasonal grazing of a cottonwood floodplain is, at least initially (3 years), compatible with migratory bird use of a site for breeding. Habitat associations suggested that common yellowthroats and yellow-breasted chats were most unique and most likely to respond negatively to higher levels of grazing. We suggest that these latter 2 species are appropriate ecological indicators of the quality of ground-shrub vegetation as breeding bird habitats in lowland floodplains of the Great Plains.

340. **Breeding bird response to varying amounts of basal area retention in riparian buffers.**
Hanowski, J.; Danz, N.; Lind, J.; and Niemi, G.
Journal of Wildlife Management 69(2): 689-698. (2005)
NAL Call #: 410 J827; ISSN: 0022541X.
Notes: doi: 10.2193/0022-541X(2005)069 [0689:BBRTVA]2.0.CO;2.
Descriptors: birds/ breeding/ buffers/ forest/ harvest/ Minnesota/ riparian/ streams/ avifauna/ basal area/ buffer zone/ conservation management/ ecological impact/ riparian forest/ timber harvesting/ Minnesota/ Aves
Abstract: We examined response of breeding bird communities to forest harvest that removed varying amounts of tree basal area from riparian buffers on a 2- to 4-m-wide stream in northern Minnesota, USA. We compared bird species and communities in 30-m-wide riparian buffers along the stream. Buffers were established within plots in which upland forests were clear-cut (basal area 2 m^2/ha) according to standard local forest management practice. Buffers had 4 treatments (3 plots/treatment): (1) no harvest (riparian control); (2) reduction of basal area to an average of 7-10 m^2/ha; (3) reduction of basal area to an average of 2 m^2/ha (defined as a clear-cut); and (4) control (no harvest in either riparian buffer or adjacent upland). Bird surveys were conducted 1 year prior to harvest and for 4 years after harvest.Results revealed a significant response of the bird community to varying amounts of tree basal area retention in the riparian area. Univariate (analysis of variance) and multivariate (principal response curves [PRC]) analyses showed that in the first year after harvest, bird community composition in the riparian buffers changed in all 3 treatments relative to the control plots, and continued to diverge over time. More species and individuals, primarily those species associated with edge or early-successional habitats, colonized the harvested riparian buffers after treatment. In contrast, the number of birds and species that inhabit interior forests declined in the riparian buffers. Results suggest that any amount of harvest in riparian buffers next to clear-cut upland forest will affect breeding bird communities along small headwater streams. Because individual bird species are differentially affected by riparian forest harvest, management should consider the desired future condition of the forest and choose a harvest prescription to benefit the desired avifauna community.

341. **Brown-headed cowbird behavior and movements in relation to livestock grazing.**
Goguen, Christopher B. and Mathews, Nancy E.
Ecological Applications 11(5): 1533-1544. (2001)
NAL Call #: QH540.E23; ISSN: 1051-0761
Descriptors: commercial activities/ nutrition/ feeding behavior/ reproduction/ reproductive behavior/ associations/ parasites diseases and disorders/ land and freshwater zones/ Passeriformes: farming and agriculture/ conservation measures/ nest parasitism/ Molothrus ater/ brood parasites/ livestock grazing/ conservation/ New Mexico/ Colfax County/ Passeriformes/ Aves/ birds/ chordates/ vertebrates
Abstract: The Brown-headed Cowbird (Molothrus ater) is a widespread brood parasite which often engages in a commensalistic feeding relationship with domestic livestock. We studied the behavior of female cowbirds breeding in pinyon-juniper woodlands in New Mexico, USA, on two adjacent sites, one an active cattle ranch, and the other a site that was not grazed by domestic livestock throughout the songbird breeding season. In 1994, we conducted morning and afternoon surveys of cowbird abundance in pinyon-juniper and prairie habitats; from 1995 to 1997 we used radio telemetry to monitor daily and seasonal movement and behavioral patterns of female cowbirds. Our objectives were to measure how closely cowbird feeding behavior was linked to livestock grazing, and how the presence or absence of active livestock grazing within a female's breeding range influenced diurnal patterns of behavior. During morning surveys, we detected cowbirds primarily in pinyon-juniper habitat, but in similar numbers in the ungrazed and actively grazed woodlands. In the afternoon, we detected cowbirds feeding almost exclusively in actively grazed prairies but found that they deserted those sites when cattle were removed in early July. Radio telemetry confirmed that individual females were commuting daily between these habitats. Females (n = 30) were generally located in pinyon-juniper habitats from 0500 to ≃1200, presumably breeding. Females that bred within actively grazed pinyon-juniper habitat often fed on the ground with livestock on their morning ranges, while those breeding in ungrazed habitat did not. In total, 98% of cowbird feeding observations occurred with livestock. Although most females commuted <3 km between breeding and feeding ranges, some individuals with breeding ranges located toward the center of the ungrazed property averaged 7.7 km. When cattle were rotated out of the main feeding pasture in early July, females immediately extended their commutes by ≃1.2 km to access remaining actively grazed pastures. Overall home range sizes were large (160-4344 ha) and tended to increase with distance between the females' breeding range and active livestock grazing. This increase was reflected mainly by differences in feeding range sizes rather than breeding range sizes. The observed link between cowbird behavior and the distribution of livestock suggests that in regions where livestock grazing is the dominant land use, manipulations of livestock grazing patterns may provide an effective tool to manage cowbird parasitism.

342. **Burning and grazing effects on bobwhite foods in the southeastern coastal plain.**
Lewis, C. E. and Harshbarger, T. J.
Wildlife Society Bulletin 14(4): 455-459. (1986)
NAL Call #: SK357.A1W5; ISSN: 0091-7648
Descriptors: Pinus palustris/ Pinus elliottii/ Colinus virginianus/ prescribed burning/ habitat destruction/ wildlife management/ grazing/ Georgia
This citation is from AGRICOLA.

343. **Butterfly responses to habitat edges in the highly fragmented prairies of central Iowa.**
Ries, L. and Debinski, D. M.
Journal of Animal Ecology 70(5): 840-852. (Sept. 2001)
NAL Call #: 410 J828
Descriptors: edge permeability/ habitat fragmentation/ lepidoptera/ tracking study
Abstract: 1. The behaviour of two butterfly species, a habitat specialist (Speyeria idalia) and a habitat generalist (Danaus plexippus), was tracked at four prairie edges to determine the extent to which edges act as a barrier to emigration. The four edge types studied were crop, road, field and treeline. The edges differed in structure ranging from high-contrast (treeline) to low-contrast (field). 2. S. idalia, the habitat specialist, responded strongly to all

edges, even those with low structural contrast. However, S. idalia's response was strongly affected by conspecific density at crop and field edges; individuals were less likely to exit from high density plots. S. idalia responded to edges both by turning to avoid crossing them, and returning to the plot if they had crossed. 3. D. plexippus responded strongly only to treeline edges. Wind direction and time of year were important factors influencing behaviour at edges for this species. Conspecific density was not a significant factor affecting their behaviour. D. plexippus responded to edges by not crossing them, but rarely returned once they had crossed. 4. In highly fragmented landscapes, such as the one in which this study occurred, butterflies which show little or no response to edges may exhibit high emigration rates because of the high probability of encountering an edge in small habitat patches. Butterflies may respond strongly to even subtle habitat boundaries, but those responses may be modified by the edge structure, local environment or other conditions. Therefore, modifying edge structure may be a way to influence emigration rates, making it a useful tool for conservation.

344. **Butterfly responses to prairie restoration through fire and grazing.**
Vogel, J. A.; Debinski, D. M.; Koford, R. R.; and Miller, J. R.
Biological Conservation 140(1-2): 78-90. (2007)
NAL Call #: S900.B5; ISSN: 00063207.
Notes: doi: 10.1016/j.biocon.2007.07.027.
Descriptors: burning/ butterflies/ grazing/ Insect conservation/ restoration/ tallgrass prairie
Abstract: The development of land for modern agriculture has resulted in losses of native prairie habitat. The small, isolated patches of prairie habitat that remain are threatened by fire suppression, overgrazing, and invasion by non-native species. We evaluated the effects of three restoration practices (grazing only, burning only, and burning and grazing) on the vegetation characteristics and butterfly communities of remnant prairies. Total butterfly abundance was highest on prairies that were managed with burning and grazing and lowest on those that were only burned. Butterfly species richness did not differ among any of the restoration practices. Butterfly species diversity was highest on sites that were only burned. Responses of individual butterfly species to restoration practices were highly variable. In the best predictive regression model, total butterfly abundance was negatively associated with the percent cover of bare ground and positively associated with the percent cover of forbs. Canonical correspondence analysis revealed that sites with burned only and grazed only practices could be separated based on their butterfly community composition. Butterfly communities in each of the three restoration practices are equally species rich but different practices yield compositionally different butterfly communities. Because of this variation in butterfly species responses to different restoration practices, there is no single practice that will benefit all species or even all species within habitat-specialist or habitat-generalist habitat guilds.

345. **Can livestock be used as a tool to enhance wildlife habitat?**
Severson, Kieth E.
Fort Collins, Colo.: Rocky Mountain Forest and Range Experiment Station, Forest Service, U.S. Department of Agriculture; General Technical Report-RM 194, 1990. 123 p.
Notes: 43rd Annual Meeting of the Society for Range Management, Reno, Nev., February 13, 1990.
NAL Call #: aSD11.A42 no. 194
Descriptors: livestock/ Cervus elaphus/ Antilocapra americana/ Odocoileus hemionus/ forage/ grazing/ Cervus elaphus nelsoni/ Centrocercus urophasianus
This citation is from AGRICOLA.

346. **A case study of changing land use practices in the Northern Great Plains, U.S.A.: An uncertain future for waterbird conservation.**
Higgins, K. F.; Naugle, D. E.; and Forman, K. J.
Waterbirds 25(SPECIAL PUBL.2): 42-50. (2002)
NAL Call #: QL671; ISSN: 07386028
Descriptors: agriculture/ cropland/ grassland/ land use/ nesting cover/ South Dakota/ wetlands/ agriculture/ grassland/ habitat conservation/ land use change/ waterfowl/ wetland/ United States
Abstract: Wetland and grassland habitats of the northern Great Plains are a primary breeding ground for waterbirds in North America. Native mixed grass prairies that were historically used for cattle grazing have met with changing social and economic pressures that put the remaining 40% of this resource at high risk of tillage. In this paper, we describe the current state of our waning rural societies, characterize impacts of land use change on waterbird habitats, and discuss conservation actions to benefit waterbirds. Recent population statistics indicate that a record number of farmers facing low commodity prices are selling their farms and moving to urban centers for employment. Other farmers are shifting from diversified agriculture to monoculture grain farming to take advantage of farm programs that provide incentives to bring marginal land into production. Additional data indicate that concurrent changes in crop types have decreased quality of farmland wildlife habitat while bigger and faster farm equipment and genetically modified crops continue to make farming marginal land less risky. Legislators and administrators should be advised that waterbird habitat loss continues to expand westward. The last chance to sustain the unique grassland-wetland character of the northern Great Plains is to accelerate grassland conservation with short-and long-term stewardship programs and incentives to family ranchers. This philosophy is of vital importance because it also protects wetland habitats that otherwise are vulnerable to drainage when native prairie is converted to cropland. Lastly, and perhaps most importantly, this would conserve our prairie heritage for future generations while preserving the private property rights of landowners.

347. **Cattle and sheep grazing effects on soil organisms, fertility and compaction in a smooth-stalked meadowgrass-dominant white clover sward.**
Murphy, W. M.; Mena Barreto, A. D.; Silman, J. P.; and Dindal, D. L.
Grass and Forage Science 50(3): 191-194. (1995)
NAL Call #: 60.19 B773; ISSN: 0142-5242
Descriptors: Poa pratensis/ Trifolium repens/ cattle/ sheep/ rotational grazing/ pastures/ range management/ forbs/ soil fertility/ soil compaction/ free-living nematodes/ Rotifera/ earthworms/ nitrogen/ potassium/ phosphorus/ topping/ Vermont
This citation is from AGRICOLA.

348. **Cattle grazing and avian communities of the St. Lawrence River islands.**
Belanger, L. and Picard, M.
Journal of Range Management 52(4): 332-338. (1999)
NAL Call #: 60.18 J82 ; ISSN: 0022-409X.
http://jrm.library.arizona.edu/Volume52/Number4/azu_jrm_v52_n4_332_338_m.pdf
Descriptors: Phragmites australis/ cows/ islands/ prairies/ grazing intensity/ wild birds/ range management/ wildlife management/ Phalaris arundinacea/ Passeriformes/ canopy/ habitats/ species diversity/ waterfowl/ nesting/ Quebec
Abstract: Three hundred islands are found along the St. Lawrence River in Quebec. Among these islands, over 5,000 ha are used for agricultural purposes and 32% of this total is devoted to communal pasture, a traditional practice in this part of the river. In 1993 and 1994, we compared the avian communities of 500 ha natural spring flooded prairie islands subjected to different degrees of grazing pressure. Three islands were divided into 12 sectors, in which 108 sample plots of 0.5 ha were selected. Results show that the degree of visual obstruction by herbaceous vegetation and the percentage of shrub cover were higher on ungrazed and on moderately grazed prairie (< 1 cow/ha/year) as compared with intensively grazed prairie (> 1 cow/ha/year). More than 1,650 observations of passerines were made and 13 species were identified. The Swamp Sparrow (Melospiza georgiana), Savannah Sparrow (Passerculus sandwichensis), Red-winged Blackbird (Agelais phoeniceus), and Bobolink (Dolichonyx oryzivorus) were the 4 most abundant species, accounting for over 80% of all birds counted. Ungrazed and moderately grazed prairie contained 6 times more birds than intensively grazed prairie (10.4 birds/ha and 11.7 birds/ha vs 1.6 birds/ha). We also recorded 167 and 113 dabbling duck (anatinae) nests in 1993 and 1994 respectively. Moderately grazed and ungrazed prairies had a nest density nearly 10 times higher than that of intensively grazed prairie (0.50 +/- 0.01 and 0.30 +/- 0.01 nest/ha vs 0.05 +/- 0.01 nest/ha). Our study shows that grazing pressure on prairies of the studied islands largely determined the type of bird species present. However, prairie subjected to excessive grazing pressure is not suitable for waterfowl nesting. Various recommendations are provided for integrated management of wildlife and agriculture on the St. Lawrence River communal pasture islands.
This citation is from AGRICOLA.

349. **Cattle grazing and management of dusky seaside sparrow habitat.**
Holder, Gregory L.; Johnson, Mark K.; and Baker, James L.
Wildlife Society Bulletin 8(2): 105-109. (1980)
NAL Call #: SK357.A1W5; ISSN: 0091-7648
Descriptors: Fringillidae/ Passeriformes/ Ammodramus maritimus nigrescens/ dusky seaside sparrow/ seaside sparrow/ fires-burns/ grazing/ habitat alterations/ cattle/ sparrow habitat/ endangered species/ St. John's River basin/ Florida/ natural resources/ animal science: animal nutrition/ plant ecology/ Florida

350. **Cattle grazing and sharp-tailed grouse nesting success.**
Kirby, D. R. and Grosz, K. L.
Rangelands 17(4): 124-126. (1995)
NAL Call #: SF85.A1R32; ISSN: 0190-0528
Descriptors: Phasianidae/ nesting/ rangelands/ nests/ rotational grazing/ cattle/ grazing/ North Dakota
This citation is from AGRICOLA.

351. **Cattle management to enhance wildlife habitat in south Texas.**
Ortega, S. J. Alfonso and Bryant, Fred C.
Wildlife Management Bulletin of the Caesar Kleberg Wildlife Research Institute 6: 1-11. (2005)
Descriptors: commercial activities/ conservation measures/ land zones/ North America/ comprehensive zoology: farming and agriculture/ cattle management strategies/ rangeland habitat management applications/ habitat management/ terrestrial habitat/ rangeland habitat/ Texas/ cattle management strategies applications/ rangelands/ Phasianidae/ Galliformes/ Aves/ birds/ chordates/ mammals/ ungulates/ vertebrates
Abstract: For cattle ranching operations in South Texas, wildlife recreation can be a very important source of income for those who choose to diversify. In many cases, income from wildlife such as hunting leases is higher than the income obtained from cattle. Range, cattle, and wildlife management practices need to be adjusted to achieve rangeland sustainability, fulfill the requirements of multiple animal species, and optimize economic output. Under the climatic conditions of South Texas, specific strategies to adjust cattle stocking rates at the first signs of drought are required if valuable range plants and wildlife productivity are to be maintained. We discuss strategies of cattle grazing, including rates of use, grazing systems, stocking rate adjustments based on range condition, calculation of correct stocking rate, and guidelines to adjust livestock numbers based on spring and fall moisture availability. In South Texas, all wildlife species are important to consider in the context of total ranch management. We offer these guidelines to those who are interested in fostering compatible cattle and wildlife operations while protecting the integrity of rangeland, watershed, habitat, and soil resources. We use South Texas as a model to encourage the development of similar strategies and prescriptions for other arid and semiarid regions to help preserve rangeland habitat integrity and optimize biological and economic output.

352. **Cattle trampling of simulated ground nests in rotationally grazed pastures.**
Paine, L.; Undersander, D. J.; Sample, D. W.; Bartelt, G. A.; and Schatteman, T. A.
Journal of Range Management 49(4): 294-300. (1996)
NAL Call #: 60.18 J82 ; ISSN: 0022-409X.
http://jrm.library.arizona.edu/Volume49/Number4/azu_jrm_v49_n4_294_300_m.pdf
Descriptors: cattle/ pheasants/ rotational grazing/ wild birds/ stocking rate/ grazing intensity/ Wisconsin
Abstract: For many grassland songbird species, pastures represent some of the best available breeding habitat in the Upper Midwest. Increasing interest in intensive rotational grazing (IRG) among midwestern livestock farmers may result in an expansion of pasture hectares in the region. We evaluated the effects of several cattle stocking densities on ground nest survival in rotationally grazed cool-season pastures in southwestern Wisconsin. Ground nests were simulated with clutches of 3 unwashed pheasant eggs. We tested 3 rotational grazing systems: a 1-day dairy rotation stocked at 60 head ha-1; a 4-day beef rotation at 15 head ha-1; and a traditional, non-intensive 7-day rotation at 8 head ha-1. Paddock size (1.2 ha) and nest density (15 nests paddock($^{-1}$)) were held constant. The simulated nests were observed 4 times day(-1) to document trampling patterns during the herds' diurnal grazing and rumination cycles. Trampling damaged a mean of 75% (+/- 3.1%) of the nests for all 3 treatments during 8 consecutive replications. While the 7-day treatment exhibited a pattern of greater nest trampling during cattle grazing periods than during rumination periods, this pattern was less evident in the 4-day treatment and absent in the 1-day treatment. Increasing vegetation height-density and percent vegetation cover were associated with reduced nest trampling rates, but pasture forage production and removal were not associated with nest damage.
This citation is from AGRICOLA.

353. **Cattle trampling of simulated ground nests under short duration and continuous grazing.**
Koerth, B. H.; Webb, W. M.; Bryant, F. C.; and Guthery, F. S.
Journal of Range Management 36(3): 385-386. (1983)
NAL Call #: 60.18 J82; ISSN: 0022-409X.
http://jrm.library.arizona.edu/Volume36/Number3/azu_jrm_v36_n3_385_386_m.pdf
Descriptors: birds/ bird communities/ grazing lands/ nest success/ nest survival rate
Abstract: Trampling by cattle on simulated ground nests [of birds] were compared between continuous (CONT) grazing at 8.0 ha/steer and short duration grazing (SDG) at 5.3 ha/steer. Trampling losses were similar under CONT grazing (15%) and SDG (9%) at a nest density of 1/ha. Percentage trampling loss did not increase at higher nest densities under either grazing regime. Nest survival curves indicated a loss rate of 2.21%/wk under CONT grazing and 2.09%/wk under SDG. SDG with cattle will probably not increase trampling loss of ground nests over CONT grazing.

354. **Changes in abundance and diversity of microarthropods associated with fescue prairie grazing regimes.**
Clapperton, M. Jill; Kanashiro, Derrick A.; and Behan Pelletier, Valerie M.
Pedobiologia 46(5): 496-511. (2002)
NAL Call #: 56.8 P343; ISSN: 0031-4056
Descriptors: field experiment: experimental method/ livestock grazing: plant community structure, soil health, soil quality/ Orthic Black Chernozemic: Udic Haploboroll/ disturbance severity/ fescue prairie grazing regimes/ grassland productivity/ grazing recovery exclosure/ heavy grazing regime/ light grazing regime/ soil bulk density/ soil depth/ soil moisture/ soil temperature
Abstract: Livestock grazing influences plant community structure, soil quality and health, and is likely to also affect the populations and diversity of soil biota. In our study, we determined the abundance and family level diversity of soil mites under very heavy and light grazing regimes, and a very heavy grazing exclosure, and asked whether there were differences in abundance of mite taxa that reflected the severity of disturbance. The field experiment we sampled was established in 1949 on a Rough Fescue Prairie with Orthic Black Chernozemic (Udic Haploboroll) soils near Stavely Alberta Canada. Soil cores were taken from the light (L)(1.2 AUM (animal unit month) ha-1) and very heavy (VH) (4.8 AUM ha-1) grazing regimes and the grazing recovery exclosure (Ex) in the very heavy grazing site in June and October 1999. The results showed that the soil temperature, moisture and bulk density varied between the grazing regimes, soil depth and the sampling times. Collembola were not abundant at any of the sites compared with Acari. Among Acari, prostigmatid mites were significantly more abundant in VH site and all the grazing treatments at both depths and sampling times. Oribatida, and to a lesser extent Mesostigmata, were more closely associated with reduced and undisturbed habitats than the Prostigmata, and there was a positive relationship between increased grassland productivity and the abundance and diversity of soil microarthropods. Our results suggest that Acari are sensitive to soil disturbance.

355. **Changes in land cover and breeding bird populations with restoration of riparian habitats in east-central Iowa.**
Benson, Thomas J.; Dinsmore, James J.; and Hohman, William L.
Journal of the Iowa Academy of Science 113(1-2): 10-16. (2006)
NAL Call #: Q11.J68; ISSN: 0896-8381
Descriptors: conservation measures/ ecology/ terrestrial habitat/ land zones/ Aves: habitat management/ riparian habitat restoration/ grassland and wetland population changes/ population dynamics/ riparian habitat restoration effects/ semiaquatic habitat/ wetlands habitat/ population changes/ grassland/ riparian habitat/ Iowa/ Benton/ Iowa County/ Tama County/ Aves/ birds/ chordates/ vertebrates
Abstract: Conversion of Midwestern riparian areas for agricultural production has greatly altered their function and suitability for birds and other wildlife. Recently, however, restoration of riparian functions has been a major focus of land management agencies in the Midwest. We used historic land-use data to describe land-cover changes since European settlement and the subsequent effects of habitat

restoration efforts on the landscape along a section of the Iowa River in east-central Iowa. We then used bird-density data collected in a subset of the study area in 2001 and 2002 to estimate changes in breeding bird populations of the entire study area resulting from these habitat restoration efforts. Before settlement, the (>24,000 ha) Iowa River Corridor was dominated by herbaceous vegetation (72%), with wooded areas accounting for less than one-third of the area. Between the mid-1800s and 1992, agricultural conversion decreased the amount of herbaceous cover by >75%, and the cover of woody vegetation increased by >25%. After the 1993 flood, establishment of USDA conservation easements increased the amount of herbaceous cover in the corridor by >135% (>5,000 ha). Populations of most grassland and wetland bird species in the corridor (13 of 17) increased with habitat restoration, although some species associated with open habitats, such as those that often breed in rowcrop fields, decreased. We estimated that these restored habitats provide habitat for >12,000 additional birds of grassland- or wet land-dependent species in the Iowa River Corridor, 5,000 of which are members of eight species that are of moderate or high conservation priority. An understanding of presettlement land cover, the extent of land-cover alteration, and the effects of habitat restoration on the landscape and breeding bird populations provides a useful guide for both evaluating the efficacy of past restoration and for guiding future conservation and restoration efforts

356. **Changes in spider Araneae assemblages in relation to succession and grazing management.**
Gibson, C. W. D.; Hambler, C.; and Brown, V. K.
Journal of Applied Ecology 29(1): 132-142. (1992)
NAL Call #: 410 J828; ISSN: 0021-8901
Descriptors: Linyphiidae/ sheep grazing/ invertebrates/ plant species composition arable land/ grassland/ disturbed land/ species accumulation
Abstract: Spiders were sampled, by suction (D-vac) and direct counts of their webs, in a controlled sheep grazing experiment on calcareous ex-arable land and in old calcareous grassland. Results from 1985-89 are presented. Heavily grazed assemblages were dominated by a group of Linyphiidae, also characteristic of disturbed land. Large web-spinners were most sensitive to grazing, preferring ungrazed controls because of their dependence of rigid plant structures. DCA ordination of D-vac data suggested that only heavy grazing (in spring and autumn) produced a distinct asemblage. Three other grazed treatments produced impoverished versions of ungrazed control assemblages. The dominant successional trend was a gradual accumulation of species, especially in ungrazed controls. This process was incomplete by 1989: old grasslands contained many species, including some characteristics of calcareous grassland, which had failed to colonize the ex-arable field 7 years after abandonment. Most features of the assemblages could be explained by the effects of grazing on plant architecture, in contrast to other invertebrates studied in the same system, which were more strongly affected by plant species composition.

357. **Changes in the distribution and status of sage-grouse in Utah.**
Beck, Jeffrey L.; Mitchell, Dean L.; and Maxfield, Brian D.
Western North American Naturalist 63(2): 203-214. (2003)
NAL Call #: QH1.G7; ISSN: 1527-0904
Descriptors: Centrocercus minimus/ Centrocercus spp./ Centrocercus urophasianus/ Galliformes/ terrestrial ecology/ habitat degradation/ habitat fragmentation/ habitat loss/ sagebrush habitats/ habitat management/ sagebrush rangeland enhancement requirement/ ecosystems/ Utah/ conservation/ wildlife management/ land zones
Abstract: Sage-grouse (Centrocercus spp.) were abundant in all of Utah's 29 counties at the time of European settlement wherever sagebrush (Artemisia spp.) occurred. Greater Sage-Grouse (C. urophasianus) inhabited areas north and west of the Colorado River, and Gunnison Sage-Grouse (C. minimus) occupied suitable habitat south and east of the Colorado River. The largest Greater Sage-Grouse populations in Utah are currently restricted to suitable habitats in Box Elder, Garfield, Rich, Uintah, and Wayne Counties. A remnant breeding population of Gunnison Sage-Grouse occurs in eastern San Juan County. We stratified Greater Sage-Grouse populations (1971-2000) by counties where the 1996 to 2000 moving average for estimated spring breeding populations was > 500 (GT500) or < 500 (LT500). Males per lek declined in all populations from 1971 to 2000; however, there were consistently more males observed on GT500 than on LT500 leks. Juveniles per adult hen (including yearling hens) Greater Sage-Grouse in the 1973-2000 fall harvest in Box Elder, Rich, and Wayne Counties did not differ from 2.25, a ratio suggesting sustainable or increasing sage-grouse populations. Declines are attributed to loss, fragmentation, and degradation of sagebrush habitat. Sage-grouse conservation ultimately depends on management and enhancement of remaining sagebrush rangelands in Utah.

358. **Changing habitat associations of a thermally constrained species, the silver-spotted skipper butterfly, in response to climate warming.**
Davies, Zoe G.; Wilson, Robert J.; Coles, Sophie; and Thomas, Chris D.
Journal of Animal Ecology 75(1): 247-256. (2006)
NAL Call #: 410 J828; ISSN: 0021-8790
Descriptors: behavior/ biogeography: population studies/ terrestrial ecology: ecology, environmental sciences/ climatology: environmental sciences/ wildlife management: conservation/ reproduction/ climate warming
Abstract: 1.The impact of climate change on the distribution, abundance, phenology and ecophysiology of species is already well documented, whereas the influence of climate change on habitat choice and utilization has received little attention. Here we report the changing habitat associations of a thermally constrained grassland butterfly, Hesperia comma, over 20 years.2. Between 1982 and 2001-2, the optimum percentage of bare ground within habitat used for egg-laying shifted from 41% to 21%.3. Egg-laying rates are temperature-dependent and females actively adjust microhabitat usage in response to temperature variations; relatively warmer host plants are

chosen or oviposition at low ambient temperatures, and cooler host plants at high ambient temperatures.4. Climate warming has increased the availability of thermally suitable habitat for H. comma at the cool, northern edge of the species' distribution, therefore increasing: (a) egg-laying rate and potentially the realized rate of population increase; (b) effective area of habitat patches as more microhabitats within a given vegetation fragment are now suitable for egg-laying; (c) buffering of populations against environmental variation as eggs are laid within a wider range of microhabitats; and (d) the number of habitat patches in the landscape that are currently available for colonization (including the use of more northerly facing aspects; Thomas et al., Nature, 2001, 411, 577-581). Conservationists often assume the habitat requirements of a species to be constant, and manage habitats to maintain these conditions. For many species, these requirements are likely to change in response to climate warming, and care must be taken not to manage habitats based on outdated prescriptions.

359. **Characteristics of nest sites of northern bobwhites in western Oklahoma.**
Townsend, D. E.; Masters, R. E.; Lochmiller, R. L.; Leslie D.M.; Demaso, S. J.; and Peoples, A. D.
Journal of Range Management 54(3): 260-264. (2001)
NAL Call #: 60.18 J82; ISSN: 0022409X
Descriptors: bobwhite/ Colinus virginianus/ Gallinaceous/ habitat/ quail/ upland game/ gamebird/ habitat structure/ nest site/ vegetation structure/ United States
Abstract: Previous authors have described nesting habitat of the northern bobwhite (Colinus virginianus) throughout its range, but few have compared structural or compositional differences of vegetation between nest sites and random non-use sites, and successful and non-successful nests. From 1996-1998, we compared cover and structure of 85 plant species from 80 nest sites of northern bobwhite in western Oklahoma. Nest sites were consistently associated with greater structural complexity than what was available at random. Bobwhites selected nest sites with a greater coverage of grass (ca. 50%) and woody (ca. 20-30%) vegetation with a relatively low percentage of bare ground, presumably because these attributes maximize their chance for successful reproduction by providing protection against weather and predators. Successful nests were more concealed during 1996 and 1997 (12.37 and 10.74% visibility, respectively) than non-successful nest sites (21.6 and 27.65% visibility), but levels of concealment did not differ during 1998. We found no significant differences in vegetation composition or structure between successful and non-successful nest sites.

360. **Characteristics of ungulate behavior and mortality associated with wire fences.**
Harrington, J. L. and Conover, M. R.
Wildlife Society Bulletin 34(5): 1295-1305. (2006)
NAL Call #: SK357.A1W5; ISSN: 00917648.
Notes: doi: 10.2193/0091-7648(2006)34 [1295:COUBAM]2.0.CO;2.
Descriptors: Antilocapra americana/ Cervus elaphus/ elk/ habitat fragmentation/ highways/ human-wildlife conflicts/ mortality/ mule deer/ Odocoileus hemionus/ pronghorn/ wire fences
Abstract: We studied the characteristics of pronghorn (Antilocapra americana), mule deer (Odocoileus hemionus), and elk (Cervus elaphus) mortalities associated with wire fences along roads in Colorado and Utah, USA, from June 2004 to June 2005. We estimated an average annual mortality occurrence of 0.25 mortalities/km for the wire fences studied (0.08 mule deer mortalities/km, 0.11 pronghorn mortalities/km, and 0.06 elk mortalities/km) or 0.5 mortalities/km of road. The highest wire fence-mortality rates in our study area occurred during August, which coincided with weaning of fawns. Mule deer and pronghorn jumped fences in >81% of observed crossings. Mortalities were largely caused by animals getting caught between the top 2 wires. Mule deer experienced higher fence-mortality rates than elk or pronghorn because they crossed fences more frequently ($P < 0.001$) and spent more time in road right-of-ways ($P < 0.001$) than the other species. Juveniles were 8 times more likely to die in fences than adults. Woven-wire fences topped with a single strand of barbed wire were more lethal to ungulates than woven wire with 2 strands of barbed wire above it or 4-strand barbed-wire fences ($P < 0.01$). There was a direct relationship between the frequency of fence mortalities and ungulate abundance ($r^2 = 0.83$). Traffic volumes were inversely related to fence-mortality frequencies ($r^2 = 0.50$) and ungulate densities along the right-of-way ($r^2 = 0.50$).

361. **Communities of small mammals in six grass-dominated habitats of southeastern Oklahoma.**
Clark, B. K.; Clark, B. S.; Homerding, T. R.; and Munsterman, W. E.
American Midland Naturalist 139(2): 262-268. (Apr. 1998)
NAL Call #: 410 M58
Descriptors: prairies/ pasture/ species diversity/ community composition/ Oklahoma/ Mammalia
Abstract: During autumn 1991, we sampled small mammals in sixgrass-dominated habitats including upland ungrazed native prairie,upland improved pastures, upland mowed native prairie, uplandroadside fencerows, lowland ungrazed native prairie and lowlandungrazed native prairie with forbs and shrubs in southeastern Oklahoma. Eleven species of small mammals were represented in 405 captures. Species diversity (H') was high in upland (1.57) and lowland (1.47) ungrazed prairie and least for upland fencerows(0.86). Evenness (J') exhibited a similar pattern and was high in upland (0.88) and lowland (0.82) ungrazed prairie and least for lowland ungrazed prairie with forbs and shrubs (0.53). Community overlap (R_o) varied from 1.00 (upland improved pastures and upland roadside fencerows) to 0.57 (upland improved pastures and upland ungrazed prairie). Abundance of small mammals was greatest in fencerows, largely due to the prevalence of hispid cotton rats(Sigmodon hispidus). Different land-use practices elicited both positive and negative species-specific responses. Current human activity in some locations may produce habitat mosaics that result in an overall greater abundance and diversity of small mammals.

362. **Comparative productivity of American ducks and mallards nesting in agricultural landscape of southern Quebec.**
Maisonneuve, C.; McNicoll, R.; and Desrosiers, A.
Waterbirds 23(3): 378-387. (2000)
NAL Call #: QL671; ISSN: 07386028
Descriptors: Anas platyrhynchos/ Anas rubripes/ black duck/ chronology/ clutch size/ hen survival/ mallard/ nesting success/ agricultural land/ clutch size/ habitat structure/ nesting success/ survival/ waterfowl/ Canada/ Anas platyrhynchos/ Anas rubripes
Abstract: We monitored radio-marked female American Black Ducks (Anas rubripes) and Mallards (A. platyrhynchos) in agricultural landscapes of southern Quebec in 1994-1996 to characterize nesting habitat, and to compare nesting success and female survival rates. In early spring, when nesting cover is almost non-existent in agricultural fields, both species avoid fields for nesting. These habitats are rather used later in cases of renesting. Both species selected recent wood cuts and edge-transition habitats (abandoned farmland, hedgerows and riparian areas) as nesting habitat. Median nest initiation date, clutch size, and nest success rates did not differ between the two species. Especially high Black Duck nesting success (100%) in peatlands underlines the importance of these habitats. When peatland nests are excluded to provide a better indication of what prevails in typical agricultural landscapes, nesting effort of female Mallards is almost twice that of Black Ducks. Survival rates of females were similar for both species, both during laying and post-laying periods. Received 20 October 1999, accepted 20 May 2000.

363. **Comparing pocket gopher (Thomomys bottae) density in alfalfa stands to assess management and conservation goals in northern California.**
Smallwood, K. Shawn; Geng, Shu; and Zhang, Minghua
Agriculture, Ecosystems and Environment 87(1): 93-109. (2001)
NAL Call #: S601.A34; ISSN: 0167-8809
Descriptors: commercial activities/ ecology/ population dynamics/ man-made habitat/ abiotic factors/ land and freshwater zones/ Thomomys bottae (Geomyidae): farming and agriculture/ farming practices/ conservation measures/ density and distribution/ population density/ alfalfa crop habitats/ distribution within habitat/ cultivated land habitat/ alfalfa fields/ abiotic factors/ California/ Yolo County/ Geomyidae/ Rodentia, Mammalia/ chordates/ mammals/ vertebrates
Abstract: Pocket gophers (Thomomys bottae) affect alfalfa (Medicago sativa L.) production in Yolo County, California, as well as the distribution of special status, rare species that either prey on gophers or use their burrows as habitat. Farming practices, as well as attributes of the landscape and of alfalfa fields, were compared to 134 estimates of gopher density among 35 alfalfa stands scattered throughout the County during 1992-1994. Gophers in alfalfa fields averaged only one-fourth the average density among published reports, and the range from low to high density was much smaller in alfalfa fields. Gopher density was greater at the field edge, especially during the first 2 years of stand production. Preference for the edge decreased by the third year of alfalfa production as gophers used the available space in the field interior. A stepwise multiple regression model could explain 73% of the variation in the 134 estimates of gopher density. This variation was explained by years since sowing of the alfalfa (standardized slope coefficient, 0.52), annual frequency of flood irrigation (0.43), habitat area as a percentage of the landscape within a 500m buffer around the field (0.31), season of the year (0.25), field size (0.20) and percentage of sand within the top soil layer (0.16). This model can be used to predict the distribution of special status species that depend on gophers, and can be used to guide conservation efforts by increasing the spatial extent of non-cultivated gopher habitat on suitable areas intervening alfalfa fields. Non-cultivated gopher habitat is currently rare in the valley portion of Yolo County. Gopher control failed to influence density to the magnitude sought by the alfalfa growers, and cessation of control would benefit both production and conservation goals in some alfalfa growing regions.

364. **A comparison of restored native grasslands and exotic grass pastures as wintering habitat for declining grassland bird species in the southeastern United States.**
Mcmellen, A. B. and Schweitzer, S. H.
In: XX International Grassland Congress: Offered Papers. Wageningen, Netherlands: Wageningen Academic Publishers, 2005.
Notes: Meeting Information: 20th International Grassland Congress, Dublin, Ireland; June 26 -July 01, 2005; 9076998817 (ISBN).
Descriptors: terrestrial ecology: ecology, environmental sciences/ wildlife management: conservation/ wintering habitat/ restored native grassland/ exotic grass pasture

365. **Compatibility of prescribed burning with the conservation of insects in small, isolated prairie reserves.**
Panzer, Ron
Conservation Biology 16(5): 1296-1307. (2002)
NAL Call #: QH75.A1C5; ISSN: 0888-8892
Descriptors: conservation/ ecology/ terrestrial habitat/ abiotic factors/ physical factors/ land and freshwater zones/ Insecta: conservation/ biodiversity preservation/ prescribed burning compatibility/ population dynamics/ grassland/ small isolated prairie reserves/ fire/ prescribed burning/ prairie reserves/ Indiana/ Wisconsin/ Illinois/ Indiana/ Newton County/ Green and Kenosha Counties/ prairie reserve burning/ Insecta/ arthropods/ insects/ invertebrates

366. **Concurrent effects of fire regime, grazing and bison wallowing on tallgrass prairie vegetation.**
Trager, Matthew D.; Wilson, Gail W. T.; and Hartnett, David C.
American Midland Naturalist 152(2): 237-247. (2004)
NAL Call #: 410 M58; ISSN: 0003-0031
Descriptors: Bovidae/ Artiodactyla/ Bos bison/ Bison bison/ terrestrial ecology/ fire regime/ grazing/ interacting disturbances/ tallgrass prairie/ vegetation patterns/ wallowing/ habits-behavior/ intraspecies relationships/ fires-burns/ foods-feeding/ grasslands/ ecosystems/ habitat management/ wildlife-habitat relationships/ Kansas/ Konza Prairie Biological Station/ environmental factors/ behavior/ conservation/ wildlife management/ habitat use/ land zones/

nutrition/ bison/ prairie/ food/ vegetation/ change in vegetation
Abstract: We examined the effects of fire regime and bison activity oil the plant communities of active bison wallows and the surrounding grazing lawns at Konza Prairie Biological Station in northeastern Kansas, USA. In both mid-june and late july the grazed sites had higher species richness and more vegetation cover than the wallow edges regardless of fire regime. The percent cover of most dominant perennial species was significantly higher on grazing lawns than in wallows. Annual species and exotic species had significantly higher cover in wallows than in grazing lawns and in annually burned sites compared to those burned at a 4-y interval. Overall, treatment effects on community structure and individual species abundance were stronger in the June. However, in July there was significantly more bare ground wallows around sites burned at a 4-y, interval, suggesting increased wallowing activity at these sites. This finding suggests a strong effect of fire regime on seasonal bison activity, which further indicates the importance of multiple interacting disturbances for generating local- and landscape-level vegetation patterns in tall grass prairie.

367. **Conservation of biodiversity in managed rangelands, with special emphasis on the ecological effects of large grazing ungulates, domestic and wild.**
Duncan, Patrick and Jarman, Peter J.
International Grassland Congress: Proceedings 17(3): 2077-2084. (1993); ISSN: 0074-6185
Descriptors: ungulates/ Ungulata/ Bos taurus/ conservation/ damage/ grazing/ ecosystems/ mammals/ rangeland/ species diversity/ cattle/ prairie/ diversity

368. **Conservation of grassland birds in North America: Understanding ecological processes in different regions.**
Askins, Robert A.; Chavez-Ramirez, Felipe; Dale, Brenda C.; Haas, Carola A.; Herkert, James R.; Knopf, Fritz L.; and Vickery, Peter D.
Auk 124: 1-46. (2007)
NAL Call #: 413.8 AU4 ; ISSN: 0004-8038
Descriptors: birds/ grasslands/ habitat requirements/ prairies/ Bison bison/ Castor canadensis/ beavers/ longleaf pine/ Pinus palustris/ whooping crane/ Pinus palustris/ Pinus spp.
Abstract: Many species of birds that depend on grassland or savanna habitats have shown substantial overall population declines in North America. To understand the causes of these declines, we examined the habitat requirements of birds in six types of grassland in different regions of the continent. Open habitats were originally maintained by ecological drivers (continual and pervasive ecological processes) such as drought, grazing, and fire in tallgrass prairie, mixed-grass prairie, shortgrass prairie, desert grassland, and longleaf pine savanna. By contrast, grasslands were created by occasional disturbances (e.g., fires or beaver [Castor canadensis] activity) in much of northeastern North America. The relative importance of particular drivers or disturbances differed among regions. Keystone mammal species-grazers such as prairie-dogs (Cynomys spp.) and bison (Bison bison) in western prairies, and dam-building beavers in eastern deciduous forests- played a crucial, and frequently unappreciated, role in maintaining many grassland systems. Although fire was important in preventing invasion of woody plants in the tallgrass and moist mixed prairies, grazing played a more important role in maintaining the typical grassland vegetation of shortgrass prairies and desert grasslands. Heavy grazing by prairie-dogs or bison created a low "grazing lawn" that is the preferred habitat for many grassland bird species that are restricted to the shortgrass prairie and desert grasslands. Ultimately, many species of grassland birds are vulnerable because people destroyed their breeding, migratory, and wintering habitat, either directly by converting it to farmland and building lots, or indirectly by modifying grazing patterns, suppressing fires, or interfering with other ecological processes that originally sustained open grassland. Understanding the ecological processes that originally maintained grassland systems is critically important for efforts to improve, restore, or create habitat for grassland birds and other grassland organisms. Consequently, preservation of large areas of natural or seminatural grassland, where these processes can be studied and core populations of grassland birds can flourish, should be a high priority. However, some grassland birds now primarily depend on artificial habitats that are managed to maximize production of livestock, timber, or other products. With a sound understanding of the habitat requirements of grassland birds and the processes that originally shaped their habitats, it should be possible to manage populations sustainably on "working land" such as cattle ranches, farms, and pine plantations. Proper management of private land will be critical for preserving adequate breeding, migratory, and winter habitat for grassland and savanna species.

369. **Conservation of grassland leafhoppers: A brief review.**
Biedermann, Robert; Achtziger, Roland; Nicke, Herbert; and Stewart, Alan J. A.
Journal of Insect Conservation 9(4): 229-243. (2005)
NAL Call #: QL362.J68 ; ISSN: 1366-638X
Descriptors: climatology: environmental sciences/ terrestrial ecology: ecology, environmental sciences/ wildlife management: conservation/ climate/ conservation/ population density/ habitat change/ ecology
Abstract: The leafhoppers, planthoppers and their allies (collectively known as the Auchenorrhyncha) are presented as a group of insects that are highly appropriate for studying grassland ecology and conservation, evaluating the conservation status of sites and monitoring environmental and habitat change. Semi-natural grasslands typically support dense populations and a wide range of species with diverse ecological strategies. Their numerical dominance in many grasslands means that they have considerable functional significance, both as herbivores and as prey for higher trophic levels. Population and assemblage studies are supported by good ecological knowledge about most species and modern identification keys. Hitherto, most studies have focused on the composition and structure of assemblages and how they are affected by conservation management. However, grasslands support many rare species with small and fragmented populations which deserve conservation attention in their own right, and recent work has started to reflect this. The effects of management on the composition

and structure of grassland leafhopper populations and assemblages are described and an assessment is given of the main threats facing individual species and overall diversity. There is a need to synthesise the scattered literature on grassland leafhoppers, to provide a model for how the composition and structure of populations and assemblages respond to major environmental and anthropogenic gradients across large biogeographic areas. Such an analysis could help predict the impact of likely future changes in land use and climate.

370. **Conservation of piping plovers in the U.S. Alkali Lakes Core Area.**
Ivan, Jacob S.; Murphy, Robert K.; Rabenberg, Michael; and Smith, Karen A.
Intermountain Journal of Sciences 8(4): 254. (2002); ISSN: 1081-3519
Descriptors: Charadrius melodus/ birds/ conservation/ wildlife management/ endangered-threatened species/ ecosystems/ grasslands/ prairies/ predators/ predator control/ survival/ productivity/ wildlife-habitat relationships/ habitat management/ piping plover/ Montana/ North Dakota/ Alkali Lakes Core Area
Abstract: The northern Great Plains population of piping plovers has been listed as Threatened in the U.S. and Endangered in Canada since 1985. The current population decline and poor prognosis is thought to be due to inadequate reproductive success stemming from significant alteration of the prairie landscape and predator community during the last century. Planted trees, increased woody cover, rockpiles, junkpiles, and abandoned buildings now offer denning, nesting, and roosting habitat for a variety of egg and chick predators that were once uncommon on northern prairies, e.g. great-horned owl, striped skunk, raccoon, American crow. Also, in many areas, once extensive native grasslands are now reduced to small remnants that may be more efficiently searched by predators. About two-thirds of the U.S. Great Plains population breeds annually on the eight county study area, which extends from northwest North Dakota through northeast Montana. Over the past decade, the authors have documented size, distribution, habitat selection, and vital rates for this population. They have also identified and implemented a rigorous predator exclusion program that has boosted piping plover reproductive rates into the range necessary to stabilize the population decline. Currently they are evaluating landscape influences on plover productivity to determine whether habitat preservation and restoration, e.g. removal of unnatural landscape features that may house predators of facilitate predation, can contribute measurably to piping plover recovery.

371. **Conservation value of agricultural riparian strips in the Boyer River watershed, Quebec (Canada).**
Jobin, B.; Belanger, L.; Boutin, C.; and Maisonneuve, C.
Agriculture, Ecosystems and Environment 103(3): 413-423. (2004)
NAL Call #: S601.A34; ISSN: 01678809.
Notes: doi: 10.1016/j.agee.2003.12.014.
Descriptors: farmland/ landscape modification/ Quebec/ riparian habitat/ streambank
Abstract: Riparian habitats play a major role in biodiversity conservation in intensive agricultural landscapes because they represent remnants of both wetland and woody habitats available for wildlife. The importance of herbaceous, shrubby and wooded riparian habitats for the conservation of biodiversity (plants, amphibians, reptiles, birds, small mammals) is well documented for the Boyer River watershed (southern Quebec, Canada). This paper examines their conservation value for these different taxonomic groups at the watershed level and the possible effects on wildlife of various landscape modification scenarios. The overall species richness and insectivorous bird abundance in the watershed would increase markedly if there were more wooded strips in the landscape mainly due to additional plant and bird species. A scenario where all three types of riparian strips would be well-represented in the watershed is most likely to be implemented. This scenario would be the most beneficial to wildlife communities because of high native species diversity within wooded strips combined with the presence of unique species associated with each of the three types of strips. Encouraging landowners to protect existing wooded riparian habitats would be the most effective and cost-beneficial method to maintain current level of habitats distribution in the landscape, and to favour the establishment of new shrubby and wooded strips in the Boyer River watershed. [Crown Copyright.]

372. **Conservation value of private lands for Crested Caracaras in Florida.**
Morrison, J. L. and Humphrey, S. R.
Conservation Biology 15(3): 675-684. (2001)
NAL Call #: QH75.A1C5; ISSN: 08888892.
Notes: doi: 10.1046/j.1523-1739.2001.015003675.x.
Descriptors: habitat quality/ nature conservation/ private land/ raptors/ United States/ Caracara cheriway
Abstract: In southcentral Florida, where agricultural lands are being converted rapidly to urban development, much of the remaining nonurban habitat occurs on privately owned cattle ranches. We studied the Crested Caracara (Caracara cheriway), a threatened bird of prey, to learn the role of private lands in sustaining the population. We investigated patterns of distribution and reproductive activity of breeding pairs of caracaras in relation to patterns of land ownership and use. Eighty-two percent of 73 active nest sites found were on privately owned cattle ranches. We rarely found breeding pairs on publicly owned lands, most of which are managed as natural areas (no agricultural production and limited livestock grazing) to support native plant and animal communities. In 46 breeding areas with 4 years of known histories of occupancy and reproduction, pairs nesting on lands where the major land use was cattle ranching exhibited higher rates of breeding-area occupancy, attempted breeding during more years, initiated egg laying earlier, exhibited higher nesting success, and attempted a second brood after successfully fledging a first brood more often than pairs nesting on lands managed as natural areas. Compositional analysis suggested nonrandom selection of habitats by breeding pairs of caracaras in their establishment of a home range in the current landscape of southcentral Florida. Compared with random areas and available habitat in the overall study area, caracara home ranges had higher proportions of improved pasture and lower proportions of forest, woodland, oak scrub, and marsh. Which management activities favor and do not favor caracaras is uncertain, and hypotheses should be

formulated and tested to guide future conservation applications. Particular grazing and fire management practices on privately and publicly owned lands may affect the structure of vegetation and prey communities in ways that influence caracaras. Or, replacement of native by exotic grasses may retain structurally suitable plant communities, whereas fertilization and grazing may increase productivity and nutrient cycling in ways that favor caracaras. Given continued conversion of natural habitats and agricultural lands to urban development, it is important to recognize that cattle ranches may provide important resources for wildlife conservation. Although cattle ranching is not likely to benefit all species historically associated with the native prairie ecosystem in Florida, finding ways to retain this land use may be important for the conservation of Florida's population of Crested Caracaras and other organisms of Florida's dry prairies.

373. **Conservative and moderate grazing effects on Chihuahuan Desert wildlife sightings.**
Joseph, Jamus; Collins, Michelle; Holechek, Jerry; Valdez, Raul; and Steiner, Robert
Western North American Naturalist 63(1): 43-49. (2003)
NAL Call #: QH1.G7; ISSN: 1527-0904
Descriptors: Antilocapra americana/ Antilocapridae/ Artiodactyla/ Lepus californicus/ Sylvilagus auduboni/ Leporidae/ Lagomorpha/ Bos taurus/ Mammalia/ Zenaida macroura/ Columbiformes/ Callipepla squamata/ Galliformes/ Aves/ grazing/ deserts/ wildlife habitat/ drought/ black-tailed jackrabbit/ pronghorn/ scaled quail/ mourning doves/ desert cottontails/ Mexico/ Chihuahua Province
Abstract: Seasonal wildlife observations were made along transects on 2 pastures conservatively grazed (36% use of perennial grasses) and 2 pastures moderately grazed (47% use of perennial grasses) in south central New Mexico in non-drought (1997) and drought years (1998). Experimental pastures were similar in soils, terrain, spacing of watering points, and brush cover. Average ecological condition score for the conservatively grazed pastures was 60% compared with 64% for moderately grazed pastures. Throughout the study total standing vegetation understory herbage levels were higher (P < 0.05) on conservatively grazed than moderately grazed pastures. Total wildlife, total gamebird, and total songbird sightings did not differ (P > 0.05) between conservatively and moderately grazed pastures. Black-tailed jackrabbit (Lepus californicus) sightings were higher (P < 0.05) on moderately grazed than conservatively grazed pastures. Sightings of pronghorn (Antilocapra americana), scaled quail (Callipepla squamata), mourning doves (Zenaida macroura), and desert cottontails (Sylvilagus auduboni) showed no differences (P > 0.05) between conservatively and moderately grazed pastures. Dry conditions in 1998 depressed total wildlife sightings by > 50% compared to 1997. Both songbird and gamebird (particularly mourning dove) sightings were severely reduced in the dry compared to wet year (P < 0.05). Our results are consistent with Nelson et al. (1997) that livestock grazing at intermediate levels had no effect on most Chihuahuan Desert upland wildlife species, and that drought years severely depress wildlife sightings.

374. **Contribution of live fences to the ecological integrity of agricultural landscapes.**
Harvey, C. A.; Villanueva, C.; Villacis, J.; Chacon, M.; Munoz, D.; Lopez, M.; Ibrahim, M.; Gomez, R.; Taylor, R.; Martinez, J.; Navas, A.; Saenz, J.; Sanchez, D.; Medina, A.; Vilchez, S.; Hernandez, B.; Perez, A.; Ruiz, F.; Lopez, F.; Lang, I.; and Sinclair, F. L.
Agriculture, Ecosystems and Environment 111(1-4): 200-230. (2005)
NAL Call #: S601.A34; ISSN: 01678809.
Notes: doi: 10.1016/j.agee.2005.06.011.
Descriptors: biodiversity conservation/ Central America/ Costa Rica/ farm management/ Faunal diversity/ landscape characterization/ landscape connectivity/ Local knowledge/ Nicaragua/ agricultural land/ boundary/ mobility/ rural landscape/ wildlife management/ Animalia/ Aves/ Bos taurus/ Coleoptera/ Papilionoidea
Abstract: Live fences are conspicuous features of agricultural landscapes across Central America but there is remarkably little information about their abundance, distribution, and function. Here we present a detailed analysis of: (1) the abundance, composition, structure and distribution of live fences in four contrasting cattle-producing areas of Costa Rica and Nicaragua; (2) the management of live fences by farmers; and (3) the ecological roles of live fences in providing habitat, resources and connectivity for wildlife. Data on botanical composition and structure are complemented by documentation of local knowledge about live fences and associated management practices, as well as an assessment of fauna that utilize them. Live fences were common, occurring on between 49% and 89% of cattle farms, with an overall mean of 0.14 ± 0.01 km ha-1 of farm land and almost 20 fences per farm. They were generally short (164.3 ± 5.4 m), narrow (3.76 ± 0.03 m) and densely planted (323.1 ± 8.6 trees km-1), consisting primarily of planted trees. The mean tree species richness for individual fences in each landscape was low (from 1.4 to 7.5 species per fence), but landscape species richness was higher (from 27 to 85 species, with over 70 species in three out of four sites). A total of 161 tree and palm species were recorded in the live fences across the four sites. The abundance, tree species composition and structure of live fences varied across farms and landscapes, reflecting differences in environmental conditions and management strategies. In all landscapes the main productive roles of live fences were to divide pastures and serve as barriers to animal movement, although they were also sources of fodder, firewood, timber and fruit. The main ecological roles were to provide habitats and resources for animal species and structural connectivity of woody habitat across the agricultural landscape. More than 160 species of birds, bats, dung beetles and butterflies were recorded visiting them. Their value for biodiversity conservation depended on their species composition, structural diversity and arrangement within the landscape, all of which were heavily influenced by management currently undertaken by farmers in pursuit of production rather than conservation goals. Live fences are important features of agricultural landscapes that merit much greater attention in sustainable land management strategies and need to be an explicit element in regulations and incentives that aim to enhance the ecological integrity of rural landscapes in Central America.

375. **Contributions of the United States Department of Agriculture Natural Resources Conservation Service to conserving grasslands on private lands in the United States.**
Heard, L. P.
In: 20th International Grassland Congress. Dublin, Ireland. O'Mara, F. P.; Wilkins, R. J.; Mannetje, L.; Lovett, D. K.; Rogers, P. A.; and Boland, T. M. (eds.) Wageningen, Netherlands: Wageningen Academic Publishers; pp. 665; 2005. ISBN: 9076998817
Descriptors: biogeography: population studies/ terrestrial ecology: ecology, environmental sciences/ conservation/ water quality/ conservation/ biodiversity/ soil protection/ United States Department of Agriculture/ Natural Resources Conservation Service

376. **Conversion of tall fescue pastures to tallgrass prairie in southeastern Kansas: Small mammal responses.**
Rucker, A. D. Kansas State University, 2001.
Notes: Thesis, Kansas Cooperative Fish and Wildlife Research Unit
Descriptors: abundance/ burning/ cattle grazing/ cover/ fertilization, soil and water/ fescue/ habitat management/ mammals/ prairie/ rabbits and hares/ shrews/ species diversity/ vegetation/ wildlife-habitat relationships/ rodents
Abstract: Small mammal responses to a method of converting fescue pastures to native tallgrass prairie were examined at the Kansas Army Ammunition Plant neat Parsons, Kansas. The conversion method included removing cattle from fescue pastures, halting nitrogen fertilization and implementing spring burning one year following cattle removal. Five treatments were identified to study the trajectory of prairie restoration: (1) ungrazed, mowed native prairie; (2) currently grazed, unburned fescue pastures receiving annual nitrogen fertilizer; (3-5) fescue pastures from which cattle and fertilizer were removed on 1 January of 1997, 1998, and 1999 with annual spring burning initiated one year following cattle removal. Eleven species were captured, including cotton rat, deer mouse, white-footed mouse, western and plains harvest mice, eastern woodrat, least shrew, Elliot's short- tailed shrew, prairie vole, house mouse, and eastern cottontail rabbit.

377. **Cover for wildlife after summer grazing on Sandhills rangeland.**
Reece, Patrick E.; Volesky, Jerry D.; and Schacht, Walter H.
Journal of Range Management 54(2): 126-131. (2001)
NAL Call #: 60.18 J82 ; ISSN: 0022-409X.
http://jrm.library.arizona.edu/Volume54/Number2/azu_jrm_v54_n2_126_131_m.pdf
Descriptors: Bos taurus/ Galliformes/ Phasianidae/ tympanuchus phasianellus/ birds/ ecosystems/ grasslands/ habitat use/ livestock/ nests-nesting/ rangeland/ wildlife-habitat relationships/ wildlife-livestock relationships/ cattle/ sharp-tailed grouse/ foods-feeding/ interspecies relations/ cover/ Aves/ Nebraska
Abstract: Livestock production and wildlife habitat objectives become antagonistic on grasslands when the architecture of standing herbage needed for key wildlife species limits the amount of forage that can be used by livestock. However, quantitative information needed to achieve cover objectives for wildlife is not available for summer-grazed grasslands. Three replicates of seven grazing treatments were applied to the same 1.0-ha pastures for three years. Treatments included ungrazed control, and grazing at 16, 32, or 48 animal unit days (AUD) ha^{-1} for five to seven days during mid-June or mid-July. Cover was estimated after killing frost in September by measuring the average height below which complete visual obstruction occurred. Cumulative grazing pressure (AUD Mg^{-1}) was used to describe grazing effects because of measurable differences in herbage among pastures and dates. Grazing in June reduced the average height of autumn cover at a constant rate from 11.0 to 7.0 cm (R^2=0.34) as cumulative grazing pressure increased from 16 to 90 AUD Mg^{-1}. In contrast, declines in cover after grazing in July were about 2.6 times greater for cumulative grazing pressures up to 40 AUD Mg^{-1} (R^2=0.62), indicating a measurable decline in plant growth and an increasing dependence of autumn cover on the remaining herbage when grazing ended. Relatively low predictability of autumn cover after June compared to July grazing was offset by more plant growth during the balance of the growing season. Frequency of low-cover patches (<or =5.0 cm) within pastures was highly correlated (R^2=0.94) with mean estimates of autumn cover. Consequently, the quality of cover near potential nesting sites also declined as the average height of cover declined, regardless of grazing date. The interdependence of low-cover patches and mean visual obstruction indicates that either variable could be the primary criterion for nest site selection up to 12 cm in visual obstruction.

378. **Cover of perennial grasses in southeastern Arizona in relation to livestock grazing.**
Bock, C. E. and Bock, J. H.
Conservation Biology 7(2): 371-377. (1993)
NAL Call #: QH75.A1C5 ; ISSN: 0888-8892
Descriptors: wildlife habitat/ livestock/ grazing/ perrenial grasses/ Arizona
Abstract: Southwestern grama (Bouteloua) grasslands are floristically allied to the North American Cental Plains but lie outside the historic range of the plains' principal ungulate grazer, Bison bison. The authors compared perennial grassland cover and species composition on eight sites transected by the boundary fence of a 22 yr old livestock exclosure in a grama grassland in SE Arizona. Total grass canopy cover was greatest on the ungrazed portion of each of the eight sites. Two short stoloniferous species (Hilaria belangeri and Bouteloua eriopoda) were the only taxa substantially more abundant on grazed quadrats overall. Among these and eight taller bunchgrasses, there was a strong positive correlation between potential height and response to release from grazing with the three tallest species showing the greatest increases on ungrazed treatments (Bouteloua curtipendula, Bothriochloa barbinodis, and Eragrostis intermedia). Bouteloua gracilis, the most abundant grass in the region, showed an intermediate response to livestock exclusion. Grama grasslands at the Arizona site have changed more and in different ways following livestock exclusion than those on the Central Plains of Colorado. Contributing factors may include: 1) greater annual precipitation at the Arizona site,

2) the much larger size of the Arizona livestock exclosure, and 3) the absence of extensive grazing by native ungulates in the Southwest since the Pleistocene. -from Authors

379. **Critical demographic parameters for declining songbirds breeding in restored grasslands.**
Fletcher, R. J.; Koford, R. R.; and Seaman, D. A.
Journal of Wildlife Management 70(1): 145-157. (2006)
NAL Call #: 410 J827; ISSN: 0022541X
Descriptors: brood parasitism/ Elasticity/ grassland birds/ habitat restoration/ nest predation/ population projection models/ renesting/ survival
Abstract: Land area occupied by tallgrass prairie has declined throughout the midcontinental United States during the past 2 centuries, and migratory birds breeding in these habitats have also experienced precipitous population declines. State and federal agencies have responded by restoring and reconstructing grassland habitats. To understand consequences of restoration for grassland bird populations, we combined demographic data collected over 4 breeding seasons (1999-2002) in northern Iowa, USA, with population projection models to estimate population growth rates of 2 declining migratory songbirds, dickcissels (Spiza americana) and bobolinks (Dolichonyx oryzivorus). To determine what parameters were critical for conservation of these species, we estimated relative contributions of nest predation, brood parasitism by brown-headed cowbirds (Molothrus ater), annual survival, and renesting to population growth using elasticity analysis. Based on model simulations, the population growth rate for dickcissels was not high enough to be stable without immigration into the area ($\eta < 1$). For bobolinks, populations could only be stable ($\eta = 1$) if annual survival was relatively high (adult survival >0.7, with juvenile survival between 0.2 and 0.5). Population growth rates were most sensitive to adult survival across a wide range of parameter estimates, whereas sensitivity to brood parasitism and renesting were consistently low. Elasticities associated with nest predation were highly variable and dependent on survival estimates. In the absence of changes in other demographic parameters, eliminating brood parasitism would not be enough to ensure stable populations of either species. Only management focused on increasing adult survival or decreasing nest predation could produce stable populations. Our results underscore the need for reliable adult survival estimates and conservation strategies focused throughout all phases of the annual cycle. In addition, our modeling approach provides an effective framework for investigating the importance of demographic parameters to population growth rates of birds that are influenced by nest predation, brood parasitism, and renesting. Although habitat restoration is one of the few alternatives for conserving communities in threatened landscapes, restoration strategies also need to have positive effects on population dynamics for species of concern, which has not been demonstrated in this grassland system.

380. **Cumulative effects of wild ungulate and livestock herbivory on riparian willows.**
Brookshire, E. N.; Kauffman, J. Boone; Lytjen, Danna; and Otting, Nick
Oecologia (Berlin) 132(4): 559-566. (2002)
NAL Call #: QL750.O3; ISSN: 0029-8549
Descriptors: nutrition/ diet/ feeding behavior/ ecology/ terrestrial habitat/ land and freshwater zones/ Cervus elaphus/ Odocoileus hemionus (Cervidae): food plants/ Salix boothii and Salix geyeriana/ browsing effect on plant growth/ foraging/ browsing/ impact on habitat/ riparian habitat/ Oregon/ Blue Mountains/ Upper Meadow Creek/ browsing effect on food plant growth/ reproduction and structure/ Cervidae/ Artiodactyla/ Mammalia/ chordates/ mammals/ vertebrates
Abstract: We examined the effects of wild ungulates (deer and elk) and domestic sheep browsing on the growth, structure, and reproductive effort of two common willow species, Salix boothii and S. geyeriana, in a montane northeast Oregon riparian zone. With the use of exclosures, large herbivore effects on willows were studied in an area browsed by native mammals only and an adjacent area in which domestic sheep also lightly grazed during summer months. Growth variables were repeatedly measured on individual plants over a 5-year period to understand physiognomic and flowering responses of native willows to different levels of browsing pressure. At the beginning of the study, all willows were intensely browsed but were significantly taller in the area browsed only by native mammals than in the area also grazed by sheep (69 versus 51 cm, respectively). Willows inside exclosures responded with pronounced increases in height, crown area, and basal stem diameters while the stature of browsed plants outside exclosures stayed constant or declined. In the area browsed by both sheep and wild herbivores, the size of browsed plants remained at pre-treatment levels (<60 cm in height) for the duration of the study. There was no significant difference in growth rates of enclosed willows, indicating that current herbivory was the primary cause of growth retardation in the study area. Foliar area was strongly correlated with basal stem numbers for enclosed plants but much less so for browsed plants. Willows inside exclosures had more than twice as much foliar area per stem. Stem diameters were a positive function of crown area: stem-number ratios, suggesting lower photosynthetic potential was correlated with diminished radial growth among browsed plants. No flowering was observed until 2 years after exclusion when plants inside all exclosures and browsed willows in the wild ungulate area responded with a large pulse in flowering. Browsed plants in the sheep + wild ungulate area did not flower. The number of catkins produced per plant was significantly associated with willow height and plants <70 cm in height did not flower, thus suggesting a size threshold for reproduction in these species. Our results suggest that even relatively light levels of domestic livestock grazing, when coupled with intense wild ungulate browsing, can strongly affect plant structure and limit reproduction of riparian willows.

381. **Current issues in sagebrush habitat management.**
Boyd, Chad S.
Northwestern Naturalist 86(2): 85-86. (2005)
NAL Call #: QL671.M8; ISSN: 1051-1733
Descriptors: Artemisia spp./ cattle/ greater sage grouse/ habitat management/ sagebrush/ grazing/ fire
Abstract: Declining populations of greater sage grouse (Centrocercus urophasianus) and other sagebrush obligates have focused attention on sagebrush habitat management. Invasive annual weeds such as cheatgrass dominate over 7,000,000 ha of Great Basin rangeland. At higher elevations, reduced fire frequency has promoted juniper invasion of sagebrush habitat. Livestock grazing affects the majority of the sagebrush biome, but there is a shortage of literature linking grazing to quality of sagebrush obligate habitat. Management is complicated by variation in monitoring protocols across professional disciplines. Solving habitat management issues will require cooperation between a diversity of professionals including wildlife biologists and range and landscape ecologists.
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382. **Daytime activity of white-tailed deer in response to short-duration and continuous grazing.**
Cohen, W. E.; Reiner, R. J.; Bryant, F. C.; Drawe, D. L.; and Bradley, L. C.
Southwestern Naturalist 34(3): 428-431. (1989)
NAL Call #: 409.6 So8 ; ISSN: 0038-4909
Descriptors: Odocoileus virginianus/ pastures/ wildlife management/ Texas
This citation is from AGRICOLA.

383. **Deer and cattle diets on heavily grazed pine-bluestem range.**
Thill, R. E. and Martin, A.
Journal of Wildlife Management 53(3): 540-548. (1989)
NAL Call #: 410 J827; ISSN: 0022-541X
Descriptors: Odocoileus virginianus/ Pinus palustris/ Andropogon sp./ seasonality/ feeding preference/ range management/ Louisiana
Abstract: We studied dietary overlap between captive white-tailed deer (n = 3) (Odocoileus virginianus) and cattle (n = 4) for 3 years on 2 rotationally burned, 54-ha longleaf pine (Pinus palustris)-bluestem (Andropogon spp.) pastures in central Louisiana [USA]. A third of each pasture was burned each year in late February. One pasture was grazed heavily (61-77% herbage use) yearlong; the other was grazed heavily (50-67% use) from mid-April to 1 November. Deer diets were dominated yearlong by a mixture of browse (49.3-83.2%) and forbs (11.2-47.1%). Cattle consumed mostly grasses during spring and summer and 60 and 40% browse and herbage, during fall and winter, respectively. Cattle consumed more herbage on first-year burns. Dietary overlap under heavy yearlong grazing averaged 25.8, 11.8, 26.0, and 30.7% during spring, summer, fall, and winter, respectively. Overlap under heavy seasonal grazing averaged 18.5, 7.4, and 22.6% during spring, summer, and fall, respectively. Diets of both animals were diverse and overlap generally resulted from sharing small amounts of many plant taxa. Except on recent burns during summer, dietary overlap under heavy yearlong grazing was comparable to that observed under moderate yearlong grazing at half the cattle stocking rate. Moderate grazing (40-50% herbage removal) of similar range from late spring through early fall should have little negative impact on deer forage availability. Grazing during late fall and winter reduces an already limited supply of deer forage by reducing availability of evergreen browse and herbaceous winter rosettes.
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384. **Demography of a population collapse: The northern Idaho ground squirrel (Spermophilus brunneus brunneus).**
Sherman, Paul W. and Runge, Michael C.
Idaho Academy of Science. Journal 37(1): 49-50. (2001); ISSN: 0536-3012
Descriptors: Spermophilus brunneus brunneus/ survival/ succession/ population ecology/ nutrition/ mammals/ livestock/ history/ habitat use/ habitat management/ foods-feeding/ food supply/ fires-burns/ behavior/ Idaho ground squirrel/ Idaho, West-central
Abstract: Idaho ground squirrels, Spermophilus brunneus brunneus, inhabit five counties in west-central Idaho, and are made up two subspecies, the northern and southern. The northern Idaho ground squirrel has 36 historic sites. The short-grass meadow near the historical townsite of Bear in Idaho is named "Squirrel Valley" and is the largest and densest of the known populations. When studied, the Squirrel Valley population had 272 adults and juveniles. The population declined and by 1999 contained only 10 individuals. The factors causing the population decline included nutritional inadequacy of food resources, particularly seeds, due to drying of the habitat and changes in plant species composition, themselves the result of fire suppression and grazing. Survival rates and litter sizes varied among years. Survival and breeding rates of yearling females were low. Studies suggest that changes in life-history parameters and their variances can play a critical role in anthropogenic population declines.
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385. **Densities of brown-headed cowbirds in riparian and rangeland areas, with and without cattle present, along the middle Rio Grande, New Mexico.**
Tisdale Hein, Rinda E. and Knight, Richard L.
Studies in Avian Biology (26): 152-156. (2003)
NAL Call #: QL671.S8; ISSN: 0197-9922
Descriptors: brood parasitism/ cowbird management/ grazing/ habitat suitability/ livestock management/ rangeland habitat/ riparian habitat/ species density/ species distribution
Abstract: We compared the densities of total Brown-headed Cowbirds (Molothrus ater), female cow-birds, and potential hosts during the morning hours on grazed and ungrazed riparian sites along the Rio Grande, New Mexico, in an attempt to evaluate the influence of the physical presence of cattle on these variables. In addition, we compared the densities of all cowbirds, female cowbirds, and potential hosts between morning and afternoon hours at riparian and rangeland sites, both with and without cattle present. We found no significant differences in total cowbird, female cowbird, or potential host densities during morning hours between riparian sites with and without cattle, indicating that the physical presence of cattle alone did not influence cowbird abundance or potential host abundance at our study sites. Cowbirds were absent from all of our riparian sites during the afternoon hours, indicating that habitat type and/or alternative feeding/congregation opportunities may have been more

important in influencing cowbird densities during afternoon feeding periods than was the mere presence of cattle. Cowbird numbers in rangeland sites were low during both morning and afternoon periods, reflecting the low suitability of rangeland as cowbird breeding, and possibly feeding, habitat regardless of the presence of cattle. The lack of afternoon cowbird detections in both riparian and rangeland sites suggests that alternative feeding resources and/or congregation areas existed within the cowbird's commuting range. These findings have implications for current livestock management efforts to reduce cowbird parasitism of imperiled songbird species.

386. **Density and diversity of overwintering birds in managed field borders in Mississippi.**
Smith, M. D.; Barbour, P. J.; Burger, L. W.; and Dinsmore, S. J.
Wilson Bulletin 117(3): 258-269. (2005)
NAL Call #: 413.8 W692; ISSN: 00435643
Descriptors: agricultural change/ avifauna/ habitat conservation/ population decline/ population density/ species diversity/ Mississippi/ Aves/ Melospiza melodia/ Passerculus sandwichensis/ Passeridae
Abstract: Grassland bird populations are sharply declining in North America. Changes in agricultural practices during the past 50 years have been suggested as one of the major causes of this decline. Field-border conservation practices encouraged by the U.S. Department of Agriculture's National Conservation Buffer Initiative meet many of the needs of sustainable agriculture and offer excellent opportunities to enhance local grassland bird populations within intensive agricultural production systems. Despite the abundant information on avian use of and reproductive success in, strip habitats during the breeding season, few studies have examined the potential value of field borders for wintering birds. We planted 89.0 km of field borders (6.1 m wide) along agricultural field edges on one-half of each of three row crop and forage production farms in northeastern Mississippi. We sampled bird communities along these field edges during February-March 2002 and 2003 using line-transect distance sampling and strip transects to estimate density and community structure, respectively. We used Program DISTANCE to estimate densities of Song (Melospiza melodia), Savannah (Passerculus sandwichensis), and other sparrows along bordered and non-bordered transects while controlling for adjacent plant community. Greater densities of several sparrow species were observed along most bordered transects. However, effects of field borders differed by species and adjacent plant community types. Diversity, species richness, and relative conservation value (a weighted index derived by multiplying species-specific abundances by their respective Partners in Flight conservation priority scores) were similar between bordered and non-bordered edges. Field borders are practical conservation tools that can be used to accrue multiple environmental benefits and enhance wintering farmland bird populations. Provision of wintering habitat at southern latitudes may influence population trajectories of short-distance migrants of regional conservation concern.

387. **Density and success of bird nests relative to grazing on western Montana grasslands.**
Fondell, Thomas F. and Ball, I. J.
Biological Conservation 117(2): 203. (2004)
NAL Call #: S900.B5; ISSN: 0006-3207
Descriptors: brown-headed cowbird/ grassland/ grazing/ ground-nesting birds/ nest density/ prairie/ agriculture/ habitat/ habitat change/ change in vegetation/ brood/ egg/ fertility/ recruitment/ reproduction/ density
Abstract: Grassland birds are declining at a faster rate than any other group of North American bird species. Livestock grazing is the primary economic use of grasslands in the western United States, but the effects of this use on distribution and productivity of grassland birds are unclear. We examined nest density and success of ground-nesting birds on grazed and ungrazed grasslands in western Montana. In comparison to grazed plots, ungrazed plots had reduced forb cover, increased litter cover, increased litter depth, and increased visual obstruction readings (VOR) of vegetation. Nest density among 10 of 11 common bird species was most strongly correlated with VOR of plots, and greatest nest density for each species occured where mean VOR of the plot was similar to mean VOR at nests. Additionally, all bird species were relatively consistent in their choice of VOR at nests despite substantial differences in VOR among plots. We suggest that birds selected plots based in part on availability of suitable nest sites and that variation in nest density relative to grazing reflected the effect of grazing on availability of nest sites. Nest success was similar between grazed plots and ungrazed plots for two species but was lower for nests on grazed plots than on ungrazed plots for two other species because of increased rates of predation, trampling, or parasitism by brown-headed cowbirds (Molothrus ater). Other species nested almost exclusively on ungrazed plots (six species) or grazed plots (one species), precluding evaluation of the effects of grazing on nest success. We demonstrate that each species in a diverse suite of ground-nesting birds preferentially used certain habitats for nesting and that grazing altered availability of preferred nesting habitats through changes in vegetation structure and plant species composition. We also show that grazing directly or indirectly predisposed some bird species to increased nesting mortality. Management alternatives that avoid intensive grazing during the breeding season would be expected to benefit many grassland bird species. © 2004 Elsevier.

388. **Desert grassland canopy arthropod species richness: Temporal patterns and effects of intense, short-duration livestock grazing.**
Forbes, G. S.; Van Zee, J. W.; Smith, W.; and Whitford, W. G.
Journal of Arid Environments 60(4): 627-646. (2005)
NAL Call #: QH541.5.D4J6; ISSN: 0140-1963.
Notes: doi: 10.1016/j.jaridenv.2004.07.004.
Descriptors: arthropods/ desert/ insects/ livestock grazing/ shrub-removal/ species richness
Abstract: Arthropods living in the canopies of two woody shrub species (a sub-shrub (Gutierrezia sarothrae) and a large shrub (Prosopis glandulosa)) and perennial grasses plus associated herbaceous species, were sampled on 18, 0.5 hectare plots in a Chihuahuan Desert grassland for five consecutive years. Mesquite shrubs were removed from

nine plots, six plots were grazed by yearling cattle in August and six plots were grazed in February for the last 3 years of the 5 year study. Arthropod species richness ranged between 154 and 353 on grasses, from 120 to 266 on G. sarothrae, and from 69 to 116 on P. glandulosa. There was a significant relationship between the number of families of insects on grass and G. sarothrae and growing season rainfall but species richness was not a function of growing season rainfall on any of the plants. Several of the arthropod families that were the most species rich in this grassland were found on all of the plants sampled, i.e. Salticid spiders, Bruchid and Curculionid beetles, Cicadellid and Psyllid homopterans, and ants (Formicidae). There were more species rich families that were shared by grasses and the sub-shrub G. sarothrae than with mesquite. The absence of a relationship between growing season rainfall and species richness was attributed to variation in life history characteristics of arthropods and to the non-linear responses of annual and perennial desert grassland plants to rainfall. There were no significant differences in insect family or species richness on any of the plant types as a result of removal of mesquite (P. glandulosa) from selected plots. Intense, short duration (24 h) grazing by livestock during in late summer resulted in reduced species richness in the grass-herb vegetation layer but had no effect on insect species richness on snakeweed or mesquite shrubs. Livestock grazing in winter had no effect on insect species richness on any of the vegetation sampled.

389. **Desert mule deer use of grazed and ungrazed habitats.**
Ragotzkie, K. E. and Bailey, J. A.
Journal of Range Management 44(5): 487-490. (1991)
NAL Call #: 60.18 J82; ISSN: 0022-409X.
http://jrm.library.arizona.edu/Volume44/Number5/azu_jrm_v44_n5_487_490_m.pdf
Descriptors: commercial activities/ nutrition/ feeding behavior/ ecology/ terrestrial habitat/ land and freshwater zones/ Odocoileus hemionus crooki: farming and agriculture/ habitat use/ foraging/ home range/ habitat utilization/ grass-shrubland habitats/ cattle grazing/ grasslands/ scrub/ Arizona/ Santa Rita Experimental Range/ Cervidae/ Artiodactyla/ Mammalia/ chordates/ mammals/ vertebrates

390. **Desert riparian areas: Landscape perceptions and attitudes.**
Zube, Ervin H. and Sheehan, Michele R.
Environmental Management 18(3): 413-421. (1994)
NAL Call #: HC79.E5E5 ; ISSN: 0364-152X
Descriptors: human (Hominidae)/ animals/ chordates/ humans/ mammals/ primates/ vertebrates/ agriculture/ farmers/ land use/ local decision makers/ management/ natural area preservation/ realtors/ resource managers/ Safford, Arizona/ socioeconomics/ Upper Gila River/ wildlife preservation
Abstract: The perceptions and attitudes of residents and special interest groups along the Upper Gila River in the vicinity of the town of Safford, Arizona, USA, were studied with a primary focus on descriptions of the riparian landscape and attitudes towards planning and management in and around the riparian area. Special interest groups included farmers, resource managers, realtors, and local decision makers. Attention was directed to differences between resource managers and other groups. Findings from this study are compared with those from a previous study along the Upper San Pedro River. Notable differences between the two areas included perceptions of appropriate land uses, with a greater emphasis on agriculture and related activities in the Upper Gila River area and on wildlife and natural area preservation in the Upper San Pedro area. Relationships of perceptions and attitudes with the socioeconomic contexts of the two study areas are explored.

391. **Development of a grassland integrity index based on breeding bird assemblages.**
Coppedge, B. R.; Engle, D. M.; Masters, R. E.; and Gregory, M. S.
Environmental Monitoring and Assessment 118(1-3): 125-145. (2006)
NAL Call #: TD194.E5; ISSN: 01676369.
Notes: doi: 10.1007/s10661-006-1237-8.
Descriptors: avian assemblages/ Conservation Reserve Program/ fragmentation/ grasslands/ Juniper/ landscape pattern/ Oklahoma/ response guilds
Abstract: We utilized landscape and breeding bird assemblage data from three Breeding Bird Survey (BBS) routes sampled from 1965-1995 to develop and test a grassland integrity index (GII) in a mixed-grass prairie area of Oklahoma. The overall study region is extensively fragmented from long-term agricultural activity, and native habitat remnants have been degraded by recent encroachment of woody vegetation, namely eastern redcedar (Juniperus virginiana L.). The 50 individual bird survey points along the BBS routes, known as stops, were used as sample sites. Our process first focused on developing a grassland disturbance index (GDI) as a measure of cumulative landscape disturbances for these sites. The GDI was based on five key landscape variables identified in an earlier species-level study of long-term avian community dynamics: total tree, shrub, and herbaceous vegetation cover indices, overall mean landscape patch size, and grassland patch core size. The GII was then developed based on breeding bird assemblage data. Assemblages were based on commonly used response guilds reflective of five avian life history parameters: foraging mode/location, nesting location, habitat specificity, migratory pattern, and dietary guild. We tested the response of 78 candidate assemblage metrics to the GDI, and eliminated those with no or poor response or with high correlations (redundant), resulting in 13 metrics for use in the final index. Individual metric scores were scaled to fall between 0 and 10, and the cumulative index to range from 0 to 100. Although broader application and refinement are possible, the avian-based GII has an advantage over labor-intensive, habitat-based monitoring in that the GII is derived from readily available long-term BBS data. Therefore, the GII shows promise as an inexpensive tool that could easily be applied over other areas to monitor changes in regional grassland conditions. © Springer Science + Business Media, Inc. 2006.

392. **Development of a habitat suitability index model for burrowing owls in the eastern Canadian prairies.**
Uhmann, Tanys V.; Kenkel, Norm C.; and Baydack, Richard K.
Journal of Raptor Research 35(4): 378-384. (2001)
NAL Call #: QL696.F3J682; ISSN: 0892-1016
Descriptors: Speotyto cunicularia/ birds/ modeling/ habitat surveys/ ecosystems/ prairies/ wildlife-habitat relationships/ extirpation/ population ecology/ habitat management/ habitat alterations/ succession/ agricultural practices/ burrows/ nests-nesting/ nesting sites/ burrowing owl/ habitat evaluation/ habitat suitability index/ burrowing owl/ Canada/ prairie provinces/ Manitoba/ Saskatchewan
Abstract: Recent efforts to sustain burrowing owl (Athene cunicularia) populations in Manitoba have been unsuccessful, and the species is now effectively extirpated from the province. Although specific causes of the decline remain unknown, loss, fragmentation, and degradation of suitable habitat have likely been major contributors to this decline. The authors developed a habitat suitability index model to determine suitability of burrowing owl nesting habitat in southwestern Manitoba and southeastern Saskatchewan. Model parameters were obtained using a modified Delphi technique to solicit expert opinions. An interactive, adaptive learning approach was used in model development, iteratively refining the model until acceptable levels of accuracy and robustness were achieved. Application of the model to historical burrowing owl breeding sites in Manitoba indicated that habitat suitability is often reduced by the presence of tall vegetation at former nest burrows. A management approach involving moderate grazing to maintain low vegetation height at all nest burrow sites is recommended.
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393. **Development of fall cattle grazing prescriptions to improve deer and elk forage.**
Short, Jeffrey J. and Knight, James E.
Intermountain Journal of Sciences 5(1-4): 72. (1999); ISSN: 1081-3519
Descriptors: cattle/ grazing/ prescribed grazing/ deer/ elk/ forage/ Montana
Abstract: Cattle (Bos taurus) and wild ungulates have long been viewed as competitors. In the future the best method of preserving wildlife and cattle will be to manage them cooperatively. The objective of this project was to examine the use of fall cattle grazing to improve wildlife forage. We looked at the effects of four fall cattle grazing levels on elk (Cervus elaphus), mule deer (Odocoileus hemionus) and white-tailed deer (Odocoileus virginianus) forage. The hypothesis of this study is that fall cattle grazing will improve the quality of elk and deer forage the following spring and summer. The effects of fall foraging on wildlife forage were examined on the Blackfoot Clearwater Wildlife Management area in west central Montana. A randomized complete block design with five replications was used. Cattle were grazed in enclosures during the fall of 1997 and 1998. Grazing levels were zero percent removal (control) 50% removal, 70% removal, and 90% removal. During spring and summer we measured plant species composition, plant diversity, dead plant material, green forb biomass, and green grass biomass to evaluate quality of elk and deer forage. Preliminary data from the first year of this two-year study suggests significant positive differences in wildlife forage due to cattle grazing intensity. Information generated will be useful in making management decisions on ranges that are important spring and summer wildlife habitat.
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394. **Differences in ground beetles (Coleoptera: Carabidae) of original and reconstructed tallgrass prairies in northeastern Iowa, USA, and impact of 3-year spring burn cycles.**
Larsen, Kirk J. and Work, Timothy W.
Journal of Insect Conservation 7(3): 153-166. (2003)
NAL Call #: QL362.J68; ISSN: 1366-638X
Descriptors: conservation measures/ ecology/ terrestrial habitat/ abiotic factors/ physical factors/ land zones/ Carabidae: habitat management/ burn cycles/ community structure/ distribution within habitat/ grassland/ original and reconstructed tallgrass prairie habitats/ fire/ Iowa/ Insecta, Coleoptera, Adephaga, Caraboidea/ arthropods/ beetles/ insects/ invertebrates
© Thomson Reuters Scientific

395. **Differences in plant composition in cattle and wild ungulate exclosures in north-central Montana.**
Hurlburt, Kris and Bedunah, Don.
In: Sharing Common Ground on Western Rangelands: Proceedings of a Livestock/Big Game Symposium. Sparks, Nevada. Evans, Keith E. (eds.); Vol. INT-GTR-343. Ogden, Utah: U.S. Department of Agriculture Forest Service, Intermountain Research Station; pp. 19-24; 1996.
Notes: ISSN: 0363-6186.
NAL Call #: aSD11.A48
Descriptors: nutrition/ diet/ ecology/ terrestrial habitat/ land and freshwater zones/ Cervus elaphus/ Odocoileus hemionus (Cervidae): food plants/ impact on habitat/ grassland plant community/ impact of grazing/ grassland/ grazing impact on plant community/ Montana/ Dupuyer/ grazing impact on grassland plant community/ Cervidae/ Artiodactyla/ Mammalia/ chordates/ mammals/ vertebrates
© Thomson Reuters Scientific

396. **Direct impacts of cattle grazing on grassland nesting birds.**
Churchwell, Roy; Davis, Craig A.; Fuhlendorf, Sam D.; and Engle, David M.
Bulletin of the Oklahoma Ornithological Society 38(4): 25-32. (2005); ISSN: 0474-0750
Descriptors: commercial activities/ reproduction/ reproductive behavior/ ecology/ population dynamics/ terrestrial habitat/ land zones/ Aves: farming and agriculture/ cattle grazing/ nesting success/ breeding site/ nesting site/ reproductive productivity/ mortality/ grassland/ Oklahoma/ Osage County/ tallgrass prairie preserve/ birds/ chordates/ vertebrates
Abstract: We used nest success data from a 2003 field season to examine the direct impacts of cattle grazing on grassland nesting birds. We found that 7% of nest loss was due directly to cattle through trampling of nests (6%) and abandonment (1%). We conclude that changes in grazing management could mitigate the degree to which cattle directly impact nesting success of grassland birds, and discuss these suggestions in light of our results.
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397. **Dispersal and mortality of prairie voles (Microtus ochrogaster) in fragmented landscapes: A field experiment.**
Smith, Jennifer E. and Batzli, George O.
Oikos 112(1): 209-217. (2006)
NAL Call #: 410 OI4; ISSN: 0030-1299
Descriptors: ecology/ population dynamics/ recruitment/ terrestrial habitat/ land zones/ Microtus ochrogaster: Emigration/ mortality/ fragmented landscapes/ Immigration/ distribution within habitat/ Dispersal in fragmented landscapes/ grassland/ Illinois/ Urbana/ Mammalia, Rodentia, Muridae/ chordates/ mammals/ rodents/ vertebrates
Abstract: We conducted a field experiment that manipulated landscapes by mowing so that the amount of unfavorable habitat (low cover) for prairie voles (Microtus ochrogaster) increased while the number and size of favorable patches (high cover) remained constant. Distance between favorable patches increased as the amount of unfavorable habitat increased, so we could test two current hypotheses concerning the effect of habitat fragmentation on local populations: 1) increased distance between favorable habitat patches reduces successful per capita dispersal (emigration and immigration) because dispersers suffer greater exposure to predators (the predation hypothesis); and 2) per capita dispersal is inversely density dependent in voles because increased aggression at higher density inhibits movements (the social fence hypothesis). As predicted by the predation hypothesis, increased distance between favorable habitat patches led to decreased successful dispersal among patches and increased per capita mortality, particularly among subadult and adult males (the categories of voles most likely to emigrate). As predicted by the social fence hypothesis, dispersal was inversely density dependent, and dispersing voles displayed a greater frequency of wounding (an indication of increased aggressive interactions) than did residents. The amount of wounding in general did not increase with density, however, and, as distance between patches increased to 60 m, successful dispersal became rare and erratic. Nevertheless, our overall results supported current hypotheses regarding the effects of increased habitat fragmentation on patterns of dispersal and mortality. Examining the impact of these effects on local population dynamics within different landscapes will require longer periods of observation.

398. **Distribution of elk and cattle in a rest-rotation grazing system.**
Knowles, C. J. and Campbell, R. B.
In: Proceedings of the Wildlife-Livestock Relationships Symposium. Coeur D'alene, Idaho. Peek, James M. and Dalke, P. D. (eds.)
Moscow, Idaho: Forest, Wildlife and Range Experiment Station, University of Idaho; pp. 47-60; 1982.
NAL Call #: SF84.84.W5 1981
Descriptors: Montana/ American elk/ Cervus elaphus nelsoni/ rotational grazing/ livestock
This citation is from AGRICOLA.

399. **Disturbance by fire frequency and bison grazing modulate grasshopper assemblages in tallgrass prairie.**
Joern, A.
Ecology 86(4): 861-873. (2005)
NAL Call #: 410 Ec7; ISSN: 00129658
Descriptors: Acrididae/ disturbance/ habitat heterogeneity/ Konza prairie/ long-term study/ Phasmida/ prescribed burning/ Tettigoniidae/ biodiversity/ bottom-up control/ disturbance/ fire/ grasshopper/ grazing/ vegetation structure/ Kansas/ Acrididae/ Arthropoda/ bison/ Bison bison/ Bos/ Bubalus/ Insecta/ Mammalia/ Phasmatodea/ Tettigoniidae
Abstract: Understanding determinants of local species diversity remains central to developing plans to preserve biodiversity. In the continental United States, climate, grazing by large mammals, fire, and topography are important ecosystem drivers that structure North American tallgrass prairie, with major impacts on plant community composition and vegetation structure. Frequency of fire and grazing by bison (Bos bison), through effects on plant community composition and altered spatial and structural heterogeneity of vegetation in tallgrass prairie, may act as bottom-up processes that modulate insect community species richness. As previously seen for plant species richness, I hypothesized that grazing had more impact than fire frequency in determining species richness of insect herbivore communities. I examined this prediction with grasshoppers at Konza Prairie, a representative tallgrass prairie site in which fire frequency and bison grazing are manipulated over long terms with landscape-level treatments. Topographic position (upland vs. lowland) and fire frequency (1-, 2-, 4-year intervals, and unburned) did not significantly influence grasshopper species richness or indices of diversity, while grazing had significant effects. On average, I found ~45% more grasshopper species and significantly increased values of Shannon H' diversity at sites with bison grazing. Species abundances were more equally distributed (Shannon's Evenness Index) in grazed sites as well. No significant interactions among burning and grazing treatments ' explained variation in grasshopper species diversity. Grasshopper species richness responded positively to increased heterogeneity in vegetation structure and plant species richness, and negatively to average canopy height and total grass biomass. Variation in forb biomass did not influence grasshopper species richness. A significant positive relationship between grasshopper species richness and overall grasshopper density was observed. Species richness increased marginally as watershed area of treatments in grazed areas increased, but not in ungrazed areas. Disturbance from ecosystem drivers operating at watershed spatial scales exhibits strong effects on local arthropod species diversity, acting indirectly by mediating changes in the spatial heterogeneity of local vegetation structure and plant species diversity. © 2005 by the Ecological Society of America.

400. **Does body size affect a bird's sensitivity to patch size and landscape structure?**
Winter, Maiken; Johnson, Douglas H; and Shaffer, Jill A.
Condor 108(4): 808-816. (2006)
NAL Call #: QL671.C6; ISSN: 0010-5422
Descriptors: terrestrial ecology: ecology, environmental sciences/ wildlife management: conservation/ body size/

landscape structure/ patch size/ grassland habitat
Abstract: Larger birds are generally more strongly affected by habitat loss and fragmentation than are smaller ones because they require more resources and thus larger habitat patches. Consequently, conservation actions often favor the creation or protection of larger over smaller patches. However, in grassland systems the boundaries between a patch and the surrounding landscape, and thus the perceived size of a patch, can be indistinct. We investigated whether eight grassland bird species with different body sizes perceived variation in patch size and landscape structure in a consistent manner. Data were collected from surveys conducted in 44 patches of northern tallgrass prairie during 1998-2001. The response to patch size was very similar among species regardless of body size (density was little affected by patch size), except in the Greater Prairie-Chicken (Tympanuchus cupido), which showed a threshold effect and was not found in patches smaller than 140 ha. In landscapes containing 0%-30% woody vegetation, smaller species responded more negatively to increases in the percentage of woody vegetation than larger species, but above an apparent threshold of 30%, larger species were not detected. Further analyses revealed that the observed variation in responses to patch size and landscape structure among species was not solely due to body size per se, but to other differences among species. These results indicate that a stringent application of concepts requiring larger habitat patches for larger species appears to limit the number of grassland habitats that can be protected and may not always be the most effective conservation strategy.

401. **Does management for duck productivity affect songbird nesting success?**
Koper, N. and Schmiegelow, F. K.
Journal of Wildlife Management 71(7): 2249-2257. (Sept. 2007)
NAL Call #: 410 J827
Descriptors: wildlife management/ ducks/ nesting/ songbirds/ wildlife habitats/ highlands/ prairies/ cattle/ grazing/ edge effects/ wildlife-livestock relations/ vegetation structure/ plant litter/ Alberta
Abstract: Habitat management for ducks has significantly influenced prairies and wetlands used by other species. However, the effects of management on other species have not been clearly assessed. We present the first study to compare the nesting success of ducks with the productivity of coexisting passerines. We evaluated effects of cattle grazing, subdivision of fields, habitat edges, year, and vegetation structure on duck and songbird nesting success in 32 mixed-grass prairie fields in southern Alberta, Canada. Duck and songbird nesting success were not correlated. Duck nesting success was influenced by timing of grazing and vegetation structure, and tended to be higher in wetter years, whereas nesting success of most songbirds was not influenced by vegetation structure or grazing, and was sometimes higher in drier years. Local habitat management for ducks cannot be assumed to benefit songbirds. However, some management strategies, such as those that promote tall grass and short litter, might benefit both taxa. [Authors]
This citation is from AGRICOLA.

402. **Duck nest survival in the Missouri Coteau of North Dakota: Landscape effects at multiple spatial scales.**
Stephens, S. E.; Rotella, J. J.; Lindberg, M. S.; Taper, M. L.; and Ringelman, J. K.
Ecological Applications 15(6): 2137-2149. (2005)
NAL Call #: QH540.E23 ; ISSN: 10510761
Descriptors: Anas spp./ duck populations/ fragmentation/ grassland habitat/ information-theoretic model choice/ landscape characteristics/ Missouri Coteau/ mixed models/ multiple spatial scales/ nest survival/ North Dakota/ Prairie Pothole Region/ grassland/ habitat conservation/ habitat fragmentation/ habitat loss/ nesting success/ predation risk/ survival/ waterfowl/ North America/ Prairie Pothole Region/ Anas/ Aythya
Abstract: Nest survival is one of the most important parameters in the population dynamics of grassland-nesting ducks (Anas and Aythya spp.) that breed in the Prairie Pothole Region of North America. Grassland habitats used by these species are increasingly threatened by habitat loss and the coincident fragmentation, which may indirectly alter nest survival through effects on predators. Although predators are the dominant cause of nest loss, they are difficult to monitor directly. Thus, indirect analyses of habitat variables are required. Many studies have attempted to address the relationship between fragmentation and nest survival; however, few studies have examined the influence of fragmentation at multiple spatial scales. Understanding how landscape characteristics at multiple spatial scales explain variation in nest survival is important, because no single correct scale is likely to exist for a diversity of landscape metrics. We examined the relationships between habitat variables and duck nest survival (n ≈ 4200 nests) on 18 10.4- km^2 sites selected across a gradient of landscape characteristics in the Missouri Coteau Region of North Dakota. We evaluated both a priori and exploratory competing models of nest survival that considered habitat features measured at nest sites, within nesting patches, and at multiple landscape scales. We used generalized nonlinear mixed-modeling techniques to model nest survival rates. Information-theoretic techniques were used to select among competing models. Models that included covariates measured at multiple landscape scales were better than simpler models that included only covariates measured at a single spatial scale. Landscape covariates measured at 10.4 and 41.4 km^2 resulted in the best explanation of nest survival. Nest survival was positively related to the amount of grassland habitat, negatively related to the wetland density, and related to the amount of grassland edge in a quadratic manner, with the lowest nest survival at intermediate values of grassland edge. Future research should attempt to determine the causes of these relationships, something we were unable to do with our correlative approach. Conservation efforts focused on maintaining duck populations should seek to maintain landscapes with abundant grassland and to account for the influence of configuration using GIS analyses. © 2005 by the Ecological Society of America.

403. **Duck nesting on rotational and continuous grazed pastures in North Dakota.**
Murphy, Robert K.; Schindler, Darrell J.; and Crawford, Richard D.
Prairie Naturalist 36(2): 83-94. (2004)
NAL Call #: QH540.P7; ISSN: 0091-0376
Descriptors: visual obstruction reading (VOR)/ Prairie Pothole Joint Venture (PPJV)/ continuous grazed pastures/ nest density/ nest success/ nesting habitat/ prairie habitat conservation/ rotational cattle grazing/ rotational grazed pastures
Abstract: To improve the economic viability of grazed prairie and thus conserve it as wildlife habitat, the Prairie Pothole Joint Venture (PPJV) cost-shares establishment of rotational cattle grazing on privately owned, native rangeland. During 1996 and 1997 we evaluated duck nest density, nest success, and nesting habitat on six PPJV rotational grazed pastures on the Missouri Coteau landform in central and northwestern North Dakota. Each rotational pasture was paired with a traditional, continuous grazed pasture for comparison. We located 444 nests of eight duck species. We detected no differences (P > 0.1) between rotational and continuous grazed pastures in apparent nest density of ducks ($\bar{x}$ > +/- SD nests/ha, all species combined, 1996: 0.26 +/- 0.09 and 0.31 +/- 0.12; 1997: 0.38 +/- 0.14 and 0.25 +/- 0.12), although a grazing type x year interaction suggested rotational pastures might be more attractive to ducks in a dry spring (1997). No differences in duck nest success were detected between rotational and continuous pastures (% Mayfield estimate, 1996: 27.2 +/- 12.6 and 15.5 +/- 11.0; 1997: 21.6 +/- 10.0 and 16.7 +/- 13.7), but varied occurrence of canid species could have obscured differences. We detected no differences in vegetation height-density indices as measured by visual obstruction readings (VORs) between rotational and continuous pastures in 1996. VORs were greater on rotational pastures, however, in the relatively dry spring of 1997. Our findings suggested that rotational grazing systems can serve as a prairie conservation tool on private rangelands without altering habitat values for nesting ducks, and in relatively dry springs might provide more attractive nesting cover for ducks than prairie under continuous grazing.

404. **Early brood-rearing habitat use and productivity of greater sage-grouse in Wyoming.**
Thompson, K. M.; Holloran, M. J.; Slater, S. J.; Kuipers, J. L.; and Anderson, S. H.
Western North American Naturalist 66(3): 332-342. (2006)
NAL Call #: QH1.G7; ISSN: 15270904
Descriptors: Centrocercus urophasianus/ early brood rearing/ forb/ greater sage-grouse/ habitat/ Invertebrate/ productivity/ sagebrush
Abstract: Populations of Greater Sage-Grouse (Centrocercus urophasianus) have been declining throughout their range since the 1960s. Productivity, which includes production and survival of young, is often cited as a factor in these declines. We monitored radio-equipped Greater Sage-Grouse at 3 sites in western Wyoming to assess early brood-rearing habitat use (through 14 days post-hatch) and productivity. Logistic and linear regression analyses with Akaike's Information Criterion were used to evaluate early brooding habitat use and to examine relationships between productivity and vegetation, insect size and abundance, and weather parameters. Females with broods were found in areas with greater sagebrush canopy and grass cover, and fewer invertebrates compared to random areas. The number of juveniles per female (estimated from wing barrel collections during fall harvest) was positively related to the abundance of medium-length Hymenoptera and grass cover, and the proportion of females with confirmed chicks 14 days post-hatch was positively related to abundance of medium-length Coleoptera and total herbaceous cover. Although the specific parameters varied slightly, Greater Sage-Grouse productivity in Wyoming appeared to be associated with a combination of insect and herbaceous cover elements. Managing for abundant and diverse insect communities within dense protective sagebrush stands should help ensure high-quality early brood-rearing habitat and increased Greater Sage-Grouse productivity.

405. **Early response to a prairie planting project by grassland birds: 2000 to 2006.**
Shillinglaw, John
Passenger Pigeon 69(2): 175-184. (2007);
ISSN: 0031-2703
Descriptors: conservation measures/ reproduction/ reproductive behavior/ reproductive productivity/ ecology/ community structure/ terrestrial habitat/ land zones/ Aves: habitat management/ prairie planting project/ former agricultural land/ habitat use and nesting responses/ breeding site/ restored grassland/ prairie planting project/ conservation implications/ fledgeing success/ species diversity/ grassland species/ habitat utilization/ grassland/ Wisconsin/ Waushara County/ birds/ chordates/ vertebrates
Abstract: This paper describes the vegetative changes which occurred through 2006 in a series of prairie plantings done from 2000 to 2003 on former agricultural land in southwest Waushara County, Wisconsin. How these vegetative changes relate to use by grassland birds for nesting was evaluated. Breeding bird surveys were conducted in the prairie plantings from 2000 to 2006 to determine the use of the plantings by selected species of grassland birds. The surveys demonstrated an increase in the grassland bird species, an increase in the number of species fledging young, and an increase in the total number of breeding birds over time. Implications for grassland bird conservation on public and private lands are discussed.

406. **Ecological relationships among eastern cottontail rabbits, tall fescue, and native warm-season grasses.**
Washburn, Brian Eric. University of Kentucky, 2001.
Notes: Advisor: Barnes, Thomas G.; Larson, Brian T.; Thesis/ Dissertation
Descriptors: prescribed burns/ no-till/ wildlife habitat/ cottontail rabbits/ Eastern cottontails/ Sylvilagus floridanus
Abstract: Tall fescue Festuca arundinacea grasslands may not provide suitable habitat for many wildlife species. Also, most fescue contains an endophytic fungus Neotyphodium coenophialum associated with nutritional and reproductive problems in livestock and laboratory mammals. The objectives of my research were (1) to determine the effects of the tall fescue endophyte on nutrition and reproduction in the free-ranging eastern cottontail Sylvilagus floridanus rabbit and (2) to develop effective methods of converting tall fescue grasslands to native warm-season grasslands.

Eastern cottontails (n = 111) were collected during the 1998 breeding season (May-August) from both tall fescue and non-fescue grasslands habitats. Sex, age, Condition Index, Kidney Fat Index, and paired adrenal weights were determined for each rabbit. Paired testes and epididymal weights in males, and a variety of physiological reproductive parameters in females were also assessed. In fall 1998, plant communities were described by sampling 30 1- m^2 plots in each grassland where a rabbit was collected. Also, >30 tall fescue plants from each site were collected and analyzed for the presence of the endophyte. Tall fescue cover (%) and tall fescue endophyte infection levels were used to classify cottontail collection points as tall fescue or non-fescue habitats. Tall fescue habitats were dominated by fescue (x- = 83% cover) that was highly endophyte-infected (x- = 92% infection rate), whereas non-fescue grassland habitats generally lacked tall fescue (x- = 6% cover) and were relatively uninfected (x- = 1% infection rate) by the tall fescue endophyte. Body condition (nutritional) and reproductive parameters of male and female cottontails collected from endophyte-infected tall fescue grasslands and non-fescue grassland habitats were similar. My results suggest that under natural conditions, the tall fescue endophyte is not negatively influencing the nutritional ecology or reproductive potential of free-ranging eastern cottontail rabbits in Kentucky. Conservation of tall fescue to native warm-season grasses can be accomplished by two methods. The first method includes a spring burn, followed by a pre-emergence application of imazapic, and no-till seeding native warm-season grasses. The second method involves conventional tillage and includes preparing a firm seedbed, seeding native warm-season grasses, and applying imazapic at the time of seeding. Both methods consistently resulted in established stands of native warm-season grasses in one growing season.

407. **Ecological traps in isodars: Effects of tallgrass prairie management on bird nest success.**
Shochat, Eyal.; Patten, Michael A.; Morris, Douglas W.; Reinking, Dan L.; Wolfe, Donald H.; and Sherrod, Steve K.
Oikos 111(1): 159-169. (2005)
NAL Call #: 410 OI4; ISSN: 0030-1299
Descriptors: conservation measures/ nutrition/ diet/ prey/ reproduction/ ecology/ population dynamics/ predators/ terrestrial habitat/ land zones/ Aves: habitat management/ tallgrass prairie management/ multiple ecological consequences/ breeding success/ Invertebrata/ prey abundance/ prey breeding success/ prairie/ food availability/ reproductive productivity/ Vertebrata/ predator abundance/ grasslands/ Oklahoma/ Osage and Washington Counties/ birds/ chordates/ invertebrates/ vertebrates
Abstract: Ecological traps occur when habitat selection and habitat suitability (measured in terms of fitness) are decoupled. We developed a graphical model based on isodar theory to distinguish between an ideal distribution and an ecological trap. We tested the model's predictions using data on breeding bird populations in managed tallgrass prairie in Oklahoma. Between 1992 and 1996 we monitored success for 2600 nests of 26 breeding species in undisturbed, grazed, and burned and grazed plots. We also sampled arthropod biomass and nest predator abundance. Using the isodar model we determined that managed plots are ecological traps: compared with success on plots left undisturbed, nest success on plots that were only grazed was lower, and success on plots that were burned and grazed was substantially lower. Yet birds preferred to nest on managed plots, where arthropod abundance was measurably higher. Reptiles were the most abundant taxon of nest predators, and their abundance was highest in managed plots. Consequently, tree-nesting species had higher nest success than shrub- and ground-nesting birds. Nest success also increased with tree height. We concluded that isodar theory is a useful tool for detecting ecological traps if any component of fitness is measured in addition to animal densities. Our study also suggests that (1) human modification of the environment may alter simultaneously food and predator abundance, (2) the former affects nest site selection and the latter nest success, and (3) such ecosystems are likely to become traps for breeding birds.

408. **Ecology and management of sage-grouse and sage-grouse habitat.**
Crawford, J. A.; Olson, R. A.; West, N. E.; Mosley, J. C.; Schroeder, M. A.; Whitson, T. D.; Miller, R. F.; Gregg, M. A.; and Boyd, C. S.
Journal of Range Management 57(1): 2-19. (2004)
NAL Call #: 60.18 J82 ; ISSN: 0022409X
Descriptors: fire ecology/ habitat/ herbicide/ landscape ecology/ livestock grazing/ population dynamics/ habitat conservation/ population decline/ North America/ Artemisia tridentata/ Centrocercus urophasianus/ Coniferophyta/ Hexapoda/ Insecta/ Poaceae
Abstract: Sage-grouse (Centrocercus urophasianus and C. minimus) historically inhabited much of the sagebrush-dominated habitat of North America. Today, sage-grouse populations are declining throughout most of their range. Population dynamics of sage-grouse are marked by strong cyclic behavior. Adult survival is high, but is offset by low juvenile survival, resulting in low productivity. Habitat for sage-grouse varies strongly by life-history stage. Critical habitat components include adequate canopy cover of tall grasses (≥ 18 cm) and medium height shrubs (40-80 cm) for nesting, abundant forbs and insects for brood rearing, and availability of herbaceous riparian species for late-growing season foraging. Fire ecology of sage-grouse habitat changed dramatically with European settlement. In high elevation sagebrush habitat, fire return intervals have increased (from 12-24 to > 50 years) resulting in invasion of conifers and a consequent loss of understory herbaceous and shrub canopy cover. In lower elevation sagebrush habitat, fire return intervals have decreased dramatically (from 50-100 to < 10 years) due to invasion by annual grasses, causing loss of perennial bunchgrasses and shrubs. Livestock grazing can have negative or positive impacts on sage-grouse habitat depending on the timing and intensity of grazing, and which habitat element is being considered. Early season light to moderate grazing can promote forb abundance/availability in both upland and riparian habitats. Heavier levels of utilization decrease herbaceous cover, and may promote invasion by undesirable species. At rates intended to produce high sagebrush kill, herbicide-based control of big sagebrush may result in decreased habitat quality for sage-grouse. Light applications of tebuthiuron (N-[5-(1,1-dimethylethyl)-1,3,4-thiadiazol-2-yl]-N,N'-dimethylurea) can decrease canopy cover of sagebrush and increase grass and forb

production which may be locally important to nesting bunchgrasses and shrubs. Livestock grazing can have negative or positive impacts on sage-grouse habitat depending on the timing and intensity of grazing, and which habitat element is being considered. Early season light to moderate grazing can promote forb abundance/availability in both upland and riparian habitats. Heavier levels of utilization decrease herbaceous cover, and may promote invasion by undesirable species. At rates intended to produce high sagebrush kill, herbicide-based control of big sagebrush may result in decreased habitat quality for sage-grouse. Light applications of tebuthiuron (N-[5-(1,1-dimethylethyl)-1,3,4-thiadiazol-2-yl]-N, N'-dimethylurea) can decrease canopy cover of sagebrush and increase grass and forb production which may be locally important to nesting and foraging activities. The ability of resource managers to address sage-grouse habitat concerns at large scales is aided greatly by geomatics technology and advances in landscape ecology. These tools allow unprecedented linkage of habitat and population dynamics data over space and time and can be used to retroactively assess such relationships using archived imagery. The present sage-grouse decline is a complex issue that is likely associated with multiple causative factors. Solving management issues associated with the decline will require unprecedented cooperation among wildlife biology, range science, and other professional disciplines. © 2004 Society for Range Management.

409. **Economic tradeoffs between livestock grazing and wildlife habitat: A ranch-level analysis.**
Bernardo, Daniel J.; Boudreau, Gregory W.; and Bidwell, Terrance C.
Wildlife Society Bulletin 22(3): 393-402. (1994)
NAL Call #: SK357.A1W5; ISSN: 0091-7648
Descriptors: habitat/ hunting lease/ land resources/ modeling framework/ public grazing lands/ vegetation management
Abstract: Multiple-use management of land resources for domestic livestock and wildlife is becoming an increasingly important issue on private and public lands. A modeling framework is presented to develop production plans which maximize returns from livestock grazing and meet deer and quail habitat constraints on private rangelands in Oklahoma. In the initial solution of the model, net returns are maximized from cattle grazing without concern for wildlife habitat. An intensive vegetation management program involving herbicides and prescribed burning is used to reduce forage diversity (forbs, legumes, and woody shrubs) and maximize grass production for cattle grazing. Low to moderate deer and quail habitat ratings are associated with this plan. Optimal plans to achieve incremental increases in target quail and deer habitat ratings include strip application of herbicide, fail burning, and some mechanical removal of hardwoods to produce a mosaic of small open prairie areas and wooded areas. Brush piles and disking of small portions of the prairie areas are used to improve food diversity and protective cover. Only small reductions in income from livestock production are required to attain initial improvements in quail and deer habitat ratings; however, further improvements translate to more significant income reduction. While habitat appraisal models provide means of quantifying habitat considerations in economic optimization models, several limitations still exist. First, additional research is needed to verify the positive relationship between wildlife habitat and population and-to determine the relationship between hunting lease values and habitat quality. Application of the model requires rather meticulous detail in specifying the effects of various management practices on forage production and wildlife habitat. These data are not available for all areas; however, such information is required to develop efficient multiple-use management strategies (Matulich and Adams 1987). Also, the analysis does not consider the influence of dynamics or risk on decision making. Manipulation of vegetation is a dynamic process that may occur over several years and is significantly influenced by climatic events. Risk caused by price volatility and other sources of uncertainty may also influence ranch plans. Improvements to the model should focus on these considerations. While the findings are somewhat site specific, the study does present a useful and transferable framework for simultaneously analyzing livestock management and wildlife habitat decisions. The model can be specified to accommodate alternative livestock enterprises, vegetation management treatments, and habitat improvement practices for which the required technical data are available. The model may be expanded to incorporate additional wildlife species and is adaptable to accommodate alternative wildlife habitat evaluation systems. While probably more applicable to decision making on private lands, this model could also be applied to public grazing lands.

410. **Edge avoidance by nesting grassland birds: A futile strategy in a fragmented landscape.**
Renfrew, R. B.; Ribic, C. A.; and Nack, J. L.
Auk 122(2): 618-636. (Apr. 2005)
NAL Call #: 413.8 AU4
Descriptors: edge effect/ grasslands/ landscape/ models/ nests/ pasture/ predation
Abstract: Some grassland passerine species are considered area-sensitive, but the mechanisms underlying that phenomenon are not understood, particularly on grazed grasslands. Area sensitivity may result from edge avoidance or higher nest predation near edges, both of which may be influenced by predator activity or cattle-induced vegetational differences between pasture edge and interior. We assessed the effect of distance to edge on nest density and predation Savannah Sparrows (Passerculus sandwichensis), Grasshopper Sparrows (Ammodramus savannarum), Bobolinks (Dolichonyx oryzivorus), and meadowlarks (Sturnella spp.) along wooded and nonwooded edges of Wisconsin pastures in 1998-2000 and the activity of potential mammalian nest predators along those edges in 2000-2001. We found a positive relationship between nest density and distance from edge for all edge types combined, but that was not the result of effects of wooded edges: we found no difference in density between nests located <50 or <100 m from wooded versus nonwooded (crop or grassland) edges. Models that included combinations of vegetation structure (e.g. concealment), initiation date, year, or edge variables (or all four) were poor predictors of the probability of nest predation. Placing nests away from edges, therefore, did not reduce the risk of nest predation. Eight species known to prey on grassland bird nestswere documented along pasture edges, raccoon (Procyon lotor) being the most

common. Frequency of raccoon and thirteen-lined groundsquirrel (Spermophilus tridecemlineatus) visitation was highe ralong wooded edges and nonwooded edges, respectively. Cattle (Bostaurus) activity did not differentially affect vegetation height-density along edges compared with that in the pasture interior. Possible reasons for predation risk being similar in both pasture interiors and edges in a fragmented landscape include the ease with which predators can move within pastures, high percentage of resident grassland predators, and small size (median= 47.2 ha) of pastures.

411. **Effect of a reduction in cattle stocking rate on brown-headed cowbird activity.**
Kostecke, Richard M.; Koloszar, James A.; and Dearborn, Donald C.
Wildlife Society Bulletin 31(4): 1083-1091. (2003)
NAL Call #: SK357.A1W5; ISSN: 0091-7648
Descriptors: breeding activity/ breeding areas/ brood parasitism/ cattle stocking rate/ commute distance/ cowbird removal programs/ foraging activity/ grazing pressure/ host parasite interaction/ population sustainability/ songbird conservation/ stocking rate reduction
Abstract: Brood-parasitic cowbirds (Molothrus spp.) can severely impact host populations. Cowbird removal is the primary means of reducing parasitism. As an alternative to removal, we evaluated the reduction of cattle stocking rate as a tool to shift cowbird-breeding activity away from a breeding area of a sensitive host. Activity of radiotagged, female brown-headed cowbirds (M. ater) breeding on Fort Hood, Texas, a United States Army installation that contains a large population of federally endangered black-capped vireos (Vireo atricapilla), was monitored 2 years before and 2 years after a reduction in cattle stocking rate. We predicted that cowbirds would respond to the reduction by shifting both foraging and breeding activities toward more distant herds of cattle. Reduction in stocking rate did not have the desired effect of shifting cowbird breeding areas off the study area, though parasitism rates were lower following the reduction. Following the reduction, cowbirds eventually shifted foraging activity off the study area to sites where more cattle were present and tended to commute greater distances between breeding and foraging sites. Assuming that commute distance between breeding and foraging sites was energetically limiting, the cost of the increased commute may have reduced the number of eggs produced by female cowbirds over the breeding season, thus reducing parasitism. Effectiveness of our stocking rate reduction, even when applied at a large scale (9,622 ha), was reduced by the presence of alternative foraging sites within distances that cowbirds were willing to commute. Removal of cowbirds by trapping likely will remain the most effective means of maintaining a sustainable black-capped vireo population on Fort Hood.

412. **Effect of cattle grazing on the density and species of grasshoppers (Orthoptera: Acrididae) of the Central Plains Experimental Range, Colorado: A reassessment after two decades.**
Welch, J. L.; Redak, R.; and Kondratieff, B. C.
Journal of the Kansas Entomological Society 64(3): 337-343. (1991)
NAL Call #: 420 K13; ISSN: 0022-8567
Descriptors: commercial activities/ ecology/ terrestrial habitat/ land and freshwater zones/ Acrididae (Saltatoria): farming and agriculture/ cattle grazing/ community structure/ grasslands/ Colorado/ Nunn/ grassland community structure/ long term changes/ Saltatoria/ Orthoptera/ Insecta/ arthropods/ insects/ invertebrates

413. **Effect of controlled fire frequency on grassland bird abundance during the breeding season at Cheyenne Bottoms Wildlife Area, Kansas.**
Hands, Helen M.
Transactions of the Kansas Academy of Science 110(3): 201-212. (Sept. 2007)
NAL Call #: 500 K13T
Descriptors: grasslands/ birds/ wildlife habitat/ fire management/ breeding/ red-winged blackbird/ meadowlark/ dickcissel/ grasshopper sparrow/ Common Yellowthroat/ Kansas
Abstract: Cheyenne Bottoms Wildlife Area (CBWA) is an internationally recognized wetland surrounded by mixed-grass prairie. Because habitat management historically has been focused on the marsh, this study was initiated to determine the effects of spring burning on abundance and species richness of grassland-nesting birds. The effects of years since last burn and location on abundance and species richness were inconsistent among years. Unless additional bird surveys show consistent patterns in bird response to burning, frequency of burns will be determined based on vegetation characteristics rather than abundance of nesting birds.

414. **Effect of energy development and human activity on the use of sand sagebrush habitat by lesser prairie chickens in southwestern Kansas.**
Robel, Robert J.; Harrington, John A.; Hagen, Christian A.; Pitman, James C.; and Reker, Ryan R.
Transactions of the North American Wildlife and Natural Resource Conference 69: 251-266. (2004)
NAL Call #: 412.9 N814; ISSN: 0078-1355
Descriptors: conservation measures/ ecology/ terrestrial habitat/ land zones/ Tympanuchus pallidicinctus: disturbance by man/ energy demand and human activity/ habitat management/ habitat utilization/ sand sagebrush habitat/ effect of energy development and human activity/ grassland/ sand sagebrush/ Kansas/ Finney/ Kearny and Hamilton counties/ Aves, Galliformes, Phasianidae/ birds/ chordates/ vertebrates

415. **The effect of fire on spatial distributions of male mating aggregations in Gryllotalpa major Saussure (Orthoptera: Gryllotalpidae) at the Nature Conservancy's Tallgrass Prairie Preserve in Oklahoma: Evidence of a fire-dependent species.**
Howard, Daniel R. and Hill, Peggy S.
Journal of the Kansas Entomological Society 80(1): 51-64. (2007)
NAL Call #: 420 K13; ISSN: 0022-8567
Descriptors: reproduction/ reproductive behavior/ behavior/ social behavior/ ecology/ terrestrial habitat/ abiotic factors/ physical factors/ land zones/ Gryllotalpa major: mating/ spatial distributions of male mating aggregations/ aggregating behavior/ distribution within habitat/ grassland/

tallgrass prairie/ effect of fire on spatial distributions of male mating aggregations/ fire/ Oklahoma/ Nature Conservancy's Tallgrass Prairie Preserve/ Insecta, Orthoptera, Saltatoria/ arthropods/ insects/ invertebrates
Abstract: The prairie mole cricket (Gryllotalpa major Saussure) is a native of the tallgrass prairie ecosystem of the south central United States, Its populations have dwindled with the reduced availability of suitable grassland habitat. Populations are known to occupy relict prairie sites in Oklahoma, Kansas, Arkansas and Missouri. The Nature Conservancy's Tallgrass Prairie Preserve in north central Oklahoma is the largest continuous tract of tallgrass prairie remaining (about 16,100 ha). The long-term management plan for this property includes the utilization of prescribed burns, bison grazing, cattle grazing and limited mowing to restore a functional tallgrass prairie landscape. Prairie mole cricket populations were surveyed at the site during the years 1993, 1994, 1998, and by our research team in 2005, using the male cricket's acoustic call as a discrete presence indicator. Records from these surveys were integrated with prescribed burn maps to identify spatial distribution patterns of the calling aggregations at the preserve. These data were then analyzed to determine the randomness of spatial distributions with regard to pasture burn regimes. Results revealed a non-random distribution of prairie mole cricket calling sites, with advertising males found in higher numbers on sites that had been more recently burned. Analysis of soil temperature data taken from both burned and unburned prairie patches at White Oak Prairie in Oklahoma revealed no difference between the two treatments. The results of this study indicate that prairie mole cricket lek sites are somewhat transient within a broader prairie mosaic in which fire is a regular disturbance factor and tend to emerge on more recently burned patches. This information is being utilized in constructing habitat models and resource management plans for this preserve as well as other sites harboring Gryllotalpa major populations.

416. **The effect of fire spatial scale on bison grazing intensity.**
Wallace, L. L.; Crosthwaite, K. A.; and Crosthwaite K.W.
Landscape Ecology 20(3): 337-349. (2005)
NAL Call #: QH541.15.L35 L36; ISSN: 0921-2973
Descriptors: Artiodactyla/ Bovidae/ Bison bison/ foods-feeding/ food consumption/ fires-burns/ grazing intensity/ Oklahoma/ Osage County, Tallgrass Prairie Preserve/ environmental factors/ land zones/ nutrition/ bison/ habitat/ fire/ vegetation/ food/ habitat management/ productivity/ nitrogen/ protein/ dispersion/ habitat change
Abstract: To determine whether fire spatial and temporal scales affect foraging behavior and grazing intensity by Bison (Bison bison), we burned three different patch sizes (225, 900, and 3600 m^2) across an otherwise homogeneous grassland landscape. We then monitored grazing intensity for the succeeding 14 months. During the first 5 months after the burn (August-January), the Bison grazing intensity pattern was affected by whether a plot was burned and only marginally affected by plot size. During the next 5 months (January-June), grazing intensity was unaffected by plot size, but was greatest in the unburned 225 and 3600- m^2 plots. The final 4 months (June-October), grazing intensity was unaffected by treatments other than being higher in the unburned 3600- m^2 Plots. By the final sampling date, biomass was significantly greater in the burned plots and grazing intensity appeared to be responding to the amount of biomass present and the total amount of N present. The pattern displayed within the first 5 months after the burn is congruent with the expectations of optimal foraging theory with overmatching in the smallest plot size of 225 m^2 (BioScience 37 (1987) 789-799). The next two sampling periods displayed a matching aggregate response relative to biomass availability (Oecologia 100 (1999) 107-117) and total nitrogen mass (g m^{-2}). The temporal shift that we found in Bison response to burn patch size is, to our knowledge, the first such examination of both spatial and temporal responses by Bison to landscape heterogeneity. We now have quantitative evidence of how native herbivores can alter their foraging responses to changes in landscape structure over time.

417. **Effect of grazing by sheep on the quantity and quality of forage available to big game in Oregon's Coast Range.**
Rhodes, B. D. and Sharrow, S. H.
Journal of Range Management 43(3): 235-237. (1990)
NAL Call #: 60.18 J82 ; ISSN: 0022-409X.
http://jrm.library.arizona.edu/Volume43/Number3/azu_jrm_v43_n3_235_237_m.pdf
Descriptors: sheep/ digestibility/ Odocoileus/ Cervus elaphus/ forest plantations/ Pseudotsuga menziesii/ grazing/ Odocoileus hemionus/ Oregon
This citation is from AGRICOLA.

418. **The effect of grazing on the land birds of a western Montana riparian habitat .**
Mosconi, S. L. and Hutto, R. L.
In: Proceedings of the Wildlife-Livestock Relationships Symposium. Coeur D'alene, Idaho. Peek, James M. and Dalke, P. D. (eds.)
Moscow, Idaho: Forest, Wildlife and Range Experiment Station, University of Idaho; pp. 221-233; 1982.
NAL Call #: SF84.84.W5 1981
Descriptors: birds/ Aves/ rangelands/ grazing/ riparian areas/ Montana
This citation is from AGRICOLA.

419. **The effect of livestock grazing upon abundance of the lizard, Sceloporus scalaris, in southeastern Arizona.**
Bock, Carl E.; Smith, Hobart M.; and Bock, Jane H.
Journal of Herpetology 24(4): 445-446. (1990)
NAL Call #: QL640.J6; ISSN: 0022-1511
Descriptors: Sceloporus scalaris/ amphibians and reptiles/ behavior/ grazing/ habitat alterations/ habitat use/ predator-prey relationships/ predators

420. **Effect of sheep grazing and fire on sage grouse populations in southeastern Idaho.**
Pedersen, E. K.; Connelly, J. W.; Hendrickson, J. R.; and Grant, W. E.
Ecological Modelling 165(1): 23-47. (2003)
NAL Call #: QH541.15.M3E25; ISSN: 0304-3800
Descriptors: difference equation: mathematical and computer techniques/ discrete time stochastic compartment model: mathematical and computer techniques/ simulation model: mathematical and computer techniques/ biomass/

breeding habitats/ canopy growth/ community ecology/ fire frequency/ grazing effects/ habitat mosaics/ historical environmental conditions/ long term trends/ population dynamics/ sagebrush vegetation/ seasonal dynamics
Abstract: This paper describes the development, evaluation, and use of a model that simulates the effect of grazing and fire on temporal and spatial aspects of sagebrush community vegetation and sage grouse population dynamics. The model is represented mathematically as a discrete-time, stochastic compartment model based on difference equations with a time interval of 1 week. In the model, sheep graze through sage grouse breeding habitat during spring and fall, and different portions of the area can burn at different frequencies, creating a habitat mosaic of burned and unburned areas. The model was evaluated by examining predictions of (1) growth of sagebrush canopy cover after fire, (2) seasonal dynamics of grass and forb biomass under historical environmental conditions, and (3) sage grouse population dynamics associated with selected sagebrush canopy covers. Simulated changes in sagebrush canopy cover following fire correspond well with qualitative reports of long-term trends, simulated seasonal dynamics of herbaceous biomass correspond well with field data, and simulated responses of sage grouse population size and age structure to changing sagebrush canopy cover correspond well to qualitative field observations. Simulation results suggest that large fires occurring at high frequencies may lead to the extinction of sage grouse populations, whereas fires occurring at low frequencies may benefit sage grouse if burned areas are small and sheep grazing is absent. Sheep grazing may contribute to sage grouse population decline, but is unlikely to cause extinction under fire regimes that are favorable to sage grouse.

421. **The effect of two years of livestock grazing exclosure upon abundance in a lizard community in Baja California Sur, Mexico.**
Romero-Schmidt, Heidi; Ortega-Rubio, Alfredo; Arguelles-Mendez, Cerafina; Coria-Benet, Rocio; and Solis-Marin, Francisco
Chicago Herpetological Society Bulletin 29(1): 245-248. (1994); ISSN: 0009-3564
Descriptors: grazing/ livestock/ lizards/ abundance/ North America/ Mexico: Baja California Sur

422. **Effect of vertebrate grazing on plant and insect community structure.**
Rambo, J. L. and Faeth, S. H.
Conservation Biology 13(5): 1047-1054. (1999)
NAL Call #: QH75.A1C5 ; ISSN: 0888-8892
Descriptors: grazing/ insect abundance/ cattle/ American elk/ grazing exclosures
Abstract: We compared species diversity of plants and insects among grazed and ungrazed areas of Ponderosa pine-grassland communities in Arizona. Plant species richness was higher in two of three grassland communities that were grazed by native elk and deer and domestic cattle than in ungrazed areas inside a series of three large (approximately 40-ha) grazing exclosures. Similarly, plant species richness was higher in grazed areas relative to ungrazed areas at one of two series of smaller (approximately 25- m^2) and short-term exclosure sites. Evenness of plant distribution, however, was greater inside ungrazed long-term exclosures but was reduced inside ungrazed short-term exclosures relative to grazed areas. Relative abundances of forbs, grasses, trees, and shrubs, and native and introduced plants did not differ between the long- and short-term grazing exclosures and their grazed counterparts. Relative abundances of some plant species changed when grazers were excluded, however. In contrast, insect species richness was not different between grazed and ungrazed habitats, although insect abundance increased 4- to 10-fold in ungrazed vegetation. Our results suggest that vertebrate grazing may increase plant richness, even in nutrient-poor, semi-arid grasslands, but may decrease insect abundances.

423. **Effectiveness of fire, disking, and herbicide to renovate tall fescue fields to northern bobwhite habitat.**
Madison, L. A.; Barnes, T. G.; and Sole, J. D.
Wildlife Society Bulletin 29(2): 706-712. (2001)
NAL Call #: SK357.A1W5; ISSN: 00917648
Descriptors: Colinus virginianus/ glyphosate/ nesting/ winter feeding/ fire management/ herbicide/ pasture/ United States/ Colinus virginianus/ Festuca arundinacea
Abstract: Fields dominated by tall fescue (Festuca arundinacea) are common throughout the southeastern United States and are poor habitat for northern bobwhites (Colinus virginianus). Our study examined effectiveness of controlled burning, disking, and Round-Up™ herbicide applications to improve bobwhite habitat in fescue-dominated fields. We conducted the study on 4 Kentucky Department of Fish and Wildlife Resources Wildlife Management Areas (WMA). On each WMA we divided a field into 16 0.1-ha plots, and at each field we randomly assigned 2 plots to the following treatments: control, fall burning, fall disking, spring burning, spring disking, spring herbicide application, summer burning, or summer disking. We measured the vegetation structure, seed production, and floristic composition within each treatment plot from fall 1990 to summer 1994. The spring herbicide application most effectively reduced tall fescue coverage. Fescue coverage was reduced for one year following disturbance by fall, spring, and summer disking, but had become similar to control plots and pre-treatment conditions by the second year post-treatment. Fall, spring, and summer burning did not reduce tall fescue coverage. Fall-disked plots improved habitat for bobwhite winter feeding during winter 1993, whereas herbicide-treated plots provided the best winter feeding habitat during winter 1994. Herbicide-treated plots provided the best habitat quality for bobwhite nesting in summer 1993, but no treatment satisfied nesting habitat requirements in summer 1994.

424. **Effects of a savory grazing method on big game: A final report.**
Brown, R. L. Arizona Game and Fish Dept., 1990. 58 p.
Arizona Game and Fish Department Wildlife Bulletin.
Notes: ISSN: 0518-5467.
Descriptors: cattle/ deer, mule/ elk/ feeding method/ fences/ food habits/ food supply/ game, big/ grazing/ history/ hunting/ movements/ population density/ pronghorn/ wildlife-habitat relationships/ wildlife-livestock relationships

Abstract: Elk, mule deer, and pronghorn antelope use levels were monitored within a radial design holistic resource management cell, and an adjacent set of rest-rotation pastures that were grazed by cattle during the summer months. A discussion of requirements for effective wildlife goals is included.
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425. **Effects of an 11-year livestock exclosure on rodent and ant numbers in the Chihuahuan Desert, southeastern Arizona.**
Heske, E. J. and Campbell, M.
Southwestern Naturalist 36(1): 89-93. (1991)
NAL Call #: 409.6 So8 ; ISSN: 0038-4909
Descriptors: small mammals/ livestock/ pastures/ ecology/ trampling/ grazing/ interactions
Abstract: Rodents were censused, ant colonies counted, and vegetative structure measured along 11 pairs of transects at a Chihuahua Desert study site in southeastern Arizona. One member of each pair of transects was inside and one was outside of a 20-ha livestock exclosure that had been in place for 11 years. Vegetative structure did not differ between transects exposed to or protected from cattle grazing, but significantly more rodents were captured inside the exclosure. However, only a subset of the rodent species present, primarily Dipodomys, were negatively affected by the presence of cattle. Ant colonies were equally abundant on transects inside and outside of the exclosures, indicating that ants are more resistant than rodents to trampling and potential competition for food with cattle.
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426. **Effects of bison grazing, fire, and topography on floristic diversity in tallgrass prairie.**
Hartnett, D. C.; Hickman, K. R.; and Walter, L. E.
Journal of Range Management 49(5): 413-420. (1996)
NAL Call #: 60.18 J82 ; ISSN: 0022-409X.
http://jrm.library.arizona.edu/Volume49/Number5/azu_jrm_v49_n5_413_420_m.pdf
Descriptors: prairies/ plant communities/ biodiversity/ botanical composition/ bison/ grazing/ topography/ frequency/ fires/ Kansas
Abstract: Grazed and ungrazed sites subjected to different fire frequencies were sampled on the Konza Prairie Research Natural Area in northeast Kansas after 4 years of bison grazing (1987-1991). The objective was to study effects of bison grazing on plant species composition and diversity components (plant species richness, equitability, and spatial heterogeneity) in sites of contrasting fire frequency. Cover and frequency of cool-season graminoids (e.g. Poa pratensis L., Agropyron smithii Rydb., Carex spp.) and some fortes (e.g. Aster ericoides [A. Gray] Howell, and Oxalis stricta L.) were consistently higher in sites grazed by bison than in ungrazed exclosures, whereas the dominant warm-season grasses (Andropogon gerardii Vitman, Sorghastrum nutans [L.] Nash, Panicum virgatum L., Schizachyrium scoparium [Michx.] Nash) and other forbs (e.g. Solidago missouriensis Nutt.) decreased in response to bison. Plant species diversity (H') and spatial heterogeneity in all areas sampled were significantly increased by bison. Increased heterogeneity and mean species richness in grazed prairie (40 species per sample site) compared to ungrazed prairie (29 species per site) were likely a result of greater microsite diversity generated by bison, whereas preferential grazing of the dominant grasses and concomitant increases in subordinate species resulted in an increase in equitability of species abundances. Species/area relationships indicated greater effects of bison on plant species richness with increasing sample area. Increases in plant diversity components associated with bison grazing were generally greater in annually burned than in 4-year burned sites. Effects of ungulate grazers on floristic diversity have important implications given recent evidence that plant species diversity and the compositional and production stability of grassland plant communities are positively related.
This citation is from AGRICOLA.

427. **The effects of burning and grazing on habitat use by whooping cranes and sandhill cranes on the Aransas National Wildlife Refuge.**
Hunt, Howard Emery. Texas A&M University, 1987.
Descriptors: Grus canadensis/ Grus americana/ habitat disturbance [fire]/ livestock/ Texas
© NISC

428. **Effects of burning on snakes in Kansas, USA, tallgrass prairie.**
Setser, Kirk and Cavitt, John F.
Natural Areas Journal 23(4): 315-319. (2003)
NAL Call #: QH76.N37; ISSN: 0885-8608
Descriptors: Coluber constrictor/ Thamnophis sirtalis/ Serpentes/ Colubridae/ Lepidosauria/ Squamata/ terrestrial ecology/ burning/ snake refugia/ fires-burns/ grasslands/ ecosystems/ habitat use/ Kansas/ Konza Prairie Biological Station/ status/ prescribed fire/ tallgrass prairie/ environmental factors/ land zones/ population ecology
Abstract: We trapped snakes in two annually burned and two long-term unburned watersheds at the Konza Prairie Biological Station in the Flint Hills of Kansas, USA, to examine the impact of burning on tallgrass prairie snakes. Two species, Coluber constrictor L. and Thamnophis sirtalis, L. were captured in numbers sufficient for statistical analyses. Both species were more frequently captured on long-term unburned prairie than on recently burned prairie in late spring. This difference did not persist, however, during the fall. The distribution of T. sirtalis capture dates was biased toward later captures in burned prairie in comparison to unburned. We did not detect a similar pattern in C. constrictor. Our data suggest some tallgrass prairie snakes avoid freshly burned tallgrass prairie but can recolonize burned areas within a single growing season. We recommend that unburned areas be maintained adjacent to prescribed burns in managed tallgrass prairies to serve as snake refugia.
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429. **Effects of cattle grazing and haying on wildlife conservation at National Wildlife Refuges in the USA.**
Strassman, B. I.
Environmental Management 11(1): 35-44. (1987)
NAL Call #: HC79.E5E5 ; ISSN: 0364-152X
Descriptors: grass/ birds/ Fish and Wildlife Service/ regulatory agencies/ government agency/ environmental protection/ economics/ cost/ prescribed burning/ environmental law/ cattle industry/ feed industry
Abstract: The National Wildlife Refuge System is perhaps the most important system of federal lands for protecting wildlife in the USA. Only at refuges has wildlife conservation been legislated to have higher priority than

either recreational or commercial activities. Presently, private ranchers and farmers graze cattle on 981,954 ha and harvest hay on 12,021 ha at 123 National Wildlife Refuges. USA Fish and Wildlife Service policy is to permit these uses primarily when needed to benefit refuge wildlife. To evaluate the success of this policy, I surveyed grassland management practices at the 123 refuges. The survey results indicate that in fiscal year 1980 there were 374,849 animal unit months (AUMs) of cattle grazing, or 41% more than was reported by the Fish and Wildlife Service. According to managers' opinions, 86 species of wildlife are positively affected and 82 are negatively affected by refuge cattle grazing or haying. However, quantitative field studies of the effect of cattle grazing and haying on wildlife coupled with the survey data on how refuge programs are implemented suggest that these activities are impeding the goal of wildlife conservation. Particular management problems uncovered by the survey include overgrazing of riparian habitats, wildlife mortality due to collisions with cattle fences, and mowing of migratory bird habitat during the breeding season. Managers reported that they spend $919,740 administering cattle grazing and haying; thus refuge grazing and haying programs are also expensive. At any single refuge these uses occupy up to 50% of refuge funds and 55% of staff time. In light of these results, prescribed burning may be a better wildlife management option than is either cattle grazing or haying.

430. **Effects of cattle grazing on ecology and habitat of Columbia Basin pygmy rabbits (Brachylagus idahoensis).**
Thines, Nicole J.; Shipley, Lisa A.; and Sayler, Rodney D.
Biological Conservation 119(4): 525-534. (2004)
NAL Call #: S900.B5; ISSN: 0006-3207
Descriptors: Columbia Basin/ commercial enterprises/ conservation/ disturbances/ ecosystems/ endangered-threatened species/ farming and agriculture/ grasslands/ habitat use/ land zones/ shrub grasslands/ shrub-steppe habitat/ Washington/ wildlife management/ wildlife-human relationships/ Columbia Basin pygmy rabbit/ Brachylagus idahoensis
Abstract: Dramatic declines in the endangered Columbia Basin pygmy rabbit, a genetically unique population of small, burrowing rabbits in Northwestern United States, are likely the combined results of habitat degradation and fragmentation, disease, and predation. A critical component of pygmy rabbit habitat includes big sagebrush (Artemisia tridentata), which constitutes 82-99% of their winter diet and 10-50% of their summer diet. Sagebrush also forms the bulk of hiding cover around burrow sites. Across the range of pygmy rabbits, sagebrush habitat is grazed extensively by cattle. However, grazing has unknown effects on pygmy rabbits inhabiting the remaining, fragmented shrub-steppe habitat. We evaluated the effects of four grazing treatments on the distribution of pygmy rabbit burrows, diets of pygmy rabbits, and quality and quantity of vegetation at Sagebrush Flat in central Washington. Ungrazed areas contained significantly more burrows per unit area than did grazed areas. Vegetation composition and structure differed little among treatments in early summer before annual grazing by cattle. However, cattle grazing in late summer through winter removed about 50% of the grass cover, and reduced the nutritional quality (e.g., increased fiber and decreased protein) of the remaining grass. Although pygmy rabbits ate < 2% grasses in winter, grasses and forbs comprised 53% of late summer diets. Because these endangered rabbits avoided grazed areas, removing cattle grazing from key habitat locations may benefit efforts to restore this rabbit in Washington.

431. **Effects of cattle grazing on mule deer diet and area selection.**
Austin, Dennis D. and Urness, Philip J.
Journal of Range Management 39(1): 18-21. (1986)
NAL Call #: 60.18 J82 ; ISSN: 0022-409X.
http://jrm.library.arizona.edu/Volume39/Number1/azu_jrm_v39_n1_18_21_m.pdf
Descriptors: Odocoileus hemionus/ grazing/ habitat alterations/ habitat use/ wildlife-livestock relationships/ deer, mule/ enclosures and exclosures/ food habits/ grasses/ habitat/ production/ proteins/ utilization/ vegetation/ wildlife-livestock relationships/ Utah/ Sheeprock Mountains
Abstract: Split enclosures, half grazed and half ungrazed by cattle in summer, were compared for mule deer habitat use in late summer using tame deer. Diet composition, dietary nutrition, and area selected for grazing were used as criteria.

432. **Effects of cattle grazing on North American arid ecosystems: A quantitative review.**
Jones, Allison
Western North American Naturalist 60(2): 155-164. (2000)
NAL Call #: QH1.G7; ISSN: 1527-0904
Descriptors: meta analysis: analytical method/ arid ecosystems/ cattle grazing/ ecosystem integrity/ environmental impact/ litter biomass/ rangeland conservation/ soil bulk density/ species diversity/ species richness/ vegetative cover/ xeric environment
Abstract: A quantitative review was conducted of the effects of cattle grazing in and systems on 16 response variables ranging from soil bulk density to total vegetative cover to rodent species diversity. Various studies from North American arid environments that used similar measures for assessing grazing effects on the same response variables were used for the review; each study was assigned to serve as a single data point in paired comparisons of grazed versus ungrazed sites. All analyses tested the 1-tailed null hypothesis that grazing has no effect on the measured variable. Eleven of 16 analyses (69%) revealed significant detrimental effects of cattle grazing, suggesting that cattle can have a negative impact on North American xeric ecosystems. Soil-related variables were most negatively impacted by grazing (3 of 4 categories tested were significantly impacted), followed by litter cover and biomass (2 of 2 categories tested), and rodent diversity and richness (2 of 2 categories tested). Vegetative variables showed more variability in terms of quantifiable grazing effects, with 4 of 8 categories testing significantly. Overall, these findings could shed light on which suites of variables may be effectively used by land managers to measure ecosystem integrity and rangeland health in grazed systems.

433. **The effects of cattle grazing on optimal foraging in mule deer (Odocoileus hemionus).**
Kie, John G.
Forest Ecology and Management 88(1-2): 131-138. (1996)
NAL Call #: SD1.F73; ISSN: 0378-1127
Descriptors: animal husbandry/ climate/ competition/ ecology/ foraging/ grazing/ stocking level
Abstract: A previous study of different cattle stocking rates on activity patterns of female mule deer (Odocoileus hemionus) on summer range in California found that deer spent more time feeding and less time resting with increased cattle stocking rates (Kie et al., 1991). During a year of normal precipitation, deer spent more time feeding per day in late summer than in early summer in pastures grazed by cattle. In a drier year, deer spent less time feeding per day in late summer in grazed pastures. Deer increased their time spent feeding by including more feeding bouts each day, not by increasing the length of each foraging bout. Deer were also reluctant to forage at night, particularly when there was a full moon. Based on these results, we hypothesized that female mule deer act as time-minimizers when forage conditions are good, but shift to a energy-maximizing strategy when forage conditions are poor (Kie et al., 1991). Preliminary results from subsequent research on black-tailed deer (O. h. columbianus) on Mediterranean-climate, foothill winter range found that deer acted as energy-maximizers and spent less time feeding with increasing cattle stocking rates during the fall and early winter when herbaceous forage was in limited supply. After mid-January when herbaceous plants began growing rapidly there appeared to be no competition for forage between deer and cattle, and increased cattle stocking rates had no effect on the time spent foraging by deer. These results were consistent with the original hypothesis.

434. **Effects of cattle grazing on passerine birds nesting in riparian habitat.**
Taylor, D. M.
Journal of Range Management 39(3): 254-258. (1986)
NAL Call #: 60.18 J82 ; ISSN: 0022-409X.
http://jrm.library.arizona.edu/Volume39/Number3/azu_jrm_v39_n3_254_258_m.pdf
Descriptors: grazing/ cattle/ birds/ habitats/ population density/ Salix/ riparian buffers/ Oregon
This citation is from AGRICOLA.

435. **Effects of cattle grazing on salt desert rodent communities.**
Jones, Allison L. and Longland, William S.
American Midland Naturalist 141(1): 1-11. (1999)
NAL Call #: 410 M58; ISSN: 0003-0031
Descriptors: live trapping: monitoring method/ grazing/ home range size/ microhabitat use/ relative abundance/ salt desert shrub community
Abstract: Cattle grazing has been shown to alter various features of desert communities that may impact microhabitats required by various species of desert rodents, with unknown implications for desert rodent communities. We conducted a series of studies at heavily and lightly grazed sites to investigate effects of cattle grazing on desert rodent relative abundances, home range sizes and microhabitat use in salt desert shrub communities of the western Great Basin Desert. Monitoring of rodent populations with repeated live trapping showed that different levels of grazing were associated with differences in relative abundances of some species of rodents. Specifically, Dipodomys merriami was significantly more abundant in heavily grazed areas, and Perognathus longimembris was significantly more abundant in lightly grazed areas. Our studies showed that cattle, by preferentially feeding on certain plants, can create conditions that are more suitable for some species of rodents, while reducing important microhabitat for other species.

436. **Effects of cattle grazing systems on shrub-grassland birds in south Texas.**
Swanson, Douglas Wayne. Texas A&M University, 1988.
Notes: Degree: M.S.
https://libcat.tamu.edu/cgi- bin/Pwebrecon.cgi?DB=local&BBID=780791
Descriptors: behavior/ birds/ communities/ ecosystems/ habitat alterations/ grazing/ habitat use/ shrub grasslands/ Texas, southern

437. **Effects of cattle grazing upon chemical constituents within important forages for elk.**
Dragt, W. J. and Havstad, K. M.
Northwest Science 61(2): 70-73. (1987)
NAL Call #: 470 N81; ISSN: 0029-344X
Descriptors: Agropyron spicatum/ Festuca scabrella/ Festuca Idahoensis/ Cervus elaphus Nelsoni/ deferred rotation/ cattle management/ forage management/ seasonality/ indirect competition/ amensalism/ elkhorn/ mountains/ Montana
Abstract: On many western rangelands, cattle and elk use the same forages but during different seasons. This can place these species into indirect competition or amensalism. The objective of this study was to examine the effects of summer grazing by cattle upon the winter forage quality for elk. Individual plants of bluebunch wheatgrass (Agropyron spicatum), rough fescue (Festuca scabrella), and Idaho fescue (Festuca idahoensis) were monitored for phenological stage when summer grazed by cattle on a Rocky Mountain elk (Cervus elaphus nelsoni) wintering range in the Elkhorn Mountains, Montana. Assessment of winter chemical composition of these three key forage species indicated no deleterious effects of summer grazing by cattle stocked at 3.7 ha/AUM upon the winter forage quality. In general, rough fescue and Idaho fescue had lower average fiber fractions and higher crude protein than bluebunch wheatgrass. Under deferred rotation cattle management, the primary winter elk forage management concern appears to be forage quantity rather than quality.

438. **Effects of cattle on duck food plants in southern Texas.**
Whyte, R. J. and Silvy, N. J.
Journal of Wildlife Management 45(2): 512-515. (1981)
NAL Call #: 410 J827; ISSN: 0022-541X
Descriptors: Texas/ ducks/ cattle/ grazing
This citation is from AGRICOLA.

439. **Effects of continuous grazing on habitat and density of ground-foraging birds in south Texas.**
Baker, D. L. and Guthery, F. S.
Journal of Range Management 43(1): 2-5. (1990)
NAL Call #: 60.18 J82 ; ISSN: 0022-409X.
http://jrm.library.arizona.edu/Volume43/Number1/azu_jrm_v43_n1_2_5_m.pdf
Descriptors: cattle/ habitats/ birds/ Colinus virginianus/ population density/ grazing/ sandy loam soils/ clay soils/ grazing intensity/ Texas
This citation is from AGRICOLA.

8,000 ha peninsula in Glen Canyon National Recreation Area. Density and basal area of Oryzopsis hymenoides decreased with increasing grazing intensity while density and foliar cover of Gutierrezia sarothrae increased on grazed sites. Perognathus longimembris was the most abundant rodent species trapped on all sampled sites and demonstrated a 50% decrease in abundance at the heavily grazed site compared to the nongrazed site. Peromyscus maniculatus was the second most abundant rodent species recorded and increased with increasing grazing intensity.

440. **Effects of different burn regimes on tallgrass prairie herpetofaunal species diversity and community composition in the Flint Hills, Kansas.**
Wilgers, D. J. and Horne, E. A.
Journal of Herpetology 40(1): 73-84. (2006)
NAL Call #: QL640.J6; ISSN: 00221511
Descriptors: prescribed burns/ tallgrass prairie/ wildife habitat/ herpetofauna/ reptiles/ amphibians/ Kansas
Abstract: The Flint Hills region of Kansas is the largest contiguous area of tallgrass prairie remaining today. Historically, the tallgrass prairie burned every 2-3 yr on average, but current land managers have altered burn regimes, resulting in a range of habitats from annually burned to long-term unburned. We used drift fence/funnel trap arrays and coverboards to estimate species richness, evenness, and diversity of herpetofauna within three different burn regimes: annual, 4-yr, and long-term unburned at Konza Prairie Biological Station, Riley County, Kansas. During the spring and fall of 2003-2004, 315 individuals from 20 species were captured across all burn regimes. Herpetofaunal species richness, evenness, and diversity estimates were not different between the three burn treatments. However, because of species-specific responses to individual burn regimes, community composition was significantly different between the habitats (X^2 = 158.19, df = 20, P < 0.001). Four species exhibited preferences among burn regimes, which differed significantly from independent assortment, with Eumeces obsoletus and Phrynosoma cornutum preferring annual burn treatments, Scincella lateralis preferring 4-yr burn treatments, and Diadophis punctatus preferring long-term unburned treatments. Species-specific responses were likely because of changes in vegetation structure and microhabitat (temperature and moisture content) created through different frequencies of fire disturbances. Maximizing large-scale herpetofaunal diversity across the Flint Hills' rangelands could be accomplished by creating a large number of small scale habitat types through a mosaic style burning plan. © 2006 Society for the Study of Amphibians and Reptiles.

442. **Effects of distance from cattle water developments on grassland birds.**
Fontaine, A. L.; Kennedy, P. L.; and Johnson, D. H.
Journal of Range Management 57(3): 238-242. (May 2004)
NAL Call #: 60.18 J82 ; ISSN: 0022-409X
Descriptors: songbirds/ population density/ population dynamics/ cattle production/ range management/ water distribution/ prairies/ grazing intensity/ Eremophila/ Passeriformes/ plant strata/ height/ canopy/ plant litter/ botanical composition/ North Dakota
Abstract: Many North American grassland bird populations appear to be declining, which may be due to changes in grazing regimes on their breeding areas. Establishment of water developments and confining cattle (Bos taurus L.) to small pastures often minimizes spatial heterogeneity of cattle forage consumption, which may lead to uniformity in vegetative structure. This increased uniformity may provide suitable habitat for some bird species but not others. We assessed how cattle use, vegetative structure, and bird population densities varied with increasing distance from water developments (0-800 m) on the Little Missouri National Grassland (LMNG) in North Dakota. Lark buntings (Calamospiza melancorys Stejneger), which are typically associated with low vegetative cover, decreased with increasing distance from water developments. Horned larks (Eremophila alpestris L.), also a low-cover associate, followed a similar but weaker trend. Densities of another low-cover associate as well as moderate- and high-cover associates were not related to distance from water. Vegetative height-density and litter depth increased by 50 and 112%, respectively, while cowpie cover and structural variability decreased by 51 and 24%, respectively, with distance from water. Confidence interval overlap was common among all measures, showing substantial variability among study sites. Our results indicate cattle use is higher closer to water developments, and this pattern may positively affect the densities of lark buntings and horned larks. The absence of density gradients in the other bird species may be due to the paucity of locations > 800 m from water on the LMNG.
This citation is from AGRICOLA.

441. **Effects of differential livestock use on key plant species and rodent populations within selected Oryzopsis hymenoides/Hilaria jamesii communities of Glen Canyon National Recreation Area.**
Bich, Brian S.; Butler, Jack L.; and Schmidt, Cheryl A.
Southwestern Naturalist 40(3): 281-287. (1995)
NAL Call #: 409.6 So8; ISSN: 0038-4909
Descriptors: grazing/ national parks and reserves/ rodents/ grazing lands
Abstract: Four sites that varied with respect to grazing history were studied during 1990 and 1991 on an isolated

443. **The effects of domestic livestock grazing on breeding nongame birds in northeastern New Mexico.**
Goguen, C. B. Texas Tech University, 1994.
Descriptors: animals, non-game/ birds/ birds, passerines/ blackbirds and cowbirds/ gnatcatchers/ grazing/ habitat/ interspecies relationships/ livestock/ mortality/ nests and nesting/ predation/ statistics/ surveys/ vegetation/ New Mexico/ Colfax County
Abstract: Objectives were to compare the following features of ungrazed and grazed pinyon-juniper woodlands: habitat and vegetation characteristics; songbird diversity

and abundance; and songbird nesting success and cause-specific nest mortality levels. Study was conducted on the NRA Whittington Center and the adjacent Van Sweden Ranch in Colfax County. Thesis is divided into the following section titles: (1) The Influence of Domestic Livestock Grazing on Breeding Nongame Birds in Pinyon-Juniper Woodlands in Northwestern New Mexico; (2) Brown-headed Cowbird Parasitism of Grazed and Ungrazed Pinyon- Juniper Woodlands in Northeastern New Mexico; and (3) Nest Desertion and Moving by the Blue-Gray Gnatcatcher in Association with Brown-headed Cowbird Parasitism

444. **The effects of elk and cattle foraging on the vegetation, birds, and small mammals of the Bridge Creek Wildlife Area, Oregon.**
Moser, B. W. and Witmer, G. W.
International Biodeterioration and Biodegradation 45(3-4): 151-157. (2000)
NAL Call #: QH301.I54; ISSN: 0964-8305
Descriptors: elk/ cattle/ forage/ grazing/ biodiversity/ wildife habitat/ exclosures/ Oregon
Abstract: High densities of elk (Cervus elaphus), especially when combined with cattle (Bos taurus), may adversely affect local reforestation efforts and reduce forage availability. Few studies, however, have assessed the potential impacts of high densities of elk, combined with cattle, on biodiversity. We compared vegetation, bird, and small mammal diversity of three elk and cattle exclosures (ungrazed sites) to three grazed sites in the Blue Mountains of eastern Oregon. Shrub species richness was greater on ungrazed than grazed sites (P = 0.04). We found no differences in herbaceous vegetative cover, biomass, species richness, or diversity, bird abundance, species richness, or diversity between grazed and ungrazed sites. Small mammal abundance (P≤0.01), species richness (P≤0.01), and diversity (P≤0.03) were greater on ungrazed than grazed sites. In this study, foraging by elk and cattle appears to be reducing shrub and small mammal biodiversity.

445. **The effects of fall grazing or burning bluebunch wheatgrass range on forage selection by deer and cattle in spring.**
Willms, W.; Bailey, A. W.; McLean, A.; and Tucker, R.
Canadian Journal of Animal Science 60(1): 113-122. (1980)
NAL Call #: 41.8 C163; ISSN: 0008-3984
Descriptors: Odocoileus hemionus hemionus/ Odocoileus hemionus/ fires-burns/ grazing/ habitat alterations/ mule deer/ food

446. **The effects of farm field borders on overwintering sparrow densities.**
Marcus, J. F.; Palmer, W. E.; and Bromley, P. T.
Wilson Bulletin 112(4): 517-523. (2000)
NAL Call #: 413.8 W692; ISSN: 00435643
Descriptors: farm/ overwintering/ passerines/ population density/ United States/ Junco hyemalis/ Melospiza georgiana/ Melospiza melodia/ Passerculus sandwichensis/ Spizella passerina/ Spizella pusilla/ Zonotrichia albicollis
Abstract: Wintering birds that use farm fields may benefit from strips of uncultivated, grassy, and weedy vegetation, called field borders. Field borders were established on 4 farms in the North Carolina coastal plain in Wilson and Hyde counties in the spring of 1996. In February of 1997 and 1998, bird numbers on field edges and field interiors, with and without field borders, were surveyed using strip transect and line transect methods. Most (93%) birds detected in field edges were sparrows, including Song (Melospiza melodia), Swamp (Melospiza georgiana), Field (Spizella pusilla), Chipping (Spizella passerina), White-throated (Zonotrichia albicollis), and Savannah (Passerculus sandwichensis) sparrows and Dark-eyed Juncos (Junco hyemalis). We detected more sparrows on farms with field borders than on farms with mowed edges. This difference was most pronounced in field edges where field borders contained 34.5 sparrows/ha and mowed edges contained 12.9 sparrows/ha. Sparrow abundance did not differ by treatment in field interiors. Sparrow density in field borders was intermediate to wintering sparrow densities reported in other studies. These results suggest that establishing field border systems may be an effective way to increase densities of overwintering sparrows on farms in the southeastern U.S. coastal plain.

447. **Effects of fire and grazing on an arid grassland ecosystem.**
Valone, Thomas J.; Nordell, Shawn E.; and Ernest, S. K. Morgan
Southwestern Naturalist 47(4): 557-565. (2002)
NAL Call #: 409.6 So8; ISSN: 0038-4909
Descriptors: commercial activities/ ecology/ community structure/ population dynamics/ terrestrial habitat/ abiotic factors/ physical factors/ land and freshwater zones/ Rodentia: farming and agriculture/ livestock grazing/ species diversity/ population size/ grasslands/ fire/ New Mexico/ Hidalgo County/ Animas Valley/ abundance/ arid grasslands/ Mammalia/ chordates/ mammals/ vertebrates
Abstract: We examined short-term responses of grasses, shrubs, and rodents on experimental plots to determine how manipulations of livestock grazing and prescribed fire affect individual species and community structure in a shrub-invaded arid grassland. Two grasses and Gutierrezia sarothrae were found in lower abundance on burned plots in the growing season after plots burned; all Prosopis glandulosa survived the fire. Total rodent captures and the number of Dipodomys spectabilis did not differ among treatments. No significant interaction between burning and grazing was observed. Fire seems to have few short-term negative effects on species in this system.

448. **Effects of fire disturbance on grasshopper (orthoptera: acrididae) assemblages of the Comanche National Grasslands, Colorado.**
Nadeau, Lucanus; Cushing, Paula E.; and Kondratieff, Boris C.
Journal of the Kansas Entomological Society 79(1): 2-12. (2006)
NAL Call #: 420 K13; ISSN: 0022-8567
Descriptors: ecology/ population dynamics/ terrestrial habitat/ abiotic factors/ physical factors/ land zones/ Orthoptera: community structure/ population density/ grassland/ fire/ prescribed burning/ Effect on population density and community structure/ Colorado/ Comanche

National Grasslands/ Insecta/ arthropods/ insects/ invertebrates
Abstract: We documented effects of spring bums on grasshopper assemblages of the shortgrass prairie at the Comanche National Grassland, Baca County, Colorado, in 1999 and 2000. We measured grasshopper density and diversity at each of four transects on both burned and unburned sites at three locations. We did not find consistent responses of these assemblages to fire in 1999 or 2000 due to site-specific assemblage dynamics. Specifically, grasshopper density exhibited three different trends between treatments at the three locations sampled: responses were similar between burned and unburned plots at Location 1, there were significantly more grasshoppers in the unburned pasture at Location 2, and there were significantly more grasshoppers in the burned pasture at Location 3. These site-specific trends were supported by species richness measurements. Furthermore, there were no significant differences in any of the subfamilies or guilds in the number of grasshoppers collected in the burned versus the unburned treatment pooled over location. The different trends between treatments at each location for the grasshopper assemblage as a whole were most likely the result of pre-existing differences among locations and sites. That the same three trends were seen in 2000, despite time for recovery, supports this explanation. The results suggest that spring bums in the shortgrass prairie do not affect the grasshopper assemblage beyond the natural variability occurring within the grasshopper assemblage.

449. **Effects of fire management on the richness and abundance of central North American grassland land snail faunas.**
Nekola, J. C.
Animal Biodiversity and Conservation 25(2): 53-66. (2002)
NAL Call #: QL1.M87; ISSN: 1578-665X
Descriptors: conservation measures/ ecology/ population dynamics/ terrestrial habitat/ abiotic factors/ physical factors/ land zones/ Gastropoda: habitat management/ fire management/ species richness/ abundance/ community structure/ population size/ grasslands/ United States, Midwest/ North America/ Mollusca/ invertebrates/ molluscs
Abstract: The land snail faunas from 72 upland and lowland grassland sites from central North America were analyzed. Sixteen of these had been exposed to fire management within the last 15 years, while the remainder had not. A total of 91,074 individuals in 72 different species were observed. Richness was reduced by approximately 30% on burned sites, while abundance was reduced by 50-90%. One-way ANOVA of all sites (using management type as the independent variable), a full 2-way ANOVA (using management and grassland type) of all sites, and a 2-way ANOVA limited to 26 sites paired according to their habitat type and geographic location, demonstrated in all cases a highly significant (up to $p < 0.0005$) reduction in richness and abundance on fire managed sites. Contingency table analysis of individual species demonstrated that 44% experienced a significant reduction in abundance on fire-managed sites. Only six species positively responded to fire. Comparisons of fire response to the general ecological preferences of these species demonstrated that fully 72% of turf-specialists were negatively impacted by fire, while 67% of duff-specialists demonstrated no significant response. These differences were highly significant ($p = 0.0006$). Thus, frequent use of fire management represents a significant threat to the health and diversity of North American grassland land snail communities. Protecting this fauna will require the preservation of site organic litter layers, which will require the increase of fire return intervals to 15+ years in conjunction with use of more diversified methods to remove woody and invasive plants.

450. **Effects of fire on grasshopper assemblages in a northern mixed-grass prairie.**
Branson, D. H.
Environmental Entomology 34(5): 1109-1113. (Oct. 2005)
NAL Call #: QL461.E532
Descriptors: population studies/ terrestrial ecology: ecology, environmental Sciences/ Orthoptera/ Insecta/ Arthropoda/ Invertebrata/ Animalia/ Melanoplus sanguinipes (Orthoptera): species/ Melanoplus femurrubrum (Orthoptera): species/ Ageneotettix deorum (Orthoptera): species/ Phoetaliotes nebrascensis (Orthoptera): species/ Eretettix simplex (Orthoptera): species/ Opeia obscura (Orthoptera): species/ Encoptolophus costalis (Orthoptera): species/ Trachyrhachys kIowa (Orthoptera): species/ Melanoplus gladstoni (Orthoptera): species/ Melanoplus infantilis (Orthoptera): species/ biomass/ mixed grass prairie/ grasshopper assemblage/ grassland fire
Abstract: Grassland fires have been shown to influence grasshopper community composition and population dynamics, but studies of their effects on rangeland grasshopper assemblages in the northern Great Plains are lacking. This study was designed to examine the effect of a grassland wildfire on grasshopper community composition and population densities of three grasshopper subfamilies in western North Dakota northern mixed-grass prairie with sampling in paired burned and unburned plots. A rapidly moving fire occurred in late October 1999, after egg-overwintering grasshoppers had died. Vegetation biomass and nitrogen content of grasses did not differ statistically between burned and unburned plots in 2000. The fire negatively affected grasshopper population densities the year after the fire, but species diversity was not affected by the fire. Much of the reduction in grasshopper population densities was caused by a decline in densities of Gomphocerinae species. Grasshopper subfamily densities did not differ statistically between burned and unburned plots in 2001. Additional research is needed to determine the mechanisms leading to the reduction in Gomphocerinae species densities.

451. **Effects of fire regime on birds in southeastern pine savannas and native prairies.**
Engstrom, R. T.; Vickery, P. D.; Perkins, D. W.; and Shriver, W. G.
Studies in Avian Biology (30): 147-193. (2005)
NAL Call #: QL671.S8; ISSN: 01979922
Descriptors: birds/ fire/ longleaf pine/ prairie/ United States, southeastern region/ Aimophila aestivalis/ Aves/ Picoides borealis/ Pinus palustris
Abstract: Fire, both natural and anthropogenic, has played a critical role in shaping vegetation structure and composition of many of the plant communities of the southeastern United States. Pine savannas, especially

longleaf pine (Pinus palustris), that were dominant over much of the upland coastal plain, have declined by approximately 97% over the past 100 yr. The inferred natural fire regime of this vegetation type was a fire frequency of 2-8 yr with typically low-severity fires that occurred during the lightning season (June-August). Currently, dormant-season (January through April) fires are used most frequently. Approximately 110-120 species, excluding migrants, comprise the avian community of southeastern pine savannas; and some of these are among the most rapidly declining bird species in the eastern United States. Disruption of the natural fire regime by fire exclusion or lengthened fire interval was detrimental to bird species associated with tree (e.g., Red-cockaded Woodpecker [Picoides borealis] and ground cover components (e.g., Bachman's Sparrow [Aimophila aestivalis] of the ecosystem. Lightning-season fire has mixed effects on birds (e.g., loss of some nests, but improved brood habitat); therefore, creation of patches of different burn treatments should be carefully considered. The foremost management and conservation challenge is to increase the number of acres of southeastern pine savannas burned frequently through thoughtful application of prescribed burning. Important research challenges include measuring tradeoffs among bird species and other wildlife for different fire regimes, evaluating metapopulation effects of different landscape applications of fire, and considering the nutrient dynamics of different fire regimes on bird populations.

452. **The effects of grassland management using fire on habitat occupancy and conservation of birds in a mosaic landscape.**
Pons, P.; Lambert, B.; Rigolot, E.; and Prodon, R.
Biodiversity and Conservation 12: 1843-1860. (Sept. 2003)
NAL Call #: QH75.A1B562
Descriptors: range management/ prescribed burning/ grazing/ environmental impact/ wild birds/ wildlife habitats/ habitat preferences/ wildlife management/ France/ bird communities/ natural resources, environment, general ecology, and wildlife conservation/ animal ecology and behavior/ plant production range and pasture grasses
This citation is from AGRICOLA.

453. **The effects of grazing and browsing animals on wildlife habitats.**
Urness, P. J. and Austin, D. D.
Utah Science 50(2): 104-107. (1989)
NAL Call #: 100 Ut1F
Descriptors: grassland management/ grasslands/ rangelands/ grazing/ nature conservation
Abstract: The effects of stocking different species of animal on rangelands in Utah, USA, is discussed, with particular reference to the possible impact on wildlife through alteration of their habitat.

454. **Effects of grazing and burning on densities and habitats of breeding ducks in North Dakota.**
Kruse, Arnold D. and Bowen, Bonnie S.
Journal of Wildlife Management 60(2): 233-246. (1996)
NAL Call #: 410 J827; ISSN: 0022-541X
Descriptors: land use/ Lostwood National Wildlife Refuge/ native grasslands/ nest density/ nest success/ seasonality/ wildlife management
Abstract: Native grassland communities controlled by public agencies become increasingly important to the maintenance of many wildlife species as privately owned grasslands are destroyed or degraded for farming, mining, and development. In turn, wildlife on publicly owned grasslands are affected by the management techniques practiced by local managers. We studied the effects of grazing and prescribed burning on upland-nesting ducks and the structure and type of vegetation from 1980 to 1988 at the Lostwood National Wildlife Refuge (NWR) in northwestern North Dakota. Mallard (Anas platyrhynchos), the most abundant species at Lostwood NWR, had lower (P < 0.05) annual nest densities on experimental and control fields in the later years than in the early years of the study. Spring burning reduced (P = 0.016) nest densities of gadwall (A. strepera). Spring grazing reduced nest densities of gadwall (P = 0.014), and blue-winged teat (A. discors, P = 0.023). Nest density of gadwall increased (P = 0.018) after spring grazing was terminated. On the summer burn/spring graze fields, blue-winged teal had lower (P = 0.010) nest densities after treatments (1987-88) than before treatments (1980-81). Nest success was high (mallard 34%, gadwall 45%, blue-winged teal 31%) but was not influenced (P ≥ 0.16) by the burning and grazing treatments. During the study, the amount of grass/brush increased, whereas the amount of brush and brush/grass decreased on control and treatment fields. During the years with burning and grazing, short vegetation increased and tall vegetation decreased. On the spring graze fields, 1 year after grazing ended the vegetation was similar to that on the control fields. The spring burn and summer burn/spring graze fields recovered more slowly. Brushy species such as western snowberry (Symphoricarpos occidentalis) provided attractive nesting habitat for many upland-nesting waterfowl species, especially mallard, gadwall, American wigeon (A. americana), and northern pintail (A. acuta). Habitat needs of additional species of wildlife that depend on grasslands may need to be considered when deciding how to manage habitat.

455. **Effects of grazing intensity and temporal application of grazing treatments of nongame birds in North Dakota mized-grass prairie.**
Salo, Eric D. South Dakota State University, 2003.
Notes: Thesis (M.S.)
http://wfs.sdstate.edu/wfsdept/Publications/Theses/Salo,%20Eric%20D.%20MS-2003.pdf
Descriptors: Conservation Reserve Program/ birds/ Aves/ grazing/ rangelands/ North Dakota/ Great Plains
Abstract: Grazing occurred naturally in the northern Great Plains and influenced many natural processes in grassland ecosystems, including the habitat selection of breeding birds. Grazing, mainly for livestock production, is still an important land use practice and is one that impacts millions of hectares on both public and private land in the United States. In North Dakota alone, various grazing practices affect over 4 million hectares (10 million acres), making it one of the most important land uses, second only to cereal and oil crop production. To better understand how grazing affects nongame breeding birds, a study was conducted at Central Grasslands Research Extension Center (CGREC) to determine the effects of four levels of grazing intensity on nongame bird populations and grassland habitat. In addition, two earlier studies, conducted at CGREC were

repeated, one in native prairie and the other in Conservation Reserve Program (CRP) grasslands, to determine the temporal effects of grazing systems on nongame bird populations and habitat. Bird surveys were conducted along permanent belt transects and during a 15 minute “walk-about” three times per year on treatment plots during the summers of 2001 and 2002. Vegetation structure was characterized from measurements taken parallel to the bird survey transects, two times per year for each treatment plot. Many species of nongame birds responded differently to the effects of grazing intensity and to the temporal effects of grazing systems in both native prairie and CRP grasslands. Overall breeding bird densities and vegetation structure were negatively affected by increasing levels of grazing intensity in mixed-grass prairie. Clay-colored sparrows, grasshopper sparrows, and savannah sparrows reached their highest densities in the light and moderate grazing intensity treatments whereas their lowest populations occurred in the high and extreme grazing intensity treatments. In contrast, densities of chestnut-collared longspurs, horned larks, and various species of shorebirds were highest in the high and extreme grazing treatment plots. Nongame bird densities and species richness during this study period were lower for all grazing treatments in native prairie and CRP grazing system grasslands when compared to earlier studies. Among grazing treatments, season-long pastures exhibited similar or slightly higher densities of nongame birds when compared to rotational grazing treatments in the native prairie and CRP study areas. However, rotational grazing treatments supported more species and are probably beneficial because they provide areas of undisturbed habitat during the breeding season. Results from this study suggest that management of grassland habitats can be manipulated to provide nesting habitat for certain species of grassland birds depending on particular management goals.

456. **Effects of grazing management treatment on grassland plant communities and prairie grouse habitat.**
Manske, L. L.; Barker, W. T.; and Biondini, M. E.
In: Prairie chickens on the Sheyenne National Grasslands, General Technical Report-RM 159/ Bjugstad, Ardell J., ed.; Fort Collins, Colo.: Rocky Mountain Forest and Range Experiment Station, Forest Service, U.S. Department of Agriculture, 1988. pp. 58-72.
Notes: Paper presented at a "Symposium on Prairie Chickens on the Sheyenne National Grasslands," September 18, 1987, Crookston, Minnesota. Includes references.
NAL Call #: aSD11.A42
Descriptors: birds/ wildlife/ grasslands/ range management/ grazing/ North Dakota
This citation is from AGRICOLA.

457. **Effects of grazing on long-billed curlew (Numenius americanus) breeding behavior and ecology in southwestern Idaho.**
Bicak, T. K.; Redmond, R. L.; and Jenni, D. A.
In: Proceedings of the Wildlife-Livestock Relationships Symposium. Coeur D'alene, Idaho. Peek, James M. and Dalke, P. D. (eds.)
Moscow, Idaho: Forest, Wildlife and Range Experiment Station, University of Idaho; pp. 74-85; 1982.
NAL Call #: SF84.84.W5 1981
Descriptors: Idaho/ long-billed curlew/ Numenius americanus/ grazing/ breeding behavior

458. **Effects of grazing on nesting by upland sandpipers in southcentral North Dakota.**
Bowen, Bonnie S. and Kruse, Arnold D.
Journal of Wildlife Management 57(2): 291-301. (1993)
NAL Call #: 410 J827; ISSN: 0022-541X
Descriptors: endangered species/ field method/ marshland management/ protection
Abstract: Grazing by livestock is often used to reduce litter, improve plant vigor, and alter plant species composition, but additional information is needed on the effects of these management practices on upland-nesting birds. Thus, we conducted an experimental study of the effect of grazing on nest density and nest success of upland sandpipers (Bartramia longicauda) in southcentral North Dakota from 1981 to 1987. Our experimental design consisted of 4 treatments and 1 control, each applied to 1 field in each of 3 study areas. The treatments represented options available to grassland managers: spring grazing, autumn grazing, autumn-and-spring grazing, season-long grazing, and control (ungrazed during the study). Nests (n = 342) were found by searching study areas with a cable-chain drag. Nest density was lower (P = 0.006) for treatments where cattle were present (spring, autumn-and-spring, and season-long) than where cattle were not present (autumn and control) during the nesting season. We concluded that grazing during the nesting season reduced the nest density of upland sandpipers. Nest success varied among years (P = 0.01) and was low in the first year of grazing and higher at the end of the study period. We found little evidence that the grazing treatment influenced nest success. We recommend that public lands with breeding populations of upland sandpipers include a complex of fields under various management practices, including fields undisturbed during the nesting season.

459. **Effects of grazing on small mammal abundance in eastern South Dakota.**
Bouska, Wesley W. and Jenks, Jonathan A.
Proceedings of the South Dakota Academy of Science 85: 113-118. (2006)
NAL Call #: 500 So82; ISSN: 0096-378X
Descriptors: commercial activities/ conservation measures/ ecology/ population dynamics/ terrestrial habitat/ land zones/ Blarina brevicauda/ Microtus ochrogaster/ Microtus pennsylvanicus/ Peromyscus maniculatus/ Sorex cinereus: farming and agriculture/ cattle grazing/ habitat management/ population density/ cattle grazing/ management implications/ grassland/ South Dakota/ Brookings/ Mammalia, Insectivora, Soricidae/ chordates/ Insectivores/ mammals/ rodents/ vertebrates
Abstract: Variation in small mammal abundance was compared between ungrazed and grazed pasture in Brookings County, South Dakota from 28 September through 27 October 2005. Total relative abundance and absolute abundance of small mammal populations did not differ (p=0.476) between grazed and ungrazed pastures. However, there were significantly more (p<0.05) masked shrews (Sorex cinerus) trapped on ungrazed than grazed pasture. Conversely, there were significantly more (p<0.05) deer mice (Peromyscus maniculatus) and meadow voles

(Microtus pennsylvanicus) trapped on grazed than ungrazed pasture. Because little information is available on effects of grazing on small mammal communities in the Northern Great Plains, these results will aid range and wildlife managers in developing local grazing programs that maintain the abundance and diversity of small mammal populations.

460. **Effects of grazing on the demography and growth of the Texas tortoise.**
Kazmaier, Richard T.; Hellgren, Eric C.; Ruthven, Donald C.; and Synatzske, David R.
Conservation Biology 15(4): 1091-1101. (2001)
NAL Call #: QH75.A1C5 ; ISSN: 0888-8892
Descriptors: demography/ disturbance tolerance/ grazing effects/ growth/ species management
Abstract: Considerable effort has been exerted in attempts to understand the complex ecological effects of grazing. North American tortoises, by virtue of their distribution, provide a good model taxon through which to study how grazing effects vary with grazing regime, habitat, and climate. We studied the Texas tortoise (Gopherus berlandieri), which is restricted primarily to privately owned rangelands of southern Texas and northeastern Mexico. Management of this species is hampered by a lack of information on the effects of common land-use practices. We evaluated the effects of moderate grazing by cattle (short-duration, winter-spring rotational grazing regime; 6-28 animal-unit days/ha/year) on this tortoise by comparing two grazed and two ungrazed sites in the Western Rio Grande Plains, Texas (U.S.A.), from April 1994 to October 1997. We made 132 captures of 106 individuals in the ungrazed pastures and 324 captures of 237 individuals in the grazed pastures. We also radiotracked 22 tortoises in the ungrazed pastures and 25 tortoises in the grazed pastures. Comparisons of relative abundance, body-size distribution, age distribution, body mass, sex ratio, adult survival, proportion of juveniles, and growth rates revealed no differences (p>0.05 for all parameters) between tortoises on grazed and ungrazed areas. Based on these results, we suggest that moderate grazing by cattle is not incompatible with maintenance of Texas tortoise populations. Our data were consistent with a general model of tortoise biogeography and tolerance of disturbance which suggests that Texas tortoises are tolerant to intermediate levels of disturbance. Generalities about the effect of cattle grazing on the four North American tortoises should be avoided unless they can be placed in the context of grazing regime, precipitation, habitat quality, and tortoise requirements.

461. **Effects of grazing on vegetation structure, prey availability, and reproductive success of Grasshopper Sparrows.**
Sutter, B. and Ritchison, G.
Journal of Field Ornithology 76(4): 345-351. (2005)
NAL Call #: 413.8 B534; ISSN: 02738570
Descriptors: Ammodramus savannarum/ cattle/ grasshopper sparrow/ grazing/ nest success/ Ammodramus savannarum/ Animalia/ Aves/ Bos taurus/ Insecta/ Invertebrata/ Passeridae
Abstract: Populations of Grasshopper Sparrows (Ammodramus savannarum) have been declining, and agricultural practices, such as grazing by domestic cattle (Bos taurus), are likely contributing factors. Grazing can alter the composition and structure of vegetation and influence prey availability, and such changes can impact the nesting success of grassland birds. Our objective was to examine the nesting success of Grasshopper Sparrows in grazed and ungrazed habitats on the Blue Grass Army Depot in Madison County, Kentucky. Clutch sizes of female Grasshopper Sparrows nesting in grazed and ungrazed areas differed significantly, with mean clutch sizes of 4.48 in ungrazed areas and 3.91 in grazed areas. In addition, nest success was higher in ungrazed areas (70%) than grazed areas (25%). Insect sweeps revealed that invertebrate biomass in ungrazed areas was greater than in grazed areas, and analysis of vegetation indicated that grazed areas had less litter, more shrubs, and shorter, less dense vegetation than ungrazed areas. Most unsuccessful nests were depredated, and the higher predation rates on nests in grazed areas may have been due to differences in vegetation structure. Shorter, less dense vegetation in grazed areas may make it easer for predators to observe adults and locate nests, while taller, denser vegetation in ungrazed areas may provide greater concealment. While the results of previous studies suggest that light to moderate grazing can produce habitat suitable for Grasshopper Sparrows, more intense grazing, as on our study area (one animal unit/ha), creates habitat less suitable for these sparrows.

462. **Effects of grazing practices and fossorial rodents on a winter avian community in Chihuahua, Mexico.**
Desmond, M.
Biological Conservation 116(2): 235-242. (2004)
NAL Call #: S900.B5; ISSN: 0006-3207
Descriptors: deserts/ grasslands/ grazing/ land use/ natural grasslands/ population density/ species diversity/ wild birds/ winter/ Dipodomys spectabilis
Abstract: Chihuahuan Desert grasslands are important wintering grounds for grassland and shrub-adapted birds. Many species belonging to these assemblages are currently exhibiting population declines. One area recognized for its importance to biological diversity, including grassland birds, is the Janos-Nuevo Casas Grandes black-tailed prairie dog (Cynomys ludovicianus) complex in northwestern Chihuahua, Mexico, an area containing 58 colonies with 30,000 ha of prairie dogs. This is one of the largest remaining prairie dog complexes and the only intact complex in the Chihuahuan Desert. In its current condition, a large percentage of this complex is of reduced value to wildlife. Overgrazing on communal (ejido) lands has resulted in areas being comprised of annual grasses and forbs. The density of active prairie dog burrows and banner-tailed kangaroo rat (Dipodomys spectabilis) mounds as well as avian diversity and abundance were lower on ejido lands than an adjacent private ranchland with and without prairie dogs. Few avian species used overgrazed portions of the prairie dog colony. Community similarity among plot types was low due to different management practices and differences on and off colony. To retain, and in many instances restore the biological diversity of this important region it is essential to work with local ejidos on grazing management.

463. **Effects of grazing systems on sharp-tailed grouse habitat.**
Mattise, S. N.; Linder, R. L.; and Kobriger, G. D.
In: Proceedings of the Wildlife-Livestock Relationships Symposium. Coeur D'alene, Idaho. Peek, James M. and Dalke, P. D. (eds.)
Moscow, Idaho: Forest, Wildlife and Range Experiment Station, University of Idaho; pp. 124-132; 1982.
NAL Call #: SF84.84.W5 1981
Descriptors: sharp-tailed grouse/ grazing/ livestock

464. **Effects of habitat management for ducks on target and nontarget species.**
Koper, N. and Schmiegelow, F. K. A.
Journal of Wildlife Management 70(3): 823-834. (2006)
NAL Call #: 410 J827; ISSN: 0022541X.
Notes: doi: 10.2193/0022-541X(2006)70[823:EOHMFD]2.0.CO;2.
Descriptors: Alberta/ cattle grazing/ dry mixed-grass prairie/ ducks/ edge effects/ field size/ shorebirds/ songbirds/ surrogate species
Abstract: Habitat management for ducks has significant implications for the conservation of other species. We hypothesized that, because of their flagship and umbrella characteristics, upland-nesting ducks might be effective surrogate species for songbird and shorebird conservation in the dry mixed-grass prairie. We tested this by comparing effects of habitat management (cattle grazing deferments and field size), distance to other habitat (water, cropland/forage, roads), and vegetation, on the richness and density of ducks, songbirds, and shorebirds in southern Alberta, Canada. There were no consistently similar responses to these habitat characteristics among ducks, songbirds and shorebirds. Despite their conceptual appeal, ducks are, therefore, unlikely to be good surrogate species for avian conservation in the dry mixed-grass prairie. Habitat managers and conservation planners should empirically validate whether habitat management for ducks positively affects other species, if this is a management objective. Our results suggest that in dry mixed-grass prairie, deferring cattle grazing is likely to increase densities of only lesser scaup but that grazing, in general, can be used by managers to create a heterogeneous habitat that supports many species.

465. **Effects of hay management on grassland songbirds in Saskatchewan.**
Dale, B. C.; Martin, P. A.; and Taylor, P. S.
Wildlife Society Bulletin 25(3): 616-626. (1997)
NAL Call #: SK357.A1W5
Descriptors: birds/ environmental impact/ agricultural practices/ Saskatchewan/ grassland birds/ songbird conservation/ songbirds
Abstract: Evaluated impacts of hay management on endemic grassland birds.

466. **Effects of haying and agricultural practices on a declining species: The North American wood turtle, Glyptemys insculpta.**
Saumure, R. A.; Herman, T. B.; and Titman, R. D.
Biological Conservation 135(4): 581-591. (2007)
NAL Call #: S900.B5; ISSN: 00063207.
Notes: doi: 10.1016/j.biocon.2006.11.003.
Descriptors: agriculture/ erosion/ haying/ Injury/ mortality/ survivorship
Abstract: In North America, the spatio-temporal scale of deforestation has resulted in a 94% decrease in temperate forests within 360 years. Despite the enormous scale of this disturbance, agriculture is so pervasive in modern society that its impacts are highly underappreciated. We investigated the impact of current agricultural practices on a disturbance-dependent species in southern Quebec, Canada. Of 30 wood turtles (Glyptemys insculpta) followed via radio-telemetry, 20% died as a result of agricultural activities. Anthropogenic mortality estimates for adults and juveniles in 1998 were 0.10 and 0.18, respectively. For 1999, these values were 0.13 and 0.17, respectively. Of those turtles that survived, many had injuries inflicted by agricultural machinery. Sub-lethal mutilation rates for adults were 90 ± 3% in both years, whereas the maximum frequency for juveniles was 57%. A Carapace Mutilation Index was derived to quantify the distribution and severity of injuries observed. Only male and juvenile Carapace Mutilation Index values differed significantly. Adults had significantly more carapace injuries and limb amputations on their right sides. This bilateral asymmetry of injuries resulted from of a combination of turtle flight behavior and traditional harvesting practices. We reiterate the recommendations of forage researchers: setting the cutting height of disc mowers to 100 mm increases harvest yields, reduces wear on machinery, and decreases soil erosion. A by-product of such a change in cutting height is that turtle mortality and injury rates should be reduced, as wood turtle carapace height is <87 mm. Without changes in agricultural practices, this population will be extirpated.

467. **Effects of invasive exotic grasses on South Texas rangeland breeding birds.**
Flanders, A. A.; Kuvlesky, W. P.; Ruthven, D. C.; Zaiglin, R. E.; Bingham, R. L.; Fulbright, T. E.; Hernandez, F.; and Brennan, L. A.
Auk 123(1): 171-182. (2006)
NAL Call #: 413.8 AU4 ; ISSN: 00048038
Descriptors: breeding birds/ exotic grasses/ Guilds/ invertebrates/ South Texas
Abstract: Invasive exotic plants are a major threat to many species of wild birds. When these plants become established and widespread, the floristic composition of native plant communities becomes simplified, which can result in long-term and often irreversible habitat degradation for birds and other animals. Until recently, few studies have focused on the effect of invasive exotic grasses on breeding birds in southwestern rangelands. During the 2001 and 2002 breeding seasons (May-June), we compared the abundance and species richness of breeding birds, native flora, and arthropods on South Texas rangeland plots dominated by native grasses and plots dominated by two invasive exotic grasses, Lehmann lovegrass (Eragrostis lehmanniana) and buffelgrass (Cenchrus ciliaris). Native-grass cover was >400% greater on native-grass sites than on exotic-grass sites. Forb and grass species-richness were higher on native-grass sites. Shrub canopy cover, bare ground, and vegetation height measurements were similar on native-grass and exotic-grass sites. Overall bird abundance was 32% greater on native-grass sites than on exotic-grass sites. Lark Sparrows (Chondestes grammacus) were 73% more abundant on

native-grass sites. Four other species - Blackthroated Sparrow (Amphispiza bilineata), Northern Mockingbird (Mimus polyglottos), Northern Bobwhite (Colinus virginianus), and Cassin's Sparrow (Aimophilla cassini) - were 26-70% more abundant on native-grass sites. The guild of birds that foraged on the ground under open brush canopies was almost twice as abundant on native-grass sites. Arthropod abundance was 60% greater on the native-grass site we sampled. Specifically, spiders, beetles, and ants were 42-83% more abundant on a native-grass site than on a buffelgrass site. Compared with rangelands dominated by native vegetation, areas dominated by Lehmann lovegrass and buffelgrass in South Texas appear to provide less suitable habitat for breeding birds, especially for bird species that forage on or near the ground. © The American Ornithologists' Union, 2006.

468. **Effects of land management on nesting success of sandhill cranes in Oregon.**
Littlefield C. D. and Paullin D. G.
Wildlife Society Bulletin 18(1): 63-65. (1990)
NAL Call #: SK357.A1W5; ISSN: 0091-7648
Descriptors: Grus canadensis tabida/ cattle grazing/ habitat/ refuge/ wetland

469. **Effects of livestock grazing on bird abundance and vegetation structure in shortgrass prairie.**
Reinking, Dan L.; Wolfe, Donald H.; and Wiedenfeld, David A.
Oklahoma Ornithological Society Bulletin 33(4): 29-36. (2000); ISSN: 0474-0750
Descriptors: agricultural practices/ birds/ communities/ ecosystems/ grazing/ habitat alterations/ prairies/ wildlife-livestock relationships/ horned lark/ western meadowlark/ grasshopper sparrow/ mourning dove/ common nighthawk/ killdeer/ Aves/ Texas/ Rita Blanca Natl. Grasslands
Abstract: The authors studied the present avian community composition in a shortgrass prairie ecosystem and determined the effects of differing grazing regimes on this composition. Six species of birds were recorded in the study area. Horned larks and western meadowlarks made up 49% and 40% of the birds observed, respectively.

470. **Effects of livestock grazing on duck nesting habitat in Utah.**
West, B. C. and Messmer, T. A.
Rangeland Ecology and Management 59(2): 208-211. (Mar. 2006)
NAL Call #: SF85.J67
Descriptors: ducks/ nesting/ livestock/ grazing/ Utah
Abstract: Periodic vegetation disturbance is an important yet controversial tool for waterfowl managers. Some have reported livestock grazing removes residual vegetation and thus is detrimental to nesting ducks, and others argue that such disturbance is necessary to maintain grassland health. We evaluated the impact of winter livestock grazing on duck nesting at Bear River Migratory Bird Refuge, Utah. During winter 1999, 6 experimental plots were grazed by cattle and 6 were ungrazed; in winter 2000, 8 plots were grazed and 8 were ungrazed. All grazing treatments were conducted during 15 November-15 March and averaged a stocking rate of 9.5 animal unit months/ha. During the following spring nesting season, we measured visual obstruction readings (VOR) on grazed and ungrazed sites. Although VOR on ungrazed sites were greater than those on grazed sites, this difference became less important as the nesting season progressed. Winter grazing impacted the nesting habitat of early-nesting ducks such as mallards (Anas platyrhynchos), but not that of late-nesting species such as cinnamon teal (Anas cyanoptera) and gadwall (Anas strepera). When using livestock grazing to manage grasslands, waterfowl managers should consider their management goals, the species composition of breeding duck populations, and environmental conditions.
This citation is from AGRICOLA.

471. **Effects of livestock grazing on Mearns quail in southeastern Arizona.**
Brown, R. L.
Journal of Range Management 35(6): 727-732. (1982)
NAL Call #: 60.18 J82; ISSN: 0022-409X.
http://jrm.library.arizona.edu/Volume35/Number6/azu_jrm_v35_n6_727_732_m.pdf
Descriptors: Cyrtonyx montezumae mearnsi/ census-survey methods/ changes detrimental to wildlife/ cover/ food supply/ grassland/ grazing/ habitat/ livestock/ nests and nesting/ population density/ quail, Mearns harlequin/ wildlife-livestock relationships/ woodland climax/ Arizona/ Santa Cruz County
Abstract: The mechanics of the relationship between livestock grazing and quail densities are determined and estimates of the level of grazing intensity that is limiting to local quail populations are presented. Effects of cover removal on Mearns quail populations are examined: quail food supply was not reduced, but the elimination of escape cover and nesting grass was detrimental, especially to breeding populations.

472. **Effects of livestock grazing on rangeland grasshopper (Orthoptera: Acrididae) abundance.**
O'Neill, Kevin M.; Olson, Bret E.; Rolston, Marni G.; Wallander, Roseann; Larson, Deanna P.; and Seibert, Catherine E.
Agriculture, Ecosystems and Environment 97(1-3): 51-64. (2003)
NAL Call #: S601.A34; ISSN: 0167-8809
Descriptors: food availability/ grazing impacts/ grazing intensity/ grazing management/ habitat characteristics/ habitat quality/ heavily grazed areas/ livestock grazing/ microclimate alteration/ microhabitats/ plant cover impacts/ potential oviposition sites/ ungrazed pastures
Abstract: Livestock may impact habitat quality for grasshoppers by reducing food availability and by altering microclimate and potential oviposition sites. A 5-year study was conducted to create consistent grazing impacts on replicated plots and measure their effects on plant cover, microclimate, and grasshopper abundance. Cattle were used to produce two levels of grazing intensity that were compared to ungrazed controls. Differences in plant cover were greatest immediately after grazing each summer, grasshopper microhabitats tending to be shadier, cooler, less windy, and more humid in the ungrazed plots. The grasshopper assemblage included five of the worst pest grasshopper species in North America: Ageneotettix deorum, Aulocara elliotti, Melanoplus sanguinipes, M. packardii, and Camnula pellucida. Most species had

greater abundance on ungrazed pastures, particularly during the 4-6 weeks after grazing each year. However, A. elliotti was often more abundant in heavily grazed areas early in the year when early instars were present and in late summer when adults were predominant. There was no strong evidence that the effect of grazing on grasshopper abundance increased over the 5-year study. At this time, all changes in grasshopper numbers cannot be directly attributed to particular habitat characteristics that changed after grazing, but the results suggest that grazing management could be used to reduce pest grasshopper densities.

473. **Effects of livestock grazing on the invertebrate prey base and on the survival and growth of larvae of the Columbia spotted frog, Rana luteiventris.**
Howard, Amy and Munger, James C., 2003. 28 p. Idaho Bureau of Land Management Technical Bulletin. *http://www.blm.gov/id/st/en/info/publications/technical_bulletins/TB03-7.html*
Descriptors: commercial activities/ nutrition/ diet/ life cycle/ development/ ecology/ population dynamics/ freshwater habitat/ lentic water/ lotic water/ land zones/ Invertebrata: biomass/ community structure/ Rana luteiventris/ ponds/ streams/ biomass structure/ amphibian predators/ Idaho/ Owyhee Mountains/ livestock grazing/ amphibian predator-prey base/ Ranidae/ Anura/ Lissamphibia/ Amphibia/ amphibians/ chordates/ invertebrates/ vertebrates
Abstract: This report discusses results primarily from the second of two field seasons in which two aspects of grazing were examined for possible effects on Columbia spotted frogs (Rana luteiventris). First, exclosures were used to prevent grazing on portions of the streams and ponds to ascertain the effects of grazing on the invertebrate prey base utilized by the frogs. Although we found no statistically significant effect of grazing on either biomass or diversity of invertebrate prey, care must be taken in the interpretation of these results. While it is possible that there was no effect of the specific grazing regimes of these sites on the invertebrate community, the small sample size, the very general taxonomic identification used, and weaknesses in study design may have masked any true differences. Adult spotted frogs were apparently not actively feeding during late August to late September. Metamorphs and subadults, however, would need to forage at that time to accumulate necessary fat reserves and would therefore be affected by changes in the invertebrate community. Further work is needed to more solidly document the effects of grazing on invertebrates. Second, spotted frog larvae were raised in microcosms located at the Mudflat Guard Station and were subjected to four levels of cattle waste. During the first year, survival of larvae was very low and growth was stunted, indicating that the experimental design needed modification for the second year's experiment. During the second year, we found that addition of waste negatively affected survival rate. We also found that cattle waste does not appear to be directly toxic, nor does the decreased survival seem to be due to decreased dissolved oxygen levels. The cause of decreased survival is probably an indirect effect of addition of waste, such as an increased ammonia concentration. We also found that addition of waste led to an increased growth rate of larvae. Further study is needed to determine whether, in the more natural conditions of the field, cattle waste affects survival and growth in the same way as was observed in the microcosms.

474. **Effects of livestock management on southwestern riparian ecosystems.**
Krueper, D. J.
In: Desired future conditions for southwestern riparian ecosystems: Bringing interests and concerns together, General Technical Report-RM 272/ Shaw, Douglas W. and Finch, Deborah M., eds.; Fort Collins, Colo.: Rocky Mountain Forest and Range Experiment Station, Forest Service, U.S. Department of Agriculture, 1996. pp. 281-301.
NAL Call #: aSD11.A42 no. 272
Descriptors: ecosystems/ livestock/ grazing/ environmental degradation/ habitat destruction/ wildlife/ riparian buffers/ United States, southwestern region
Abstract: Conference held September 18-22, 1995 in Albuquerque, N. Mex.
This citation is from AGRICOLA.

475. **The effects of livestock on California ground squirrels (Spermophilus beecheyii).**
Fehmi, J. S.; Russo, S. E.; and Bartolome, J. W.
Rangeland Ecology and Management 58(4): 352-359. (2005)
NAL Call #: SF85.J67; ISSN: 1550-7424
Descriptors: burrow patterns/ ground squirrels/ California/ grasslands/ cattle grazing/ oak savanna/ livestock exclosures
Abstract: Understanding the impacts of livestock grazing on wildlands is important for making appropriate ecosystem management decisions. Using livestock exclosures, we examined the effects of moderate cattle grazing on the abundance of California ground squirrels (Spermophilus beecheyii Richardson) and the spatial distribution of active burrows within their colonies in grassland and blue oak (Quercus douglasii Hook. & Arn.) savanna habitats in the coastal range of California over a 3-year period (1991-1994). Overall, relative population densities of California ground squirrels declined significantly throughout the experiment, but did not differ between grazed and ungrazed colonies or between habitats. There was also no significant interaction between these 2 factors. The spatial distribution of burrows, as measured by the mean nearest neighbor distance of active entrances within a colony, did not differ significantly between grazed and ungrazed colonies or between habitats, nor was the interaction significant. Thus, low to moderate levels of cattle grazing did not appear to have a strong effect on the population dynamics of California ground squirrels, and grazing may be compatible with maintenance of ground squirrel populations. Based on multivariate analysis of variance of 1994 data, live plant cover, native plant cover, and standing biomass were lower where the number of burrows was higher on grazed colonies but were little affected on ungrazed colonies. Ground squirrels may increase the impact of livestock grazing and thus reduce the capacity of the land to support other activities. However, it is clear that the effects of livestock grazing are complex and that detailed studies of potential mechanisms by which grazing impacts California ground squirrel populations are necessary.

476. **Effects of long-term cattle exclosure on vegetation and rodents at a desertified arid grassland site.**
Valone, T. J. and Sauter, P.
Journal of Arid Environments 61(1): 161-170. (2005)
NAL Call #: QH541.5.D4J6; ISSN: 0140-1963
Descriptors: commercial activities/ ecology/ population dynamics/ terrestrial habitat/ land zones/ Rodentia: farming and agriculture/ community structure/ population density/ grasslands/ arid grassland/ Arizona/ arid grasslands/ faunal responses/ cattle grazing/ Mammalia/ chordates/ mammals/ rodents/ vertebrates
Abstract: Arid grasslands are often presumed to exist in one of two alternate stable states: grassland or desertified shrubland. While the conversion to shrubland can occur rather rapidly following intense overgrazing, the recovery of perennial grasses is often presumed to be difficult or impossible even with livestock removal. We examined vegetation and rodent communities at a desertified shrubland site from which livestock had been removed for more than four decades. Total shrub cover was similar but differed in composition across the grazing fence. Larrea tridentata had significantly higher cover Outside while Parthenium incanum had significantly higher cover inside the fence. Basal perennial grass cover was significantly higher inside the fence. Rodent diversity was significantly higher inside the fence due to higher abundance and diversity of pocket mice. These data suggest that recovery of perennial grasses at severely desertified sites is possible but may require several decades and that rodent diversity responds positively to such recovery. © 2004 Elsevier Ltd. All rights reserved.
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477. **Effects of management burning on prairie insect species richness within a system of small, highly fragmented reserves.**
Panzer, Ron and Schwartz, Mark
Biological Conservation 96(3): 363-369. (2000)
NAL Call #: S900.B5; ISSN: 0006-3207
Descriptors: conservation measures/ ecology/ terrestrial habitat/ abiotic factors/ physical factors/ land and freshwater zones/ Insecta: habitat management/ community structure/ grassland/ fire/ management burning/ community structure effects/ Indiana and Wisconsin/ Illinois/ Indiana/ Wisconsin/ management burning effects/ prairie habitat/ Insecta/ arthropods/ insects/ invertebrates
Abstract: A growing number of entomologists are expressing concern that insect species are being extirpated from fire-managed (F-M) reserves and are urging that management burning be substantially reduced. In accord with this view, the fire attrition hypothesis predicts that fire-excluded (F-E) sites will support greater species richness, greater mean population densities, and an inordinately large number of species that are absent from F-M sites. Comparative studies of remnant-dependent (r-d) species among F-M and F-E systems in northern Illinois, northwest Indiana, and southeast Wisconsin failed to support these predictions. Our results suggest that the fire-attrition model, based on prevailing burn practices, may be applicable to few if any species. We conclude that prevailing rotational, cool season burning practices have generally been compatible with the conservation of insect biodiversity within the highly fragmented prairie reserve system in the Chicago region.
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478. **Effects of management practices on grassland birds.**
Douglas H. Johnson, D. H.; Igl, L. D.; and Dechant Shaffer, J. A.: Northern Prairie Wildlife Research Center, U.S. Geological Survey. (2001).
Notes: See also http://www.npwrc.usgs.gov/resource/literatr/wetbird/index.htm (Effects of Management Practices on Wetland Birds). http://www.npwrc.usgs.gov/resource/literatr/grasbird/index.htm
Descriptors: ecological requirements/ dispersion/ desert habitat/ brood-egg/ habitat management/ management/ North America
Abstract: These reports are a series of literature syntheses on North American grassland birds. The need for these reports was identified by the Prairie Pothole Joint Venture (PPJV), a part of the North American Waterfowl Management Plan. The PPJV adopted the goal to stabilize or increase populations of declining grassland- and wetland-associated wildlife species in the Prairie Pothole Region. To further that objective, it is essential to understand the habitat needs of birds other than waterfowl, and how management practices affect their habitats. The focus of these reports is on management of breeding habitat, particularly in the northern Great Plains. Resource contains over 40 species accounts.
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479. **Effects of mowed trails on depredation of artificial nests in grassland.**
Rosenblatt, Daniel L.; Newton, Julianne L.; and Heske, Edward J.
Prairie Naturalist 32(1): 29-41. (2000)
NAL Call #: QH540.P7; ISSN: 0091-0376
Descriptors: wildlife management: conservation/ terrestrial ecology: ecology, environmental sciences/ artificial nests/ grasslands: habitat/ ground nesting/ mowed trail effects/ nest depredation
Abstract: We used artificial nests to assess the effects of mowed trails on nest survival in small patches of grassland in east-central Illinois. In 1997 and 1998, we placed nests on the ground 5 m, 10 m, 25 m, and 50 m away from mowed trails in oldfields to examine if the distance from mowed trails influenced nest survival. We also placed nests in control fields without mowed trails to determine if there was an increase in overall nest depredation when mowed trails were present. We detected no difference in either the number of depredation events or in depredation rates among the four distance classes of nest in fields with mowed trails. We also detected no difference in depredation between fields with mowed trails and without mowed trails. We did measure significantly higher rates of depredation in fields closest to a campground and park area than elsewhere in 1997, but not in 1998. Track stations, automated cameras, and clay eggs were used to determine the identity of potential nest predators. Data from clay eggs indicated that much of the observed egg depredation in grasslands might be due to small mammals, a group of predators that are unlikely to be affected by the presence of mowed trails.
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480. **Effects of mowing and burning on shrubland and grassland birds on Nantucket Island, Massachusetts.**
Zuckerberg, B. and Vickery, P. D.
Wilson Journal of Ornithology 118(3): 353-363. (2006)
NAL Call #: QL671.W55 ; ISSN: 15594491.
Notes: doi: 10.1676/05-065.1.
Descriptors: mowing/ prescribed burns/ shrublands/ birds/ habitat management/ habitat preference/ Massachusetts
Abstract: Throughout the United States, declines in breeding populations of grassland and shrubland birds have prompted conservation agencies and organizations to manage and restore early-successional habitats. These habitats support a variety of birds, some of which have been classified as generalists; thus, often these birds are thought to be less affected by habitat manipulation. More information, however, is needed on the response of early-successional generalists to habitat management, because conservation agencies are increasing their focus on the regional preservation and management of common species. On Nantucket Island, Massachusetts, the goal of the Partnership for Harrier Habitat Preservation (PHHP) has been to restore more than 373 ha of grassland for the island's population of Northern Harriers (Circus cyaneus). This management program has entailed methods such as prescribed burning and mowing (e.g., brushcutting) to restore and maintain grassland habitat. Over a 3-year period, we found that songbird response to burning and mowing varied among species, depending on subtle habitat preferences and the intensity and type of management. In shrublands, Eastern Towhee (Pipilo erythrophthalmus) and Common Yellowthroat (Geothlypis trichas) abundance declined in mowed areas but were unaffected by prescribed burning. In grasslands, Savannah Sparrow (Passerculus sandwichensis) abundance showed no response to either burning or mowing, whereas Song Sparrows (Melospiza melodia) preferred unmanaged grasslands. In shrublands, mowing was the most effective method for restoring grassland habitat, whereas prescribed burning had little effect on abundances of shrubland birds and vegetation structure. In grasslands, both mowing and burning were successful in restricting shrubland encroachment and maintaining grassland habitat.

481. **Effects of mowing and summer burning on the massasauga (Sistrurus catenatus).**
Durblan, Francis E.
American Midland Naturalist 155(2): 329-334. (2006)
NAL Call #: 410 M58; ISSN: 0003-0031
Descriptors: Lepidosauria/ Serpentes/ Squamata/ Viperidae/ Sistrurus catenatus/ environmental factors/ conservation/ wildlife management/ habitat use/ fires-burns/ grasslands/ ecosystems/ habitat management/ Holt County, Squaw Creek National Wildlife Refuge/ land zones/ Missouri/ mortality/ mortality rate/ mowing/ summer burning/ population ecology/ terrestrial ecology/ wet prairies
Abstract: Prescribed fire is used to reduce coverage of woody vegetation in early successional habitats, but burning may also result in direct and indirect mortality of reptiles inhabiting the burn site. Mowing prior to burning has been hypothesized to render grassland habitats unsuitable for the massasauga (Sistrurus catenatus), thereby reducing the number of individuals that may be affected in the management unit at the time of burning. I evaluated the impact of mowing prior to summer burning on massasaugas at Squaw Creek National Wildlife Refuge, in northwestern Missouri, during the summer of 2003 rising radiomarked snakes. Pre-burn mowing resulted in the direct mortality of three (43%) of seven radiomarked massasaugas present in the treatment area. Prescribed fire resulted in a mortality of one of two remaining individuals. Pre-burn mowing did not reduce mortalities as hypothesized and likely added to the overall snake mortality rate. Management alternatives other than mowing and prescribed fire when snakes are active Should be considered when managing massasauga habitat.

482. **Effects of Old World bluestem (Bothriochloa ischaemum) on food availability and avian community composition within the mixed-grass prairie.**
Hickman, K. R.; Farley, G. H.; Channell, R.; and Steier, J. E.
Southwestern Naturalist 51(4): 524-530. (2006)
NAL Call #: 409.6 So8 ; ISSN: 00384909.
Notes: doi: 10.1894/0038-4909(2006)51 [524:EOOWBB]2.0.CO;2.
Descriptors: birds/ arthropod biomass/ food availability/ grasslands/ habitat management
Abstract: Various grassland bird species have displayed population declines over the past 30 to 40 years, and interest in explaining possible causes for the declines has prompted numerous studies. Many of these studies have focused on changes in agricultural practices; few have evaluated possible effects of the presence of nonnative grasses in grasslands. The objective of our study was to determine the effects a nonnative grass, Old World bluestem (OWB; Bothriochloa ischaemum), might have on grassland bird species abundance and richness, and on bird food availability (arthropod biomass). Three pastures each of native range, expired Conservation Reserve Program (CRP), and OWB were sampled from May to July 2001 in Comanche County, Kansas. Bird abundance and species richness were assessed by using a point-count method along 3 transects in each pasture. Food availability was estimated by collecting arthropods along 10 transects in each pasture by sweep-netting. Results showed significantly lower bird abundance and species richness in OWB pastures than in native pastures. OWB pastures also had significantly less arthropod biomass than native pastures. Because food availability (arthropod biomass) was directly related to percent forb cover within fields and was mostly absent in OWB pastures, we contend these were the primary factors contributing to lower avian richness and abundance in OWB fields when compared to CRP and native pastures.

483. **Effects of plant cover improvements for nesting ducks on grassland songbirds.**
Lapointe, S.; Belanger, L.; Giroux, J.-F.; and Filion, B.
Canadian Field Naturalist 117(2): 167-172. (2003)
NAL Call #: 410.9 Ot8 ; ISSN: 0008-3550
Descriptors: aquatic birds/ nesting/ Canada, Quebec, St. Lawrence R., Varenne I.
Abstract: Several islands located along the St. Lawrence River in southern Quebec have been used as natural pastureland by cattle for decades. Recently, a rest-rotation grazing system and dense nesting cover were established on four islands near Varennes to improve duck nesting

conditions. The effects of these two plant cover improvements on the abundance of grassland songbirds were assessed through four treatments: 1) idle fields with no vegetation improvement but exclusion of cattle (IDLE), 2) improved pastures with seeding of forage plants for cattle (IMPP), 3) dense seeded nesting cover fields improved for ducks and where cattle were excluded (DNC), and 4) natural or unimproved pastures grazed by cattle after the duck nesting season (UIPP). The overall abundance of birds was similar among treatments before cover improvements as well as two years after.

484. **Effects of prairie fragmentation on the nest success of breeding birds in the midcontinental United States.**
Herkert, James R.; Reinking, Dan L.; Wiedenfeld, David A.; Winter Maiken; Zimmerman, John L.; Jensen, William E.; Finck, Elmer J.; Koford, Rolf R.; Wolfe, Donald H.; Sherrod, Steve K.; Jenkins, M Alan; Faaborg, John; and Robinson, Scott K.
Conservation Biology 17(2): 587-594. (2003)
NAL Call #: QH75.A1C5; ISSN: 0888-8892
Descriptors: wildlife management: conservation/ prairie fragmentation: breeding bird nest success/ reproductive success: brood parasitism, nest predation
Abstract: Grassland fragmentation and habitat loss are hypothesized to be contributing to widespread grassland bird declines in North America due to the adverse effects of fragmentation on breeding bird abundance and reproductive success. To assess the effects of fragmentation on the reproductive success of grassland birds, we measured rates of nest predation and brood parasitism for four species of birds (Grasshopper Sparrow (Ammodramus savannaru), Henslow's Sparrow(Ammodramus henslowii), Eastern Meadowlark (Sturnella magna), and Dickcissel (Spiza Americana)) in 39 prairie fragments ranging from 24 to >40,000 ha in size in five states in the mid-continental United States. Throughout the region, nest-predation rates were significantly influenced by habitat fragmentation. Nest predation was highest in small (<100 ha) and lowest in large (>1000 ha) prairie fragments. Rates of brood parasitism by Brown-headed Cowbirds (Molothrus ater), however, were not consistently related to fragment size and instead were more strongly related to regional cowbird abundance, being significantly higher in regions with high cowbird abundance. Differences in nest-predation rates between large fragments (54-68% of all nests lost to predators) and small fragments (78-84% lost to predators) suggest that fragmentation of prairie habitats may be contributing to regional declines of grassland birds. Maintaining grassland bird populations, therefore, may require protection and restoration of large prairie areas.

485. **Effects of prairie restoration methods on small mammal seed predation.**
Key, R M; Gohde, D.M.; Lindee, K A.; and Carrington, M. E.
Transactions of the Illinois State Academy of Science 95(Supplement): 89. (2002)
NAL Call #: 500 IL6; ISSN: 0019-2252.
Notes: Meeting abstract; 94th Annual Meeting of the Illinois State Academy of Science, Edwardsville, Illinois, USA; April 19-20, 2002.
Descriptors: terrestrial ecology: ecology, environmental sciences/ wildlife management: conservation/ clipping/ management method/ mowing/ management method/ raking/ management method/ snap trapping/ collection method/ soil tamping/ management method/ tilling/ management method/ agricultural fields: abandoned/ prairie restoration/ seed predation

486. **Effects of prescribed burning and cattle grazing on deer diets in Louisiana.**
Thill, R. E.; Martin, A.; Morris, H. F.; and Harrel, A. T.
New Orleans, LA: U.S. Dept. of Agriculture Southern Forest Experiment Station, 1995. 13 p. Research Paper.
NAL Call #: A99.9 F7628Us
http://www.srs.fs.usda.gov/pubs/rp/rp_so289.pdf
Descriptors: Odocoileus virginianus/ forage/ nutritive value/ prescribed burning/ grazing/ cattle/ nutrient content/ crude protein/ phosphorus/ calcium/ Louisiana
Abstract: A study was conducted on the dietary and nutritional effects of cattle grazing and rotational prescribed burning on the diets of three to five captive white-tailed deer (Odocoileus virginianus) on longleaf pine (Pinuspalustris Mill.-bluestem (Andropogon spp. and Schizachyrium spp.) sites in central Louisiana from October 1980 through February 1987. Deer diets were evaluated under ungrazed, moderate year-long, heavy seasonal, and heavy yearlong cattle grazing treatments. Deer diets were composed mostly of browse and forbs under all grazing treatments, but were less diverse under heavy grazing when compared with moderate and no grazing treatments. Foraging efficiency (computed as the ratio of forage intake per 30-minute trial to the distance traveled) was comparable among treatments during spring and fall but was lower under the heavy grazing treatment during summer and winter. Diets selected under ungrazed conditions contained the highest percentage of uncommon and ephemeral plant taxa during all seasons except fall. Dietary crude protein (CP), phosphorus (P), and calcium-to-phosphorus ratios varied significantly under various grazing treatments for certain seasons. Prescribed burning did not significantly affect diet diversity; however, diets from areas of first-year burns were higher in CP and P than from areas of older burns during spring and summer, but these differences disappeared by the first fall after burning. From a nutritional standpoint, burning and seasonal influences generally had more impact than grazing treatments on deer diets. No evidence was found that seasonal or yearlong cattle grazing at moderate levels (40- to 50-percent herbage removal) adversely affected deer nutrition.
This citation is from AGRICOLA.

487. **Effects of prescribed burns and bison (Bos bison) grazing on breeding bird abundances in tallgrass prairie.**
Powell, A. F. L. A.
Auk 123(1): 183-197. (2006)
NAL Call #: 413.8 AU4 ; ISSN: 00048038
Descriptors: burning/ grassland birds/ grazing/ tallgrass prairie
Abstract: Grassland birds have declined more than any other avian assemblage in North America, with nearly every species showing negative population trends. In the Flint Hills of Kansas, the largest remnant of the tallgrass prairie biome, annual spring burning of rangeland has recently

replaced burning every 2-3 years. I examined effects of different burning and bison (Bos bison) grazing regimes on June abundances of seven bird species using a 23-year data set from the Konza Prairie Biological Station. Fire significantly affected the abundances of six of the seven species. Effects varied among species but, notably, four grass-dependent species - Grasshopper Sparrow (Ammodramus savannarum), Henslow's Sparrow (A. henslowii), Dickcissel (Spiza americana), and Eastern Meadowlark (Sturnella magna) - and the shrub-dependent Bell's Vireo (Vireo bellii) - were least abundant or absent at sites in the breeding season immediately following burning. Upland Sandpipers (Bartramia longicauda) were most abundant at sites in the season following burning, whereas Brown-headed Cowbirds (Molothrus ater) exhibited no significant response. Bison grazing increased abundance of Upland Sandpiper and Grasshopper Sparrow, nearly eliminated Henslow's Sparrow, and (in combination with recent fire) lowered the abundance of Dickcissel. Although fire and grazing are natural forces that maintain tallgrass prairie, their action was, until recently, intermittent and patchy, providing grassland birds with a variety of levels of disturbance. If the vast Flint Hills prairie is to serve as a grassland bird stronghold, the region-wide practice of annual burning with intensive grazing must be replaced with alternatives that restore heterogeneity to the landscape. © The American Ornithologists' Union, 2006.

488. **Effects of prescribed fire on an ant community in Florida pine savanna.**
Izhaki, Ido; Levey, Douglas J.; and Silva, Wesley R.
Ecological Entomology 28(4): 439-448. (2003)
NAL Call #: QL461.E4; ISSN: 0307-6946
Descriptors: conservation measures/ ecology/ terrestrial habitat/ abiotic factors/ physical factors/ land zones/ Formicidae: habitat management/ prescribed fire/ community structure/ prescribed fire effects/ forest and woodland/ pine savanna/ fire/ Florida/ Interlachen Karstic Highland/ Katharine Ordway Preserve/ Insecta, Hymenoptera, Apocrita, Aculeata, Formicoidea/ arthropods/ Hymenopterans/ insects/ invertebrates
Abstract: 1. The effects of prescribed fire on ant community structure were examined in a regenerating longleaf pine savanna in Florida, U.S.A. The presence of ants on 20, 10x10 m plots was determined by baiting every 1-3 months from 18 months before a fire until 6 months afterwards. 2. Expected species richness (based on rarefaction) and species density 6 months post-fire were significantly lower than for the same month (September) 6 months before the fire. 3. Cluster analysis revealed that the effects of fire were far less important predictors of ant community structure than seasonality and unexplained inter-annual variation. Thus, overall, the impacts of fire were relatively minor and short term at the community level. 4. Different functional groups of ants (as defined by Andersen, 1997) responded to fire in strikingly different ways. Generalised Myrmicinae (e.g. Pheidole spp., Monomorium viride) were affected more severely by fire than were the other functional groups. In contrast, the dominant Dolichoderinae (Forelius pruinosus) exhibited a large increase after the fire and seemed to be responsible for the decline in abundance of several species. 5. A strong negative correlation between F. pruinosus and other groups of ants immediately after the fire suggested more intense competition among ants at that time. Six months post-fire, the abundance of F. pruinosus decreased markedly and the abundance of other species rebounded. 6. The rapid post-fire recovery of the ant community probably reflects adaptations of ants to a chronic fire regime.

489. **Effects of prescribed fire on prairie arthropods: An enclosure study.**
Harper, Mary G.; Dietrich, Chris H.; Larimore, Richard L.; and Tessene, Paul A.
Natural Areas Journal 20(4): 325-335. (2000)
NAL Call #: QH76.N37; ISSN: 0885-8608
Descriptors: conservation measures/ ecology/ habitat utilization/ terrestrial habitat/ abiotic factors/ physical factors/ land and freshwater zones/ Arthropoda: habitat management/ community ecology/ refuge maintenance/ community structure/ population dynamics/ prescribed fire/ habitat colonization/ recolonization/ grasslands/ prairie/ Illinois/ Lee County/ Vermilion County/ prairie management/ arthropods/ invertebrates

490. **Effects of protective fencing on birds, lizards, and black-tailed hares in the western Mojave Desert.**
Brooks, M.
Environmental Management 23(3): 387-400. (1999)
NAL Call #: HC79.E5E5 ; ISSN: 0364-152X
Descriptors: grasslands/ deserts/ plant communities/ prey/ seeds/ species diversity/ nature reserves/ fencing/ ground cover/ wild birds/ wild animals/ grazing/ range management/ revegetation/ Hymenoclea salsola/ Achnatherum spinosa/ Achnatherum hymenoides/ grazing behavior/ Hymenoclea/ Achnatherum
Abstract: Effects of protective fencing on wild birds, lizards, black-tailed hares (Lepus californicus), perennial plant cover, and structural diversity of perennial plants were evaluated during spring 1994 to winter 1995 at the Desert Tortoise Research Natural Area (DTNA), in the Mojave Desert, California, USA. At the northern study site the plant cover consisted of Larrea tridentata, Ambrosia dumosa, Hymenoclea salsola, Achnatherum spinosa and A. hymenoides and at the southern study site of Atriplex polycarpa and H. salsola. Abundance and species richness of birds were higher inside than outside the DTNA, and effects were larger during the breeding than during the wintering seasons and during a high rainfall than during a low rainfall year. Ash-throated flycatchers (Myiarchus cinerascens), cactus wrens (Campylorhynchus brunneicapillus), LeConte's thrashers (Toxostoma lecontei), loggerhead shrikes (Lanius ludovicianus), sage sparrows (Amphispiza belli), and verdins (Auriparus flaviceps) were more abundant inside than outside the DTNA. Nesting activity was also more frequent inside. Total abundance and species richness of lizards and individual abundances of western whiptail lizards (Cnemidophorous tigris) and desert spiny lizards (Sceloporus magister) were higher inside than outside. In contrast, abundance of black-tailed hares was lower inside. Structural diversity of the perennial plant community did not differ due to protection, but ground cover was 50% higher in protected areas. Black-tailed hares generally preferred areas of low perennial plant cover, which may explain why they were more abundant outside than inside the DTNA. Habitat structure may not affect bird and lizard communities as much as availability of

food at this desert site, and the greater abundance and species richness of vertebrates inside than outside the DTNA may correlate with abundances of seeds and invertebrate prey.
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491. **Effects of rangeland fires and livestock grazing on habitat for nongame wildlife.**
Ivey, G. L.
In: Proceedings of a symposium on sustaining rangeland ecosystems. Eastern Oregon State College, La Grande, Oregon. Edge, W. D. and Olsen-Edge, S. L. (eds.); Vol. Special Report 953.
Corvallis, Ore.: Oregon State University Extension Service; pp. 130-139; 1996.
NAL Call #: 100 Or3M no.953
Descriptors: regrowth/ seed output/ wild birds/ wild animals/ vegetation/ ground cover/ range management/ grassland management/ endangered species/ grasslands/ rangelands/ nature conservation/ grazing/ burning/ plant succession/ species diversity
Abstract: Non-game wildlife (including wild birds and rodents) has a wide variety of requirements that may be influenced by burning or livestock grazing. These practices generally reduce ground cover and cause retrogression to an earlier seral stage, consequently favouring species that prefer short cover or bare areas and disadvantaging species requiring ground cover or vegetation structure. Degradation of riparian zones by burning or grazing generally reduced species diversity and populations. Species dependent on ungrazed habitat may be at risk of local extinction as a result of grazing in some areas. Using management techniques to provide a mosaic of habitats is recommended to preserve species diversity. Some non-game wildlife benefited from fire because of an increase in the growth of herbaceous and seed-producing plants.
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492. **Effects of rangeland management on community dynamics of the herpetofauna of the tallgrass prairie.**
Wilgers, D. J.; Horne, E. A.; Sandercock, B. K.; and Volkmann, A. W.
Herpetologica 62(4): 378-388. (2006); ISSN: 00180831
Descriptors: amphibians/ Flint Hills/ mark-recapture/ POPAN/ reptiles/ species loss
Abstract: The Flint Hills of Kansas and Oklahoma are the largest remaining tracts of tallgrass prairie in North America. This area has undergone major changes in land management practices in the past 30 years. Traditional season-long cattle stocking with variable burn schedules has diversified to include intensive-early cattle stocking accompanied by annual burning. To understand how different land management practices affect the herpetofauna of a tallgrass prairie, we used mark-recapture statistics to analyze herpetofaunal community dynamics. We analyzed survey data collected over a 15-year time span (1989-2003) from a rangeland site in Cowley County, KS, USA. A modified Jolly-Seber open population model, POPAN-5, was used to estimate four community parameters: probability of species loss (φ'), probability of detection (p), probability of entry (Pent), and species richness (N). The top models included burn status as a covariate for species loss rate, while cattle stocking received moderate support as a covariate. Rates of species loss were higher during burn years (φ' = 0.04, 95% CI: 0.02 to 0.08) than nonburn years (φ' = 0.00, 95% CI: 0.00 to 0.01). Analysis of the impacts of different management practices was difficult due to confounding effects of changes in both burning and grazing. Declines in species richness tended to be steepest during a period of season-long stocking, but results were not statistically significant. Though our limited data set does not allow us to draw strong conclusions on the effects of land management on herpetofaunal populations, the mark-recapture models illustrated in our study should prove to be a valuable tool in future analyses of similar data. © 2006 by The Herpetologists' League, Inc.
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493. **The effects of rest-rotation grazing of mule deer and elk populations inhabiting the Herd Creek Allotment, East Fork Salmon River, Idaho.**
Yeo, Jeffrey J. University of Idaho, 1981.
Descriptors: Cervus elaphus/ Odocoileus hemionus/ behavior/ grazing/ fires-burns/ habitat alterations/ interspecies relationships/ land use/ mammals/ wildlife-livestock relationships/ Idaho
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494. **The effects of rest-rotation grazing on the distribution of sharp-tailed grouse.**
Nielsen, L. S. and Yde, C. A.
In: Proceedings of the Wildlife-Livestock Relationships Symposium. Coeur D'alene, Idaho. Peek, James M. and Dalke, P. D. (eds.)
Moscow, Idaho: Forest, Wildlife and Range Experiment Station, University of Idaho; pp. 147-165; 1982.
NAL Call #: SF84.84.W5 1981
Descriptors: sharp-tailed grouse/ livestock/ rotational grazing

495. **Effects of restoring oak savannas on bird communities and populations.**
Brawn, J. D.
Conservation Biology 20(2): 460-469. (2006)
NAL Call #: QH75.A1C5; ISSN: 08888892.
Notes: doi: 10.1111/j.1523-1739.2006.00310.x.
Descriptors: bird conservation/ disturbance/ fragmentation/ habitat restoration/ nest success/ prescribed fire
Abstract: Efforts to restore and maintain oak savannas in North America, with emphasis on the use of prescribed fire, have become common. Little is known, however, about how restoration affects animal populations, especially those of birds. I compared the breeding densities, community structure, and reproductive success of birds in oak savannas maintained by prescribed fire (12 sites) with those in closed-canopy forests (13 sites). All sampling was conducted in Illinois (U.S.A.). Of the 31 bird species analyzed, 12 were more common in savannas, 14 were not affected by habitat structure, and 5 were more common in forest habitat. The species favored by disturbance and restoration included Northern Bobwhites (Colinus virginianus), Mourning Doves (Zenaida macroura), Red-headed Woodpeckers (Melanerpes erythrocephalus), Indigo Buntings (Passerina cyanea), and Baltimore Orioles (Icterus galbula). Those more common in closed-canopy forest included Ovenbirds (Seiurus aurocapilla) and Wood Thrushes (Hylocichla mustelina). Few species were unique to one type of habitat, but overall avian community structure in oak savannas and closed-canopy forests was generally

distinctive. Estimates of nesting success (derived from 785 nests) revealed that 6 of the 13 species considered experienced greater productivity in the savanna habitat. Rates of brood parasitism were unaffected by restoration and habitat structure. Within savannas, tract size had little effect on breeding abundances and reproductive success. My results illustrate that restoration techniques can significantly affect the ecology of constituent animal populations and communities and have key implications regarding avian conservation and the management of forest habitat in fragmented landscapes. Small patches of forest habitat that regularly function as population sinks may offer far better prospects for birds if they are subjected to disturbance and ecosystem restoration. © 2006 Society for Conservation Biology.

496. **Effects of road baiting on home range and survival of northern bobwhites in southern Texas.**
Haines, A. M.; Hernandez, F.; Henke, S. E.; and Bingham, R. L.
Wildlife Society Bulletin 32(2): 401-411. (2004)
NAL Call #: SK357.A1W5; ISSN: 00917648
Descriptors: Colinus virginianus/ movement/ northern bobwhites/ road baiting/ supplemental feeding/ survival/ Colinus virginianus/ Sorghum/ Zea mays
Abstract: An increasingly common practice in southern Texas is baiting roads with grains such as milo (Sorghum spp.) and corn (Zea mays) to facilitate northern bobwhite (Colinus virginianus) harvest. However, baiting roads might have a negative impact on bobwhite survival by increasing predation or harvest rates. The objective of this project was to determine the effects of road baiting on bobwhite survival, home-range size, and predator abundance. The project involved 2 study sites (baited=treatment and nonbaited=control) that were monitored over 3 periods, pre-baiting (September-October), baiting (November-December), and post-baiting (January-February), during 2001-2002 and 2002-2003. We captured, radiomarked, and monitored bobwhites (n = 60 [treatment site]; n = 58 [control site]) in Jim Hogg County, Texas. We assessed relative abundance and activity of avian and mammalian predators using scent-station and road surveys, respectively. The effects of baiting roads varied between years. During 2001-2002, a relatively dry period, bobwhite survival (S' = 1.00±0.00 [control site]; S' = 0.68 ±0.10 [treatment site], P = 0.01), covey home-range size (15.6±1.43 ha [control site]; 12.7 ±2.22 ha [treatment site], P = 0.046), and covey distance to roads (193 ±24.6 m [control site]; 95 ±41.57 m [treatment site], P≤0.001) were lower on the treatment site during the feeding period in contrast to the control site. A nonsignificant trend was noted for higher avian predator abundance on the treatment site during the feeding period. During 2002-2003, a relatively wet period, no difference in bobwhite survival, covey home-range size, and covey distance to roads was found between sites and time periods due to baiting, and no trend in predator abundance was found between pastures and time periods. The practice of baiting ranch roads does not appear to benefit bobwhites in southern Texas, and during dry conditions the practice might be detrimental to bobwhite numbers by lowering survival. Baiting or other methods of dietary supplementation are more likely to benefit bobwhites in more northern climates with colder winters.

497. **Effects of rotational grazing on nesting ducks in California.**
Carroll, L. C.; Arnold, T. W.; and Beam, J. A.
Journal of Wildlife Management 71(3): 902-905. (2007)
NAL Call #: 410 J827; ISSN: 0022-541X
Descriptors: grassland management/ grasslands/ habitat selection/ nesting/ rotational grazing/ upland areas/ valleys/ Anas
Abstract: Grazing is thought to be incompatible with nesting by dabbling ducks (Anas spp.), but this belief is based on little data. We therefore conducted a 2-year, replicated field experiment to determine whether the habitat requirements of nesting ducks could be met on uplands managed by rotational grazing (1 Jul-1 Nov) in the northern San Joaquin Valley, California, USA. Grazed fields had shorter vegetation than ungrazed fields throughout the winter, but vegetation height did not differ by the beginning of the nesting season in late March, and by the end of the nesting season in late May, previously grazed fields had taller vegetation than did ungrazed fields. In 1996, densities of duck nests were >3 times higher in grazed than in ungrazed fields (least-squares means [+or-1 SE]: grazed=2.18 [0.34] nests/ha, ungrazed=0.59 [0.34] nests/ha), but nest densities were substantially lower in 1997 and did not differ between treatment groups (grazed=0.65 [0.32] nests/ha, ungrazed=0.39 [0.32] nests/ha). Mayfield nest success did not differ between grazed fields (5.3%) and ungrazed fields (2.9%). We conclude that rotational grazing was successful in providing summer nesting habitat for dabbling ducks, and we recommend that it be considered for other managed habitats within the Central Valley, California, USA.

498. **Effects of short-duration and continuous grazing on bobwhite and wild turkey nesting.**
Bareiss, L. J.; Schulkz, P.; and Guthery, F. S.
Journal of Range Management 39(3): 259-260. (1986)
NAL Call #: 60.18 J82 ; ISSN: 0022-409X.
http://jrm.library.arizona.edu/Volume39/Number3/azu_jrm_v39_n3_259_260_m.pdf
Descriptors: turkeys/ nests/ nesting/ grazing/ livestock/ pastures/ Texas
This citation is from AGRICOLA.

499. **Effects of short duration grazing on bobwhites and wild turkeys in south Texas.**
Schulz, P. A. Texas A&M University, 1986.
Descriptors: Colinus virginianus/ Meleagris gallopavo intermedia/ livestock/ habitat disturbance/ land use/ Texas/ bobwhite quail/ wild turkey

500. **Effects of short duration grazing on deer home ranges.**
Kohl, Timothy F.; DeYoung, Charles A.; and Garza, Andres
Proceedings of the Annual Conference: Southeastern Association of Fish and Wildlife Agencies 41: 299-302. (1987)
NAL Call #: SK1.S6; ISSN: 0276-7929
Descriptors: commercial activities/ reproduction/ sex differences/ behavior/ land and freshwater zones/ Odocoileus virginianus (Cervidae): farming and agriculture/ short term and continuous cattle grazing/ home range size relationships/ behavioral sex differences/ home range/ size/ short term and continuous cattle grazing effect/ Texas/ Brooks County/ King Ranch/ home range size/ sex differences/ short term and continuous cattle grazing effects/ Cervidae/ Artiodactyla/ Mammalia/ chordates/ mammals/ vertebrates

501. **Effects of short duration grazing on wild turkey home ranges.**
Schulz, P. A. and Guthery, F. S.
Wildlife Society Bulletin 15(2): 239-241. (1987)
NAL Call #: SK357.A1W5; ISSN: 0091-7648
Descriptors: Meleagris gallopavo intermedia/ grazing management/ rangeland management/ habitat quality/ Texas

502. **Effects of specialized grazing systems on waterfowl production in southcentral North Dakota.**
Barker, W. T.; Sedivec, K. K.; Messmer, T. A.; Higgins, K. F.; and Hertel, D. R.
Transactions of the North American Wildlife and Natural Resource Conference 55: 462-474. (1990)
NAL Call #: 412.9 N814.
Notes: ISSN 0078-1355 (ISSN); Conference held: 16-21 Mar 1990 in Denver, CO (USA).
Descriptors: aquatic birds/ population dynamics/ agriculture/ grazing/ North Dakota/ ducks/ livestock
Abstract: The recent decline in numbers of several waterfowl species and poor nesting success indicates that there is insufficient production of ducks in the prairie pothole region to maintain populations at desirable levels. About 50 percent of the ducks in North America are produced in the prairie pothole region and about 95 percent of the production occurs on private lands. Thus, a major effort to reverse the decline in duck numbers should emphasize the use of new and improved management techniques on private lands, particularly the use of new rangeland grazing systems. Numerous studies have evaluated the effects of grazing on duck production in North America. However, most of these evaluations were designed to compare differences of duck production between grazed lands and idle lands or among different land uses. Also, nearly all of the earlier studies of grazing effects involved seasonlong grazing treatments with occasional differences in grazing intensities. Seasonlong grazing has been shown to be detrimental to production of most upland nesting birds and also to maximum livestock production. A study of livestock and waterfowl relationships was initiated in 1982 on the Central Grasslands Research Center.

503. **Effects of successional old fields on butterfly richness and abundance in agricultural landscapes.**
Sanford, Monte P.
Great Lakes Entomologist 35(2): 193-207. (2003)
NAL Call #: QL461.M5; ISSN: 0090-0222
Descriptors: conservation measures/ life cycle and development/ ecology/ terrestrial habitat/ man-made habitat/ land zones/ Papilionoidea: habitat management/ life cycle/ life history attributes/ community structure/ grassland/ successional old fields/ cultivated land habitat/ Minnesota/ Cedar Creek Natural History Area/ Insecta, Lepidoptera, Glossata, Heteroneura/ arthropods/ insects/ invertebrates/ lepidopterans
Abstract: Native grasslands cover less than 1% of land area in the Midwestern United States; agricultural areas cover the majority of the remaining land. Abandoned agricultural lands provide areas for successional development of grasslands, which can provide critical habitat for many butterfly species in this habitat-deprived region. I examined butterfly communities in successional old fields at Cedar Creek Natural History Area, Minnesota, USA, to determine how butterfly species richness, abundance, and life-history attributes change across a successional gradient from middle to late successional stages (15-72 years after abandonment). Butterfly species richness and abundance did not change across the successional gradient, but species composition changed. Butterfly larval and adult food plant specialization weakly increased, body size decreased, generation time per species decreased, and butterflies overwintered at an earlier life stage as field age increased. This research identifies that a mosaic of successional fields in a predominantly agricultural landscape provided benefits to butterflies, and that successional mosaics should be an important goal to conserve butterfly richness in agricultural areas.

504. **Effects of the size of prescribed fire on insect predation of northern blazing star, a rare grassland perennial.**
Vickery, P. D.
Conservation Biology 16(2): 413-421. (2002)
NAL Call #: QH75.A1C5; ISSN: 08888892.
Notes: doi: 10.1046/j.1523-1739.2002.00494.x.
Descriptors: fire management/ grassland/ habitat management/ perennial plant/ predation/ United States/ Animalia/ Aves/ Insecta/ Invertebrata/ Lepidoptera/ Liatris/ Liatris scariosa/ Microlepidoptera
Abstract: Loss of native grassland habitat in New England has reached >90%. Consequently, remaining grasslands persist as small, geographically isolated fragments, and populations of many plants and animals have declined or disappeared. Given the rarity of the fauna and flora of these habitats, ecological management of many of the remaining native grassland fragments in a manner that attempts to mimic natural processes has been intensive, and the effects of this management on some taxa, such as grassland birds, are now well understood. But the effects of management, especially prescribed fire, on native plants and invertebrates are less well known. I studied the effects of prescribed fire on northern blazing star (Liatris scariosa var. novae-angliae), a rare grassland perennial endemic to the northeastern United States. Once distributed from southern Maine to northern New Jersey, northern blazing

star has disappeared from 69% of the sites where it formerly occurred. Seed predation appears to be a critical proximate factor limiting recruitment of juveniles into local populations. Seven of 8 study sites in Maine and Massachusetts had a 65% average rate of seed predation, and there was no evidence of juvenile recruitment at these sites. None of these sites had been burned in the past 5 years. Experimental research at Kennebunk, Maine, demonstrated that, in the absence of fire, seed viability of northern blazing star was low, the result of larval microlepidopteran (moth) predators in the flower heads. Prescribed fire temporarily reduced seed predation from approximately 90% to approximately 16% for 1 year following fire, but seed-predation levels once again approached 90% within 2 years. Prescribed fires larger than 13 ha helped reduce predation rates, but fires smaller than 6 ha did not, suggesting that dispersal of adult moths from unburned source areas was spatially limited. Preferably, prescribed burns should be larger than 10 ha, large enough to have core areas larger than 100 m from adjoining unburned units. My results suggest that prescribed fire should be an important component of habitat management for northern blazing star, and they emphasize the need to carefully study the effects of the spatial scale of prescribed fires in other geographic regions and for a broad range of taxa.

505. **Elk and cattle forage use under a specialized grazing system.**
Halstead, L. E.; Howery, L. D.; Ruyle, G. B.; Krausman, P. R.; and Steidl, R. J.
Journal of Range Management 55(4): 360-366. (2002)
NAL Call #: 60.18 J82 ; ISSN: 0022-409X
Descriptors: beef cattle/ grazing/ Cervus elaphus canadensis/ stubble/ rotational grazing/ topography/ wildlife management/ Pascopyrum smithii/ canopy/ Arizona
Abstract: The Walker Basin Allotment grazing system in central Arizona is designed to allocate resource use under elk (Cervus elaphus L.) and cattle (Bos taurus L.) grazing. The grazing system was designed to promote biologically acceptable levels of forage use on the half of the allotment scheduled for cattle grazing and to rest the other half by attracting elk to pastures recently grazed by cattle. The objectives of our 2-year study were to determine whether the grazing system facilitated proper forage use as defined by recent forage use and residual stubble height guidelines (i.e., 30 to 40% use and an 8- to 10-cm stubble height) and whether the system rested one half of the allotment from elk and cattle grazing. Mean (+/- SEM) total elk and cattle forage use for western wheatgrass (Pascopyrum smithii Rydb.), the key forage species, was 32 and 61% +/- 7 in 1997 and 1998, respectively; corresponding mean (+/- SEM) stubble heights were 11 and 10 cm +/- 0.6. Mean total cattle and elk forage use in 1998 (61%) exceeded the 30 to 40% use guidelines. However, mean end-of-year stubble height was never below 10 cm. The grazing system did not provide half the allotment with complete rest; elk used all study pastures. Elk use was higher in pastures with heavier tree cover and steeper terrain in both years, regardless of where cattle grazing occurred. Elk grazing patterns were apparently more dependent on tree cover and topography than any changes in forage caused by the grazing system.
This citation is from AGRICOLA.

506. **Elk (Cervus elaphus nelsoni) use of winter range as affected by cattle grazing fertilizing and burning in southeastern Washington.**
Skovlin, J. M.; Edgerton, P. J.; and McConnell, B. R.
Journal of Range Management 36(2): 184-189. (1983)
NAL Call #: 60.18 J82; ISSN: 0022-409X.
http://jrm.library.arizona.edu/Volume36/Number2/azu_jrm_v36_n2_184_189_m.pdf
Descriptors: bunch grass/ elk/ Cervus elaphus nelsoni/ Washington/ rangelands/ conservation practices/ burning/ cattle grazing
Abstract: A study of ways to increase winter use by elk of Pacific bunchgrass foothill range in southeastern Washington employed fertilizing and rangeland burning, with and without spring cattle grazing. First-year response of elk to fertilizer applied in fall (56 kg N/ha) was a 49% increase in use; but no significant carry-over effect was noted in subsequent years. Fall burning to remove dead standing litter and enhance forage palatability provided no increase in elk use in winter. Intensive cattle grazing in spring to promote regrowth did not increase elk use. In fact, cattle grazing decreased winter elk use by 28% in 1 of the 3 yr studied. The cost effectiveness of increasing elk use by fertilizing appeared marginal except perhaps in special situations. A discussion of forage allocation to both elk and cattle is presented.

507. **Elk forage utilization within rested units of rest-rotation grazing systems.**
Werner, Scott J. and Urness, Philip J.
Journal of Range Management 51(1): 14-18. (1998)
NAL Call #: 60.18 J82 ; ISSN: 0022-409X.
http://jrm.library.arizona.edu/Volume51/Number1/azu_jrm_v51_n1_14_18_m.pdf
Descriptors: Cervus elaphus/ Cervus canadensis/ Bos taurus/ behavior/ foods-feeding/ grazing/ habitat management/ mammals/ management/ wildlife/ wildlife-livestock relationships/ wapiti/ cattle/ competition/ vegetation/ rest-rotation grazing/ elk/ Utah/ Fish Lake Natl. Forest
Abstract: Researchers determined elk forage utilization during the summers of 1994 and 1995 at the forest-grassland ecotone of three rest-rotation grazing allotments in Fishlake National Forest, Utah.

508. **Elk use of winter range as affected by cattle grazing, fertilizing, and burning in southeastern Washington.**
Skovlin, Jon M.; Edgerton, Paul J.; and McConnell, Burt R.
Journal of Range Management 36(2): 184-189. (1983)
NAL Call #: 60.18 J82; ISSN: 0022-409X.
http://jrm.library.arizona.edu/Volume36/Number2/azu_jrm_v36_n2_184_189_m.pdf
Descriptors: Cervus elaphus nelsoni/ Cervus canadensis/ fertilization/ soil and water/ fires-burns/ grazing/ habitat alterations/ habitat use/ wildlife-livestock relationships/ wapiti/ home-range/ winter/ agriculture/ habitat/ disturbance/ fire/ ecology/ ethology/ prairie/ fertilizer/ Washington, southeastern area

509. **Essay: Bison restoration in the Great Plains and the challenge of their management.**
McDonald, J. L.
Great Plains Research 11(1): 103-121. (2001)
NAL Call #: QH104.5.G73 G755; ISSN: 10525165
Descriptors: Bison/ grasslands/ species diversity/ tribal lands/ values conflicts/ grassland/ indigenous population/ restoration ecology/ species conservation/ North America/ Bison bison/ Bos taurus
Abstract: Efforts to save remnant wild bison from extermination have resulted in the establishment of herds on private, public, and tribal lands. Ironically, their successful restoration has evolved into a profitable agricultural industry and a practical alternative to raising domestic cattle. Bison restoration actively managed by humans raises ecological, ethical, and evolutionary questions about whether we are compromising their native ability to function in a grasslands ecosystem. In this essay I examine current bison management practices, conflicting human values about land-use practices, and emerging land-use initiatives focusing on wild bison and ecosystem restoration in the northern Great Plains.

510. **Evaluating grazing strategies for cattle: Nutrition of cattle and deer.**
Ortega, I. M.; Soltero-Gardea, S.; Drawe, D. L.; and Bryant, F. C.
Journal of Range Management 50(6): 631-637. (1997)
NAL Call #: 60.18 J82 ; ISSN: 0022-409X.
http://jrm.library.arizona.edu/Volume50/Number6/azu_jrm_v50_n6_631_637_m.pdf
Descriptors: Coastal Bend, Texas/ continuous grazing/ crude protein/ digestibility/ IVDOM/ Odocoileus virginianus/ short-duration grazing
Abstract: We studied cattle and deer diet quality within replicated grazing treatments of continuous and short-duration grazing at heavy and moderate stocking rates. The study was conducted at the Welder Wildlife Refuge, Sinton, Tex. from October 1987 to July 1989. We obtained cattle diet samples from esophageally fistulated steers. Deer diets were reconstructed using data obtained through the bite-count technique. Digestibility (IVDOM) and crude protein (CP) of cattle diets were similar between grazing systems and stocking rates. Digestibility of deer diets was affected by both grazing systems and stocking rates. Dietary CP and IVDOM of deer and rattle diets both differed among seasons. Dietary CP levels met maintenance requirements for deer throughout the study. Also, CP levels were high enough to meet low- to mid-gestation requirements. Deer dietary protein requirements for growth and lactation were never met regardless of grazing strategy. Although protein content of cattle diets was relatively low, these values satisfied cattle maintenance needs. Nursing cows, however, would not have met their requirement in any season sampled regardless of grazing system or stocking rate. Continuous grazing and moderate stocking rates may provide white-tailed deer the opportunity for selecting diets containing more desirable forbs and greater nutrient concentration. Less intensive rotational grazing at moderate rates may be preferred to maintain to relatively high seral stage.

511. **Evaluation of a collaborative approach to mediate conflict between parties with interests in wildlife and livestock in Colorado.**
McAndrews, Gina Marie. Iowa State University, 2001.
Notes: Thesis (Ph.D.); Advisor: Salvador, Ricardo J.
Descriptors: sociology, General/ agriculture, range management/ biology, ecology/ hunting/ wildlife/ habitat restoration
Abstract: The Habitat Partnership Program (HPP) is a collaborative initiative of the Colorado Division of Wildlife and the Colorado Cattleman's Association. The program consists of 15 committees, distributed over western Colorado, representing the interests of public resource managers, livestock growers and hunters. Through partnerships and projects, each committee strives to reduce fence damage and forage loss from big game activity. Information gathered from interviews, documents, projects and observation was used to assess the effectiveness of HPP in meeting its stated goals: resolve conflicts, improve ecosystem health, raise local knowledge about resource management and improve communication and understanding. Over seven years (1991-1998), committees completed habitat improvement projects on 77,856 hectares of public and private land, established 124 water developments and assisted with noxious weed control on 5,904 hectares. In addition, 193 kilometers of new 'wildlife friendly' fence and 60 big game crossings were built. For educational purposes, committees sponsored 31 workshops in holistic resource management and developed 37 brochures on natural resource issues. Ninety-four percent of committee members thought the program improved communication between landowners, sportspersons and government agencies. As measured by independent indicators and the degree of satisfaction of program participants, HPP can be considered an improvement over previous directive programs. However, the continuous influx of people and the loss of habitat in Colorado-over 110,000 hectares per year-may render moot the issues addressed by collaborative wildlife and natural resource management programs.

512. **Evaluation of habitat structural measures in a shrubland community.**
Harrell, W. C. and Fuhlendorf, S. D.
Journal of Range Management 55(5): 488-493. (2002)
NAL Call #: 60.18 J82; ISSN: 0022409X
Descriptors: cone of vulnerability/ gallinaceous birds/ heterogeneity/ patchiness/ sand shinnery/ vegetation structure/ visual obstruction/ habitat structure/ measurement method/ rangeland/ shrubland/ wildlife management
Abstract: Accurate and efficient monitoring of habitat structure on rangelands is important for understanding wildlife responses to land management practices. Unfortunately, studies of wildlife responses to changes in habitat structure often use monitoring techniques that fail to measure variation in multiple structural dimensions. Our objectives were to evaluate relationships between measures of habitat structure in a shrubland community and to discuss the usefulness of several techniques in integrating multiple structural dimensions into a single index of habitat structure. We evaluated relationships between shrub cover, herbaceous cover, shrub patch number, average shrub patch size, average vegetation height, visual

obstruction across multiple strata of a profile board, cone of vulnerability, and angle of obstruction using a principle component analysis. Many of these variables were redundant with each other. Average visual obstruction estimates, using a profile board, were associated with variability in vertical structure as indicated by its association with height. Coefficients of variation for cone of vulnerability and visual obstruction were dependent upon their means and of limited use in describing horizontal patchiness. In contrast, shrub patch number was not linearly correlated with any other single measure in our analysis, and may be useful in describing horizontal patchiness. Cone of vulnerability and angle of obstruction are recently developed techniques that provided useful, single indices of multidimensional habitat structure. Efficient monitoring of wildlife habitat structure should employ multiple, independent techniques that measure distinct dimensions of habitat structure or a single measure that integrates multiple dimensions.

513. **Evaluation of isolated and integrated prairie reconstructions as habitat for prairie butterflies.**
Shepherd, Stephanie and Debinski, Diane M.
Biological Conservation 126(1): 51-61. (2005)
NAL Call #: S900.B5; ISSN: 0006-3207
Descriptors: conservation measures/ ecology/ terrestrial habitat/ land zones/ Papilionoidea: habitat management/ Isolated and integrated prairie reconstructions/ habitat suitability/ community structure/ grassland/ Iowa/ Ames/ Insecta, Lepidoptera, Glossata, Heteroneura/ arthropods/ insects/ invertebrates/ Lepidopterans
Abstract: Reconstructing prairie habitat is one of the most promising techniques for conserving the imperiled prairie ecosystem and its associated organisms. However, the degree to which reconstructed prairies function like remnant prairies has not been fully examined. We evaluated the effect of restoration planting prescriptions, as well as vegetative quality on butterfly communities inhabiting prairie reconstructions in central Iowa, USA. Twelve isolated reconstructed prairies (small, surrounded by agriculture), 12 integrated reconstructions (planting units in a larger matrix of reconstructed and remnant prairies), and 12 remnant prairies were surveyed for butterfly and plant diversity, abundance and composition. Remnant prairies supported significantly higher richness and abundance of habitat-sensitive butterfly species. Butterfly richness on integrated reconstructions was intermediately positioned between remnant and isolated reconstructions. The best vegetative predictors of butterfly richness (R^2 = 0.38) and abundance (R^2 =0.13) were the availability of nectar and the percent cover of litter (which is related to management issues such as time since burning). Most significantly, we found that the response of the butterfly community to vegetation in a reconstructed prairie is more complex than simply a response to vegetation diversity. Both management within the reconstruction and the landscape context around the reconstruction affect local patterns of butterflies species distribution and abundance. Integrated reconstructions develop richer butterfly communities than isolated reconstructions. © 2005 Elsevier Ltd. All rights reserved.

514. **Evaluation of rest-rotation grazing in the Missouri River Breaks on the Charles M. Russell National Wildlife Refuge, Montana.**
Oldemeyer, J. L.; Reid, V. H.; Nickey, D. A.; and Hedrick, M.
In: Proceedings of the Wildlife-Livestock Relationships Symposium. Coeur D'Alene, Idaho. Peek, James M. and Dalke, P. D. (eds.)
Moscow, Idaho: Forest, Wildlife and Range Experiment Station, University of Idaho; pp. 32-46; 1982.
NAL Call #: SF84.84.W5 1981
Descriptors: rotational grazing/ wildlife/ livestock/ Missouri River/ Montana

515. **Evaluation of the impacts of grazing on grassland wildlife populations: Evaluation of vegetation structure and floristic composition on continuous and rotational grazing systems with 4 different stocking rates in north central Missouri.**
Schulz, J. H. Missouri Department of Conservation, 2002. 52 pp. Annual Report.
Descriptors: grazing/ grassland/ vegetation/ invertebrates/ habitat/ cattle/ size/ statistics/ sampling/ livestock/ Missouri/ Linn County

516. **Factors affecting butterfly use of filter strips in midwestern USA.**
Reeder, Kathleen F.; Debinski, Diane M.; and Danielson, Brent J.
Agriculture, Ecosystems and Environment 109(1-2): 40-47. (2005)
NAL Call #: S601.A34; ISSN: 0167-8809
Descriptors: ecology/ terrestrial habitat/ man-made habitat/ land zones/ Papilionoidea: community structure/ Influencing factors/ riparian filter strips/ agricultural landscapes/ habitat utilization/ riparian habitat/ agricultural landscape riparian filter strips/ cultivated land habitat/ Minnesota/ Insecta, Lepidoptera, Glossata, Heteroneura/ arthropods/ insects/ invertebrates/ lepidopterans
Abstract: Filter strips are areas of herbaceous vegetation planted between agricultural fields and streams. In 2002 and 2003, the butterfly community in filter strips of a variety of widths and vegetative compositions was studied. Transect surveys were used to quantify butterfly abundance and diversity and measured vegetative variables in conjunction with each butterfly survey round. Overall butterfly diversity (H') and abundance of habitat-sensitive butterflies were positively correlated with filter strip width. Using stepwise regression, the best models to explain butterfly abundance included the coverage of forbs and the number of ramets in bloom in the strips, and indicated positive relationships between forbs and the butterfly community (R^2 = 0.33 and 0.07, respectively). The models that best explained abundances of large, habitat-sensitive butterflies included the height and vertical density of vegetation. The planting of forbs in filter strips is rare, but may be useful for providing food sources to butterflies.

517. **Factors associated with grassland bird species richness: The relative roles of grassland area, landscape structure, and prey.**
Hamer, T. L.; Flather, C. H.; and Noon, B. R.
Landscape Ecology 21(4): 569-583. (2006)
NAL Call #: QH541.15.L35 L36; ISSN: 09212973.
Notes: doi: 10.1007/s10980-005-2167-5.
Descriptors: AIC model-selection/ Eastern Wyoming/ grasshopper/ habitat amount/ habitat configuration/ mark-recapture/ matrix effects/ Orthoptera/ richness estimation/ thematic mapper
Abstract: The factors responsible for widespread declines of grassland birds in the United States are not well understood. This study, conducted in the short-grass prairie of eastern Wyoming, was designed to investigate the relationship between variation in habitat amount, landscape heterogeneity, prey resources, and spatial variation in grassland bird species richness. We estimated bird richness over a 5-year period (1994-1998) from 29 Breeding Bird Survey locations. Estimated bird richness was modeled as a function of landscape structure surrounding survey routes using satellite-based imagery (1996) and grasshopper density and richness, a potentially important prey of grassland birds. Model specification progressed from simple to complex explanations for spatial variation in bird richness. An information-theoretic approach was used to rank and select candidate models. Our best model included measurements of habitat amount, habitat arrangement, landscape matrix, and prey diversity. Grassland bird richness was positively associated with grassland habitat; was negatively associated with habitat dispersion; positively associated with edge habitats; negatively associated with landscape matrix attributes that may restrict movement of grassland bird; and positively related to grasshopper richness. Collectively, 62% of the spatial variation in grassland bird richness was accounted for by the model (adj-R^2 = 0.514). These results suggest that the distribution of grassland bird species is influenced by a complex mixture of factors that include habitat area affects, landscape pattern and composition, and the availability of prey. © Springer 2006.

518. **Fall and winter habitat use by scaled quail in southeastern Arizona.**
Bristow, K. D. and Ockenfels, R. A.
Rangeland Ecology and Management 59(3): 308-313. (2006)
NAL Call #: SF85.J67; ISSN: 15507424.
Notes: doi: 10.2111/04-117R2.1.
Descriptors: Callipepla squamata/ Chihuahuan desertscrub/ exotic grasses/ grazing/ livestock/ semidesert grasslands
Abstract: Scaled quail (Callipepla squamata pallida Vigors) are closely associated with semidesert grasslands of the southwestern United States, and populations have declined by as much as 50% since 1960. Livestock grazing, shrub encroachment, and exotic grass invasion are considered important factors reducing scaled quail distribution and density in Arizona. We investigated habitat use by scaled quail across their range in southeastern Arizona to determine the habitat conditions important for survival and reproduction. Pointing dogs located quail during autumn and winter of 2002-2003 and 2003-2004, and we measured habitat characteristics at 52 flush sites and 54 nonuse plots, where scaled quail were not found. We recorded information on landform, substrate, vegetation, and cover. Scaled quail used areas with grass canopy cover ≥ 26%, tree canopy cover ≤ 10%, and higher grass species richness than randomly available. Short (≤ 50 cm tall) visual obstruction (i.e., cover), usually associated with low shrubs, cacti, and bunchgrass, was greater at use sites than at nonuse plots. A logistic-regression equation, including visual obstruction and tree canopy variables, correctly predicted ≥ 91% of quail use sites. Greater amounts of visual obstruction and lower percentages of tree canopy cover best-predicted scaled quail sites. Land management practices that reduce grass species richness and cover and increase tree cover may reduce scaled quail habitat quality and availability in southeastern Arizona. Based on habitat use patterns of scaled quail, we recommend that semidesert grassland habitats contain a maximum tree canopy of < 6% and > 25% grass canopy cover at the 20-cm height to provide optimum cover availability.

519. **Fall cattle grazing versus mowing to increase big-game forage.**
Taylor, Nancy; Knight, James E.; and Short, Jeffrey J.
Wildlife Society Bulletin 32(2): 449-455. (2004)
NAL Call #: SK357.A1W5; ISSN: 0091-7648
Descriptors: Blackfoot Clearwater Wildlife Management Area/ nutrition/ seasons/ vegetation removal
Abstract: The effects of 3 levels of mowing and cattle (Bos taurus) grazing were examined on rough fescue (Festuca scabrella) range on the Blackfoot Clearwater Wildlife Management Area in west-central Montana. Treatments were implemented in enclosures during the fall of 1997 and 1998 at 50%, 70%, and 90% removal of herbaceous standing crop. Elk (Cervus elaphus) and mule deer (Odocoileus hemionus) forage measurements were obtained in spring and summer on standing dead vegetation, green grass and forb biomass, total biomass, and percent live vegetation, and compared between mowing and prescribed cattle grazing at the same removal level. At the 50% mowing level, there was increased (P<0.05) availability of grass and biomass in the spring, with increased standing dead and decreased percent live vegetation in the summer. At the 70% mowing level, there was increased standing dead and grass and decreased percent live vegetation available to elk and mule deer in the spring when compared with the same level of grazing (P<0.05). At the 90% mowing level, there was decreased availability of grass and total biomass during spring and summer (P<0.05). Results indicated that at moderate (50%) levels of vegetation removal, fall mowing might be adequate to increase grass and total biomass availability in the spring, but fall grazing by cattle might remove more standing dead material, leaving more nutritious plants available to wildlife in the summer. Fall mowing at 70% removal might provide more grass for wildlife in the spring, but reduces percent live vegetation and leaves more standing dead when compared to fall cattle grazing. This would make it more difficult for wildlife to select preferred forage in the spring, when nutrition is needed for calf and fawn production. Fall cattle grazing might be a better tool to use at the 90% level, since mowing removes more grass and total biomass, leaving reduced vegetation for elk and mule deer.

520. **Fall grazing affects big game forage on rough fescue grasslands.**
Short, J. J. and Knight, J. E.
Journal of Range Management 56(3): 213-217. (2003)
NAL Call #: 60.18 J82 ; ISSN: 0022-409X
Descriptors: cattle/ rotational grazing/ grazing intensity/ wildlife management/ Cervus elaphus/ Odocoileus/ range management/ Festuca altaica/ biomass/ spring/ summer/ botanical composition/ forbs/ wildlife-livestock relations/ Montana
Abstract: Prescribed cattle grazing is often used to purposely enhance wildlife habitat. This study investigated the effects of fall cattle (Bos taurus) grazing intensity on elk (Cervus elaphus) and deer (Odocoileus spp.) forage in the following spring and summer. These effects were examined on rough fescue (Festuca scabrella Torr.) range on the Blackfoot Clearwater Wildlife Management Area in west central Montana. Cattle were grazed in enclosures during the fall of 1997 and 1998. A randomized complete block design with 5 replications of enclosures per year was used. Grazing levels were 0% removal (control), 50% removal, 70% removal, and 90% removal of herbaceous standing crop. To evaluate elk and deer forage, measurements were obtained in spring and summer on green grass standing crop, green forb standing crop, percent green vegetation, species richness, and plant species composition. There were no differences among grazing levels for plant species composition based on canopy coverage, species richness, and green forb standing crop variables (P > 0.10). The 50% and 90% treatments reduced green standing crop in spring (P = 0.07) but not in summer (P > 0.10). Grazing treatments increased percent green vegetation (P < 0.01). Fall cattle grazing can be used as a wildlife habitat improvement tool to reduce unpalatable standing dead material. The 70% removal treatment was the most favorable for habitat improvement without degrading the range.
This citation is from AGRICOLA.

521. **Fallow land patches and ecosystem health in California's Central Valley agroecosystem.**
Hopkins, John D.
In: Managing for healthy ecosystems/ Rapport, D. J.; Lasley, W. L.; Rolston, D. E.; Nielsen, N. O.; Qualset, C. O.; and Damania, A. B., 2003; pp. 981-992.
Notes: 1566706122 (ISBN).
Descriptors: commercial activities/ conservation measures/ ecology/ man-made habitat/ land zones/ comprehensive zoology: farming and agriculture/ agroecosystem health/ role of fallow land patches/ habitat management/ strategies in agroecosystems/ ecology/ cultivated land habitat/ California/ Central Valley

522. **Fencerows as habitat for birds in an agricultural landscape in central Alberta, Canada.**
Sykes, A. K. and Hannon, S. J.
Ecoscience 8(4): 441-449. (2001)
NAL Call #: QH540.E366; ISSN: 11956860
Descriptors: birds/ fencerows/ fragmentation/ landscape/ vegetation/ agricultural ecosystem/ avifauna/ field margin/ habitat fragmentation/ habitat use/ species richness/ Canada
Abstract: Fencerows (strips of trees along field edges) are common in agricultural landscapes and may represent valuable habitat for forest birds in areas where woodland is scarce. We examined the relationship between avian presence (species richness, territory density, and abundance) in 26 fencerows and vegetation structure in the fencerows and forest cover in the adjacent landscape in central Alberta, Canada. Species richness was positively related to fencerow area, but not to other vegetation or landscape characteristics. In contrast, territory density was highest in smaller fencerows with high tree diversity and those with a low amount of forest cover in the sorrounding landscape. Redundancy analysis indicated that abundance of 16 common species was associated with vegetation in the fencerow and/or forest cover in the sorroundings. Species composition in seventeen woodlots in the area was compared with fencerow species composition. Species recorded in fencerows represented 50% of the regional species pool found in woodlots. Fencerows had mainly edge species, no interior forest species, but harbored two species (Vesper Sparrow and Eastern Kingbird) not found in woodlots. Although we advocate the retention and even restoration of fencerows, this cannot be done to the exclusion of retaining large blocks of forest in the landscape for interior forest species.

523. **Fire and cattle grazing on wintering sparrows in Arizona grasslands.**
Gordon, C. E.
Journal of Range Management 53(4): 384-389. (2000)
NAL Call #: 60.18 J82 ; ISSN: 0022-409X.
http://jrm.library.arizona.edu/Volume53/Number4/azu_jrm_v53_n4_384_389_m.pdf
Descriptors: wild birds/ beef cattle/ grazing/ prescribed burning/ grazing intensity/ wildlife management/ Arizona
Abstract: This paper reports on the results of a 3-year field study of the effects of spring/summer burning and cattle grazing on wintering sparrows in the grasslands of southeastern Arizona. The effects of fire were studied with 1 year of pre-burn data and 1 year of post-burn data from 1 fire, plus limited sampling from a second fire at Buenos Aires National Wildlife Refuge in Pima County, Ariz. The effects of grazing were studied by comparing study plots at a site that has not been grazed by cattle since 1968 with a nearby grazed pasture in Santa Cruz County, Ariz. Sparrow abundance was measured as the number of captures from flush-netting sessions conducted by groups of 13-30 volunteers. Vesper (Pocecetes gramineus (Gmelin)) and Savannah (Passerculus sandwichensis (Gmelin)) Sparrows responded positively to fire, while Cassin's Sparrows (Aimophila cassinhi (Woodhouse)) responded negatively. The ecologically and geographically restricted Baird's (Ammodramus bairdil (Audubon)) and Grasshopper (A. savannarum (Gmelin)) Sparrows utilized burned areas during the first post-burn winter and did not significantly respond to fire. Both Ammodramus sparrows also utilized the grazed pasture; they were more abundant there than in the ungrazed study area in 1 year. While field observations and a prior study suggest that heavy grazing can have a strong detrimental effect on Ammodramus sparrows, the results of this study suggest that moderate cattle grazing may be compatible with the conservation of these species.
This citation is from AGRICOLA.

524. **Fire and restoration of sagebrush ecosystems.**
Baker, W. L.
Wildlife Society Bulletin 34: 177-185. (2006)
NAL Call #: SK357.A1W5.
Notes: Literature review.
Descriptors: Artemisia/ fire ecology/ prescribed burning/ history/ ecological restoration/ wildlife management/ Wyoming/ fire rotation/ habitat management for wildlife/ forest fire management/ forestry production natural regeneration/ natural resources, environment, general ecology, and wildlife conservation
This citation is from AGRICOLA.

525. **Fire frequency and mosaic burning effects on a tallgrass prairie ground beetle assemblage.**
Cook, W. M. and Holt, R. D.
Biodiversity and Conservation 15(7): 2301-2323. (2006)
NAL Call #: QH75.A1B562; ISSN: 09603115.
Notes: doi: 10.1007/s10531-004-8227-3.
Descriptors: Carabidae/ fire frequency/ ground beetles/ pitfall trapping/ species richness/ tallgrass prairie/ beetle/ biomass burning/ grazing/ physical disturbance/ pitfall trap/ prairie/ species diversity/ vegetation structure/ Kansas/ Konza prairie/ Aves/ Carabidae/ Coleoptera/ Mammalia/ Tracheophyta
Abstract: Fire frequency has significant effects on the biota of tallgrass prairie, including mammals, vascular plants and birds. Recent concern has been expressed that widespread annual burning, sometimes in combination with heavy livestock grazing, negatively impacts the biota of remaining prairie remnants. A common management recommendation, intended to address this problem, is to create a landscape with a mosaic of different burn regimes. Pitfall trapping was used to investigate the impacts of fire pattern on the diversity and species composition of ground beetles (Coleoptera: Carabidae) at Konza Prairie Biological Station in eastern Kansas, USA. Trapping was conducted over three seasons in landscape units burned on average every 1, 4, or 20 years, and in a fourth season across the available range of vegetative structure to assess the variability of the community within the study system. In the fifth season communities were also followed immediately after two fire events to detect within-season effects of fire and to study short-term patterns of post-disturbance community assembly. Fire frequency had comparatively minimal effects on ground beetle diversity measures, and most numerically common species were observed widely across habitat and management types. Fire frequency effects were manifested primarily in changes in abundance of common species. Colonization of burned areas apparently did not occur from juxtaposed non-burned areas, but from underground or from long distances. While these results suggest that widespread annual burning of tallgrass prairie remnants may not have dramatic effects on prairie ground beetles, we urge caution regarding the application of these results to other taxa within tallgrass prairie. © Springer 2006.

526. **Fire history, passerine abundance, and habitat on a North Dakota drift plain prairie.**
Ludwick, Timothy J. and Murphy, Robert K.
Prairie Naturalist 38(1): 1-11. (2006)
NAL Call #: QH540.P7; ISSN: 0091-0376
Descriptors: conservation measures/ ecology/ terrestrial habitat/ abiotic factors/ physical factors/ Passeriformes: habitat management/ prescribed fire/ community structure/ prescribed fire history relationship/ population dynamics/ abundance/ breeding bird species/ prescribed fire history relationships/ grassland/ Drift plain prairie/ fire/ prescribed fire history/ spatial environment/ Aves/ birds/ chordates/ vertebrates
Abstract: Prescribed fire is among key tools for restoring and managing prairies in the northern Great Plains, yet there are no published reports of its impacts on grassland passerine birds on native prairie in the Drift Plain, a major physiographic subregion. We examined relationships between prescribed fire history and abundance and habitat of breeding passerines in Drift Plain prairie at Des Lacs National Wildlife National Refuge in northwestern North Dakota. In 2003, we used point counts (n = 79 75 m radius plots) to survey bird abundance on 16 management units that had been prescribe-burned one to three times each since 1992. General habitat composition and structure also were measured at each point count plot. We detected 14 passerine species, six of which were common (occurred on greater than 10 % of plots). Three endemic, historically common passerine species were rare or absent regardless of fire history. Abundances of common bird species were not influenced strongly by fire history, which contrasts with data from research on the adjacent Missouri Coteau physiographic subregion. Vegetation structure (litter depth and plant height-density) and occurrence of an exotic grass species, smooth brome (Bromus inermis), decreased with fire history. However, we detected no relationships between bird species abundances and these particular vegetation variables, perhaps because smooth brome continued to be a pervasive structural influence on all management units. Our findings indicate a need for better understanding of bird-fire relationships on remnant prairies in the vast Drift Plain.

527. **Fire regimes and avian responses in the central tallgrass prairie.**
Reinking, D. L.
Studies in Avian Biology (30): 116-126. (2005)
NAL Call #: QL671.S8; ISSN: 01979922
Descriptors: fire/ grassland birds/ habitat loss/ habitat management/ nest success/ prairie ecology/ tallgrass prairie/ vegetation response/ Ammodramus henslowii/ Ammodramus savannarum/ Aves/ Passeridae/ Spiza/ Spiza americana/ Sturnella/ Tympanuchus cupido
Abstract: Grasslands make up the largest vegetative province in North America, and one that has been significantly altered over the past two centuries. The tallgrass prairie of the eastern Great Plains and Midwest has declined to a greater extent than any other ecosystem, primarily due to plowing for cereal grain production. Grassland bird populations have declined at a greater rate and over a wider area than any other group of species. Past fire regimes shaped and maintained the tallgrass prairie ecosystem. Fires set by American Indians and caused by lighting were common and probably differed in

timing, frequency, and scale from contemporary fire regimes, although historical regimes are not well understood. Fire affects both the composition and the structure of vegetation, and can affect birds in a variety of ways. Direct effects of fire on birds include destruction of nests, while indirect effects may involve changes to vegetation, which favor some bird species over others. Greater-Prairie Chickens (Tympanuchus cupido), Henslow's Sparrows (Ammodramus henslowii), and Dickcissels (Spiza americana) respond negatively to annual fire. Grasshopper Sparrows (Ammodramus savannarum) and meadowlarks (Sturnella spp.) appear unaffected or respond positively to annual fire. Fire management across the largest remaining portions of tallgrass prairie frequently overemphasizes or de-emphasizes fire over large areas, creating homogenous habitat that does not support the full compliment of tallgrass prairie birds. Availability of adequately sized grasslands in a variety of seral stages is needed to ensure long-term population stability for the suite of bird species inhabiting tallgrass prairie.

528. **Food of vagrant shrews Sorex vagrans from Grant County, Oregon as related to livestock grazing pressures.**
Whitaker, J. O.; Cross, S. P.; and Maser, C.
Northwest Science 57(2): 107-111. (1983)
NAL Call #: 470 N81; ISSN: 0029-344X
Descriptors: earthworm/ spider/ cricket/ caterpillar/ june bug/ moth/ slug/ snail/ trampling/ compression
Abstract: Major foods of the vagrant shrew (S. vagrans) in a relatively non-grazed portion of a mountain meadow in Grant County were earthworms, spiders, crickets, caterpillars, moths, slugs and snails and June beetles and their larvae. In 2 similar areas subjected to greater recent grazing, flightless forms (except caterpillars) were much less used; they were replaced primarily by caterpillars and flying insects. The hypothesized cause for these changes was that grazing trampled and compressed the ground, thus decreasing the populations of some forms.

529. **Foraging behavior by mule deer: The influence of cattle grazing.**
Kie, J. G.; Evans, C. J.; Loft, E. R.; and Menke, J. W.
Journal of Wildlife Management 55(4): 665-674. (1991)
NAL Call #: 410 J827; ISSN: 0022-541X
Descriptors: Odocoileus hemionus/ reproductive energy demand/ activity patterns/ seasonality/ home range size/ wildlife management/ California
Abstract: We studied the effects of different cattle stocking rates on activity patterns of female mule deer (Odocoileus hemionus) on a summer range in the Sierra Nevada of California [USA]. Using an automated telemetry system, we determined that deer averaged 32 ± 2.2 (SE)% of the time feeding, 8 ± 1.1% traveling, and 60 ± 2.4% resting per 24-hour period. Deer spent more time feeding and less time resting with increased cattle stocking rates. During 1984, a year of average precipitation, deer spent more time feeding per day in late summer than in early summer in range units grazed by cattle but did not do so in ungrazed range units. In 1985, a drier year, deer spent less time feeding per day in late summer in grazed range units. Time spent feeding by deer was negatively correlated with standing crop of herbaceous forage in meadow-riparian habitats. Deer increased their time spent feeding by shortening the length of resting bouts and including more feeding bouts each day, not by increasing the length of each foraging bout. Companion studies indicated that with cattle grazing, deer home-range sizes were larger (Loft 1988), and hiding cover for fawns was reduced (Loft et al. 1987). The results are consistent with the hypothesis that cattle competed with deer, particularly at high stocking rates and during a year of below-average precipitation. We suggest that female mule deer were acting as time-minimizers to meet the high energic demands of lactation while minimizing their exposure to predators. Management options to reduce adverse effects include reducing or eliminating cattle grazing during early summer on all or part of the grazing allotment.

530. **Fragmention by agriculture influences reproductive success of birds in a shrubsteppe landscape.**
Vander Haegen, W. M.
Ecological Applications 17(3): 934-947. (2007)
NAL Call #: QH540.E23; ISSN: 10510761
Descriptors: agriculture/ Amphispiza belli/ brood parasitism/ fragmentation/ landscape effects/ nest survival/ Oreoscoptes montanus/ seasonal productivity/ shrubsteppe/ Spizella breweri/ Washington
Abstract: Shrubsteppe communities are among the most imperiled ecosystems in North America as a result of conversion to agriculture and other anthropogenic changes. In the Intermountain West of the United States, these communities support a unique avifauna, including several species that are declining and numerous others that are of conservation concern. Extensive research in the eastern and central United States and in Scandinavia suggests that fragmentation of formerly continuous forests and grasslands adversely affects reproductive success of birds, yet little is known of the potential effects on avian communities in Western shrublands. I used multi-model inference to evaluate the potential effects of local and landscape variables on nest predation and brood parasitism, and behavioral observations of color-banded birds to evaluate the potential effects of habitat fragmentation on seasonal reproductive success of passerines in the shrubsteppe of eastern Washington State, USA. Reproductive success of shrubsteppe-obligate passerines was lower in landscapes fragmented by agriculture than in continuous shrubsteppe landscapes. Daily survival rates for nests of Brewer's Sparrows (Spizella breweri; n = 496) and Sage Thrashers (Oreoscoptes montanus; n = 128) were lower in fragmented landscapes, and seasonal reproductive success (percentage of pairs fledging young) of Sage Sparrows (Amphispiza belli; n = 146) and Brewer's Sparrows (n = 59) was lower in fragmented landscapes. Rates of parasitism by Brown-headed Cowbirds (Molothrus ater) overall were low (4%) but were significantly greater in fragmented landscapes for Brewer's Sparrows, and parasitism resulted in fewer young fledged from successful nests. Simple models of population growth using landscape-specific fecundity and estimates of adult survival derived from return rates of banded male Sage Sparrows and Brewer's Sparrows suggest that fragmented shrubsteppe in Washington may be acting as a population sink for some species. Immediate conservation needs include halting further fragmentation of shrubsteppe,

restoring low-productivity agricultural lands and annual grasslands to shrubsteppe where possible, and convincing the public of the intrinsic value of these imperiled ecosystems. © 2007 by the Ecological Society of America.

531. **From the field: Efficacy of visual barriers in reducing black-tailed prairie dog colony expansion.**
Merriman, Joel W.; Zwank, Phillip J.; Boal, Clint W.; and Bashore, Terry L.
Wildlife Society Bulletin 32(4): 1316-1320. (2004)
NAL Call #: SK357.A1W5; ISSN: 0091-7648
Descriptors: Rodentia/ Sciuridae/ Cynomys ludovicianus/ black-tailed prairie dog/ conservation/ wildlife management/ New Mexico/ control/ environmental factors/ wildlife-human relationships/ land zones/ prairie dog colony/ dispersal/ barriers/ stimulus reaction/ control
Abstract: Assesses the efficacy of visual barriers in reducing prairie dog colony expansion, and the utility and durability of silt fencing and galvanized roofing as materials for construction of visual barriers. Methods used; Factors that led to a decline in black-tailed prairie dogs across most of their North American range; Problems encountered in previous studies of visual barriers.

532. **Grasshopper densities on grazed and ungrazed rangeland under drought conditions in southern Idaho.**
Fieldin, Dennis J. and Brusven, Merlyn A.
Great Basin Naturalist 55(4): 352-358. (1995)
NAL Call #: 410 G79; ISSN: 0017-3614
Descriptors: livestock grazing/ population density/ range management
Abstract: Low-density grasshopper populations were sampled at 15 pairs of rangeland sites in south central Idaho. One site of each pair had not been grazed by livestock for at least 10 years. Grazed sites were managed under normal grazing regimes established by the Bureau of Land Management. Mean grasshopper density was higher on ungrazed sites than on grazed sites. Proportions of Melanoplus sanguinipes were higher on ungrazed sites than on grazed sites and were higher on annual grasslands than on other vegetation types. Effects of grazing appeared to be independent of vegetation type. Proportions of Gomphocerinae, a subfamily of grasshoppers that feeds almost exclusively, on grasses, were affected by vegetation type, but not grazing. Crested wheatgrass seedings supported the highest proportions of Gomphocerinae. Proportions of Oedipodinae were affected by grazing and vegetation type. Higher proportions of Oedipodinae were found on grazed sites than on ungrazed sites, and on sagebrush/grass sites than on annual grasslands. Results indicate that livestock grazing during drought conditions tends to reduce grasshopper populations on southern Idaho rangeland.

533. **Grassland bird densities in seral stages of mixed-grass prairie.**
Fritcher, S. C.; Rumble, M. A.; and Flake, L. D.
Journal of Range Management 57: 351-357. (July 2004)
NAL Call #: 60.18 J82 .
http://www.fs.fed.us/rm/rapidcity/PDF/grasslandbird.pdf
Descriptors: habitat management/ birds/ grasslands/ prairies
Abstract: Birds associated with prairie ecosystems are declining and the ecological condition (seral stage) of remaining grassland communities may be a factor. Livestock grazing intensity influences the seral stage of grassland communities and resource managers lack information to assess how grassland birds are affected by these changes. We estimated bird density, species diversity, and species richness on 37 sites in 4 seral stages of western wheatgrass [Pascopyrum smithii (Rydb.) A. Love]-green needlegrass [Nassella viridula (Trin.) Barkworth] communities of the Fort Pierre National Grassland. Bird species richness did not differ among seral stages (P = 0.57), but bird species diversity was greater (P > 0.10) in early seral stages compared to late-intermediate seral stages. Grasshopper sparrow (Ammodramus savannarum Gmlin), bobolink (Dolichonyx oryzivorus Linnaeus), dickcissel (Spiza americana Gmlin), and brown-headed cowbird (Molothrus ater Boddaert) density increased (P > 0.10) from early to late seral stages. Burrowing owl (Athene cunicularia Molina), upland sandpiper (Bartramia longicauda Bechstein), chestnut-collared longspur (Calcarius ornatus Townsend), and horned lark (Eremophila alpestris Linnaeus) density decreased (P > 0.10) from early to late seral stages. Western meadowlarks (Sturnella neglecta Audubon) were more abundant in early (P = 0.05) and early-intermediate (P = 0.01) seral stages than late seral stages. Birds with habitat requirements including tall vegetation and residual cover were more abundant in later seral stages. Early seral stages were beneficial to birds that prefer short grass and sparse vegetative cover. Seral stage was an effective predictor of density for many bird species. A mosaic that includes all seral stages is necessary to maximize grassland bird species diversity and abundance across the landscape. Managers can assess the effects on grassland birds of management actions that alter the seral stage of the vegetation.
This citation is from AGRICOLA.

534. **Grassland birds: An overview of threats and recommended management strategies.**
Vickery, Peter D.; Herkert, James R.; Knopf, Fritz L.; Ruth, Janet; and Keller, Cherry E.
In: Strategies for Bird Conservation: The Partners in Flight Planning Process; Proceedings of the 3rd Partners in Flight Workshop, Proceedings-RMRS 16; Ogden, UT: Rocky Mountain Research Station, Forest Service, U.S. Department of Agriculture, 2000. pp. 74-77.
http://www.birds.cornell.edu/pifcapemay/vickery.htm
Descriptors: conservation/ terrestrial habitat/ land and freshwater zones/ Aves: conservation/ grassland/ conservation threats/ North America/ grassland species/ birds/ chordates/ vertebrates
Abstract: Grassland ecosystems are dependent on periodic disturbance for habitat maintenance. Historically, grazing by native herbivores and prairie fires were the agents principally responsible for maintaining grassland areas. However, elimination of native herbivores, widespread fire suppression, and conversion for agriculture have greatly altered grasslands in the United States and Canada. Because of these landscape changes, many grassland birds are increasingly dependent on land managers for habitat creation, maintenance, and health. Grazing, prescribed burning, and mowing/haying are the most frequently used, and versatile, grassland

management techniques. Grassland birds prefer a wide range of grass heights and densities, with some species preferring short sparse vegetation, and others preferring taller, more dense vegetation. Due to differences in species habitat preferences and regional differences in soils and floristics, the responses of individual grassland species to specific grassland management practices can be variable and often are regionally dependent. As a result, management of grassland areas is best directed toward the creation of a mosaic of grassland habitat types. This habitat mosaic is probably best maintained through some type of rotational management system in which sections of large grassland areas receive management on a regular schedule. Such a rotational system would provide a variety of habitat types in every year, would ensure the availability of suitable habitat for birds at either end of the grassland management spectrum, and also would provide habitat for birds whose preferences lie between these extremes.

535. **Grassland birds and habitat structure in Sandhills prairie managed using cattle or bison plus fire.**
Griebel, Randall L.; Winter, Stephen L.; and Steuter, Allen A.
Great Plains Research 8(2): 255-268. (1998)
NAL Call #: QH104.5.G73 G755; ISSN: 1052-5165
Descriptors: Bison bison/ birds/ communities/ ecosystems/ fires-burns/ grasslands/ grazing/ habitat alterations/ interspecies relationships/ mammals/ prairies/ bison/ Nebraska
Abstract: The authors provide information on bird abundance, distribution, and habitat structure from similar sandhill prairie landscapes managed traditionally with grazing by cattle and by a dynamic bison plus fire regime in the Great Plains. Specific habitat patches produced by fire and intensivie bison grazing appear to have different bird communities and habitat structure at the local scale.

536. **Grassland birds in restored grasslands of the Rainwater Basin region in Nebraska.**
Utrup, J. S. and Davis, C. A.
Great Plains Research 17(2): 203-213. (2007)
NAL Call #: QH104.5.G73 G755; ISSN: 10525165
Descriptors: grassland birds/ grassland restoration/ Nebraska/ Rainwater Basin Region
Abstract: Conservationists and managers mention grassland restorations as a conservation strategy to reverse the decline of grassland bird populations in the Great Plains. In the Rainwater Basin Region of south-central Nebraska, state and federal resource agencies have used grassland restorations to protect wetlands from sedimentation and agrichemical runoff. These grassland restorations may also provide important habitat for breeding grassland birds. In this paper, we describe the abundance, composition, nesting success, and habitat requirements of breeding birds in grassland restorations in the Rainwater Basin Region. We observed 14 grassland bird species in 12 grassland restorations. The most abundant species were dickcissels (Spiza americana), grasshopper sparrows (Ammodramus savannarum), and bobolinks (Dolichonyx oryzivorus). We found a total of 84 nests composed of 11 species in restorations. Dickcissels and grasshopper sparrows accounted for 77% of all nests found. Nest success was 31% (26 nests), and the major cause of nest loss was predation, which accounted for 66% (38 nests) of all nest failures. The occurrence of 10 of the species in grassland restorations was influenced by a variety of vegetation variables. Grassland bird species have benefited from grassland restorations in the Rainwater Basin Region. Conservation strategies for grassland birds in the Rainwater Basin Region should continue to focus on restoring marginal croplands back to grasslands. © 2007 Center for Great Plains Studies, University of Nebraska-Lincoln.

537. **Grassland birds nesting in haylands of southern Saskatchewan: Landscape influences and conservation priorities.**
McMaster, D. G.; Devries, J. H.; and Davis, S. K.
Journal of Wildlife Management 69(1): 211-221. (2005)
NAL Call #: 410 J827; ISSN: 0022541X.
Notes: doi: 10.2193/0022-541X(2005)069<0211:GBNIHO>2.0.CO;2.
Descriptors: Anas acuta/ cropland/ haying/ hayland/ landscape composition/ nest success/ northern pintail/ Pooecetes gramineus/ Prairie Pothole Region/ Saskatchewan/ Vesper sparrow/ waterfowl/ abundance/ grassland/ hay/ land use/ nest site/ nesting success/ Canada/ North America/ Prairie Pothole Region/ Saskatchewan/ Anas/ Anas acuta/ Anatidae/ Anser/ Aves/ Pooecetes gramineus
Abstract: To determine the benefits to grassland birds of converting cropland to hayland in southern Saskatchewan, Canada, we quantified the relative nest abundance and success of grassland nesting birds in haylands and the influence landscape variables have on these parameters. We found nests of 26 species of grassland nesting birds, primarily waterfowl and vesper sparrow (Pooecetes gramineus). With the exception of the northern pintail (Anas acuta), few nesting attempts were recorded for species of high priority in the Prairie Pothole Bird Conservation Region. Mayfield nest success for all waterfowl (20 and 13% in 1999 and 2000, respectively) was high relative to previously reported nest success estimates in other habitat types - especially spring-seeded cropland - and was near levels thought to be required to sustain populations (15-20%). Vesper sparrow nest success (39 and 33% in 1999 and 2000, respectively) also was high relative to that reported in other studies. Haying destroyed few nests as wet weather delayed operations in 1999 and 2000. More nests may be destroyed by haying in other years as approximately 25% of nests in this study were still active on the long-term average haying date for southern Saskatchewan. Among models we developed to explain waterfowl relative nest abundance, amount of cropland in the surrounding landscape and field area were the most informative. Evidence that a specific set of landscape variables was important to models of waterfowl nest success was equivocal. Landscape variables did not explain variation in vesper sparrow relative nest abundance or nest success. Within our study area, conversion of cropland to hayland appears to provide significant benefits to a variety of grassland species, including some species of high conservation priority (e.g., northern pintail). Grassland species of conservation concern nested less frequently in hayland than in native grassland.

538. **Grassland establishment for wildlife conservation.**
Jones-Farrand, D. Todd; Johnson, Douglas H.; Burger, Loren W.; and Ryan, Mark R.
In: Fish and Wildlife Response to Farm Bill Conservation Practices; Bethesda, MD: The Wildlife Society, 2007. 19 pp.
ftp://ftp-fc.sc.egov.usda.gov/NHQ/nri/ceap/fwfb3.pdf
Descriptors: conservation practices/ grassland birds/ grassland habitat/ grassland management/ terrestrial habitat/ wildlife species/ wildlife management
Abstract: This report describes the importance of grassland conservation efforts for wildlife, especially in areas historically rich in grasslands that have since been converted to row crop agriculture. Most grasslands established under farm conservation programs have replaced annual crops with perennial cover that provides year-round resources for wildlife. This change in land use has had a huge influence on grassland bird populations; little is known about its impacts on other terrestrial wildlife species. Grassland succession makes management a critical issue. Decisions on how frequently to manage a field depend on many factors, including the location (especially latitude) of the site, the phenology at the site in the particular year, the breeding-bird community associated with the site, and weather and soil conditions. The benefits for a particular species of any management scenario will depend, in part, on the management of surrounding sites, and may benefit additional species but exclude others. Thus, the benefits of grassland establishment and management are location- and species-specific.

539. **Grassland management for the conservation of songbirds in the midwestern USA.**
Walk, Jeffery W. and Warner, Richard E.
Biological Conservation 94(2): 165-172. (2000)
NAL Call #: S900.B5; ISSN: 0006-3207
Descriptors: abundance/ grassland management/ grazing/ habitat type/ mowing/ prescribed burning
Abstract: We monitored breeding eastern meadowlarks, dickcissels, Henslow's sparrows, grasshopper sparrows and field sparrows using strip transect surveys in 1995 and 1996. The 473-ha study area was an array of 3-ha management units of burned, mowed, hayed, grazed and undisturbed (>1 year) cool- and warm-season grasses and annual weeds. Management units grouped by habitat type (management regime and grass type) had different ($P < 0.05$) abundances of each species. Eastern meadowlarks and dickcissels were most frequently observed in grazed warm-season grasses. Observation rates of Henslow's sparrows and field sparrows were highest in undisturbed warm-season grasses, whereas eastern meadowlarks and grasshopper sparrows were observed least often in this habitat type. Grasshopper sparrows were observed most frequently in annual weeds; Henslow's sparrows and field sparrows were not observed in this habitat type. Overall avian abundance was lowest in recently burned cool-season grasses. The low-intensity, late-season grazing system was important for creating a heterogeneous habitat mosaic attractive to the five species studied.

540. **Grassland regeneration and reconstruction: The role of grazing animals.**
Whalley, Wal
Ecological Management and Restoration 6(1): 3-4. (2005); ISSN: 1442-7001.
Notes: doi: 10.1111%2Fj.1442-8903.2005.00213.x.
Descriptors: biogeography: population studies/ terrestrial ecology: ecology, environmental sciences/ wildlife management: conservation/ spatial variability/ ecosystem/ grassland regeneration/ grassland management/ grassy woodland/ grassland reconstruction

541. **Grassland restoration: Strengthening our underpinnings.**
Mcdonald, Tein
Ecological Management and Restoration 6(1): 2. (2005); ISSN: 1442-7001
Descriptors: biogeography: population studies/ terrestrial ecology: ecology, environmental sciences/ wildlife management: conservation/ rural area/ urban development/ conservation management/ ecosystem/ grassland restoration/ grassy woodland/ restoration management

542. **Grassland songbird nest-site selection and response to mowing in West Virginia.**
Warren, K. A. and Anderson, J. T.
Wildlife Society Bulletin 33(1): 285-292. (2005)
NAL Call #: SK357.A1W5; ISSN: 00917648
Descriptors: Agelaius phoeniceus/ bobolink/ Dolichonyx oryzivorus/ eastern meadowlark/ grassland birds/ nest success/ Passerculus sandwichensis/ red-winged blackbird/ Savannah sparrows/ Sturnella magna/ West Virginia/ grassland/ habitat management/ habitat selection/ mowing/ nesting success/ songbirds/ Canaan Valley National Wildlife Refuge
Abstract: Grassland bird populations in the eastern United States have become increasingly dependent on human-altered grassland habitats such as former hayfields and pastures for nesting. We compared grassland bird nest success and nest placement on former hayfields (n = 3) and former pastures (n = 3) and on mowed and unmowed areas on the Canaan Valley National Wildlife Refuge (CVNWR), West Virginia, 1999-2000. We located 83 nests of the 4 dominant grassland species: bobolinks (Dolichonyx oryzivorus; 19% nest success), Savannah sparrows (Passerculus sandwichensis; 34%), red-winged black-birds (Agelaius phoeniceus; 21%), and eastern meadowlarks (Sturnella magna; 70%). Vertical density of vegetation was taller at successful bobolink nests and maximum height was greater at successful Savannah sparrow nests than at unsuccessful nests. Eastern meadowlarks chose nest sites with more standing dead vegetation, deeper litter, and a greater maximum height of vegetation. Although there were no differences in nest success between mowed and unmowed treatments, mowing some fields at the conclusion of the breeding season may provide long-term advantages to grassland bird nesting success by maintaining former fields as grassland habitats.

543. **Grassland songbirds in a dynamic management landscape: Behavioral responses and management strategies.**

Perlut, N. G.; Strong, A. M.; Donovan, T. M.; and Buckley, N. J.

Ecological Applications 16(6): 2235-2247. (2006)
NAL Call #: QH540.E23 ; ISSN: 10510761
Descriptors: bobolink/ Dolichonyx oryzivorus/ fledglings per year/ grassland management/ hayfield/ logistic exposure/ nest success/ New York/ Passerculus sandwichensis/ rotationally grazed pasture/ Savannah sparrow/ Vermont

Abstract: In recent decades, earlier and more frequent harvests of agricultural grasslands have been implicated as a major cause of population declines in grassland songbirds. From 2002 to 2005, in the Champlain Valley of Vermont and New York, USA, we studied the reproductive success of Savannah Sparrows (Passerculus sandwichensis) and Bobolinks (Dolichonyx oryzivorus) on four grassland treatments: (1) early-hayed fields cut before 11 June and again in early- to mid-July; (2) middle-hayed fields cut once between 21 June and 10 July; (3) late-hayed fields cut after 1 August; and (4) rotationally grazed pastures. Both the number of fledglings per female per year and nest success (logistic-exposure method) varied among treatments and between species. Although birds initiated nests earlier on early-hayed fields compared to others, haying caused 99% of active Savannah Sparrow and 100% of active Bobolink nests to fail. Both the initial cutting date and time between cuttings influenced renesting behavior. After haying, Savannah Sparrows generally remained on early-hayed fields and immediately renested (clutch completion 15.6 ± 1.28 days post-haying; all values are reported as mean ± SE), while Bobolinks abandoned the fields for at least two weeks (mean clutch completion 33 ± 0.82 days post-haying). While female Savannah Sparrows fledged more offspring per year (1.28 ± 0.16) than female Bobolinks (0.05 ± 0.05), reproductive success on early-hayed fields was low. The number of fledglings per female per year was greater on middle-hayed fields (Savannah Sparrows, 3.47 ± 0.42; Bobolinks, 2.22 ± 0.26), and late-hayed fields (Savannah Sparrows, 3.29 ± 0.30; Bobolinks, 2.79 ± 0.18). Reproductive success was moderate on rotationally grazed pastures, where female Savannah Sparrows and female Bobolinks produced 2.32 ± 0.25 and 1.79 ± 0.33 fledgling per year, respectively. We simultaneously conducted cutting surveys throughout the Champlain Valley and found that 3-8% of hayfield habitat was cut by 1-4 June, 25-40% by 12-16 June, and 32-60% by 28 June-2 July. Thus, the majority of grassland habitat was cut during the breeding season; however, late-hayed fields served as high-quality reserves for late-nesting female Bobolinks that were displaced from previously hayed fields. For fields first cut in May, a 65-day interval between cuts could provide enough time for both species to successfully fledge young. © 2006 by the Ecological Society of America.

544. **Grassland vegetation and bird abundances on reclaimed midwestern coal mines.**

Scott, P. E.; DeVault, T. L.; Bajema, R. A.; and Lima, S. L.

Wildlife Society Bulletin 30(4): 1006-1014. (2002)
NAL Call #: SK357.A1W5; ISSN: 00917648
Descriptors: bird conservation/ exotic grasses/ grassland birds/ Indiana/ mine grasslands/ reclaimed coal mines/ vegetation analysis/ avifauna/ coal mine/ conservation/ grassland/ plant community/ restoration ecology/ United States/ Agelaius phoeniceus/ Ammodramus henslowii/ Ammodramus savannarum/ Bromus inermis/ Festuca arundinacea/ Geothlypis trichas/ Solidago/ Spiza americana/ Sturnella magna

Abstract: Reclamation of surface coal mines in the midwestern United States has produced large grasslands, which support both obligate and facultative grassland birds. We sought to characterize vegetation and determine whether birds breeding in these habitats responded to vegetation as they do in other kinds of grasslands. We measured vegetation characteristics on 9 Indiana mine grasslands and related those measures to abundance or occurrence of 6 common bird species. Eurasian grasses such as tall fescue (Festuca arundinacea) and smooth brome (Bromus inermis), prominent in seed mixtures planted decades earlier, comprised 64% of canopy cover. Forb cover averaged 27%, with as much cover by native invaders such as goldenrod (Solidago spp.) as by legumes planted during reclamation. Despite a superficial appearance of homogeneity, mine grassland vegetation varied sufficiently to affect local abundances of birds. Abundances of 3 ubiquitous species varied and were correlated with at least 1 characteristic; red-winged blackbirds (Agelaius phoeniceus) were negatively associated with percent cover by litter and by grass, whereas eastern meadowlarks (Sturnella magna) and grasshopper sparrows (Ammodramus savannarum) were negatively associated with vegetation density. No variables were associated with occurrence of dickcissels (Spiza americana) or common yellowthroats (Geothlypis trichas), although yellowthroat abundance at the occupied sites appeared to increase with greater vegetation density. Occurrence of Henslow's sparrow (Ammodramus henslowii) was positively associated with 5 variables, including percent cover by litter and grass. Blackbirds, dickcissels, and yellowthroats did not differ in abundance between grass- and forb-dominated sites, whereas Henslow's and grasshopper sparrows and meadowlarks were more common on the former. Thus, obligate grassland birds benefited from the present dominance of non-native grasses over forbs on reclaimed mines. Despite a lack of native vegetation and their artificial nature, mine grasslands supported a typical array of midwestern grassland bird species that differ in specific vegetation preferences, showing patterns similar to those observed in natural and agricultural grasslands.

545. **Grassland vegetation and bird communities in the southern Great Plains of North America.**
Chapman, R. N.; Engle, D. M.; Masters, R. E.; and Leslie, D. M.
Agriculture, Ecosystems and Environment 104(3): 577-585. (2004)
NAL Call #: S601.A34; ISSN: 01678809.
Notes: doi: 10.1016/j.agee.2004.01.026.
Descriptors: grassland/ grassland birds/ grazing/ habitat management/ plant species composition/ abundance/ breeding population/ conservation/ grassland/ vegetation structure/ Great Plains/ North America/ Aves/ Bothriochloa
Abstract: Structure and composition of vegetation and abundance of breeding birds in grasslands seeded to Old World bluestem (Bothriochloa ischmaeum) were compared to native mixed prairie in the southern Great Plains of North America. Abundance of birds was determined using fixed-radius point counts. Detrended correspondence analysis was used to compare plant community composition and canonical correspondence analysis was used to examine the relationships between plant species composition and vegetation structure with the bird community. Plant species composition differed distinctly between seeded grassland and native mixed prairie, but the differences were not reflected in habitat structure, bird community composition, or abundance of bird species. Seeded grassland was inferior to native mixed prairie in terms of diversity of plant species, but that difference did not translate into meaningful differences in structure that drove habitat selection by breeding birds. Conservation programs that promote establishment of seeded grassland and do not allow for suitable disturbance regimes will selectively benefit a narrow suite of birds regardless of plant species composition.

546. **Grazing and burning impacts on deer diets on Louisiana pine-bluestem range.**
Thill, R. E.; Martin, A.; Morris, H. F.; and Mccune, E. D.
Journal of Wildlife Management 51(4): 873-880. (1987)
NAL Call #: 410 J827; ISSN: 0022-541X
Descriptors: Odocoileus virginianus/ plant composition/ diet quality/ foraging selectivity/ feeding efficiency/ seasonality/ management/ protein/ phosphorus/ calcium
Abstract: Diets of 3-5 tame white-tailed deer (Odocoileus virginianus) on adjacent ungrazed and continuously grazed (35% herbage removal by late Oct) forested pastures were compared for forage-class use, botanical similarities, foraging selectivity and efficiency, and diet quality. Both pastures were divided into 3 burning subunits and burned in late February on a 3-year rotation. Botanical composition of diets differed between and within pastures, but forage-class use was similar except during winter, when deer selected more browse on ungrazed subunits. Grazing had no effect on dietary protein, phosphorus (P), or calcium (Ca) levels, but diets from ungrazed subunits wree higher in digestibility (except during summer), and contained more uncommon plant taxa. Deer foraged more efficiently on grazed than on ungrazed subunits but were less efficient on recent than on older burns. Diets from 1st-year burns were higher in protein during spring and summer and higher in P during spring.

547. **Grazing and passerine breeding birds in a Great Basin low-shrub desert.**
Medin, D. E.
Great Basin Naturalist 46(3): 567-572. (1986)
NAL Call #: 410 G79; ISSN: 0017-3614
Descriptors: habitat modification/ ecology/ population dynamics/ terrestrial habitat/ land and freshwater zones/ Passeriformes: agricultural activity/ sheep grazing/ biomass/ community structure/ breeding community/ population density/ breeding populations/ desert habitat/ low shrub/ Utah/ Millard County/ Desert Experimental Range/ Aves/ birds/ chordates/ vertebrates

548. **Grazing effects on nutritional quality of bluebunch wheatgrass for elk.**
Wambolt, Carl L.; Frisina, Michael R.; Douglass, Kristin S.; and Sherwood, Harrie W.
Journal of Range Management 50(5): 503-506. (1997)
NAL Call #: 60.18 J82 ; ISSN: 0022-409X.
http://jrm.library.arizona.edu/Volume50/Number5/azu_jrm_v50_n5_503_506_m.pdf
Descriptors: Cervus elaphus nelsoni/ Cervus canadensis/ Bos taurus/ behavior/ ecosystem/ foods-feeding/ grazing/ mammals/ nutrients/ overwintering/ rangeland/ wildlife-habitat relationships/ wapiti/ cattle/ interspecies relations/ nutrition physio./ biochem/ elk/ Montana
Abstract: The authors studied the nutrient content of bluebunch wheatgrass in a three-pasture rest-rotation grazing system and in an exclosure on the elk winter range in southwestern Montana. The wheatgrass was cattle-grazed in the spring, ungrazed by cattle for a year, or given a long-term rest. Nitrogen and phosphorus were greater in the spring-grazed pasture, but regrowth of wheatgrass in this plot did not improve the nutrient content for wildlife over the non-grazed plots. Elk were not likely to eat enough bluebunch wheatgrass to meet their protein maintenance requirements during winter.

549. **Grazing in the Sierra Nevada: Home range and space use patterns of mule deer as influenced by cattle.**
Loft, Eric R.; Kie, John G.; and Menke, John W.
California Fish and Game 79(4): 145-166. (1993)
NAL Call #: 410 C12; ISSN: 0008-1078
Descriptors: Odocoileus hemionus/ Bos taurus/ behavior/ grazing/ habitat use/ mammals/ home range-territory/ wildlife-livestock relationships/ mule deer/ cattle/ home-range/ food/ competition/ cover/ dispersion/ habitat/ California: Sierra Nevada

550. **Grazing management impacts on quail during drought in the northern Rio Grande Plain, Texas.**
Campbell Kissock, L.; Blankenship, L. H.; and White, L. D.
Journal of Range Management 37(5): 442-446. (1984)
NAL Call #: 60.18 J82 ; ISSN: 0022-409X.
http://jrm.library.arizona.edu/Volume37/Number5/azu_jrm_v37_n5_442_446_m.pdf
Descriptors: Colinus virginianus/ Callipepla squamata/ grass
Abstract: Relationships between the abundance of 2 quail species [Colinus virginianus, Callipepla squamata] and range site and grazing management during drought were

evaluated in the northern Rio Grande Plain of Texas. Clay loam range sites provided better nesting cover and greater abundance of forbs for quail than sandy loam and shallow ridge range sites. Foliar cover and aboveground standing crop of grass were greater on the 3 range sites within the short duration and deferred rotation systems as compared with the yearlong system. During drought, grazing systems provided better nesting and protective cover for quail than yearlong grazing.

551. **Grazing management in Texas and its impact on selected wildlife.**
Bryant, F. C.; Guthery, F. S.; and Webb, W. M.
In: Proceedings of the Wildlife-Livestock Relationships Symposium. Coeur D'alene, Idaho. Peek, James M. and Dalke, P. D. (eds.)
Moscow, Idaho: Forest, Wildlife and Range Experiment Station, University of Idaho; pp. 94-112; 1982.
NAL Call #: SF84.84.W5 1981
Descriptors: Texas/ grazing/ wildlife/ grazing management
This citation is from AGRICOLA.

552. **Grazing pressure impacts on potential foraging competition between angora goats and white-tailed deer.**
Ekblad, R. L.; Stuth, J. W.; and Owens, M. K.
Small Ruminant Research 11(3): 195-208. (1993)
NAL Call #: SF380.I52; ISSN: 0921-4488
Descriptors: Capra hircus/ Odocoileus virginianus/ grazing/ foods-feeding/ habitat alterations/ habitat use/ wildlife-livestock relationships/ white-tailed deer/ domestic goat/ experiment/ food/ Texas: Zavala County

553. **Greater sage-grouse nesting habitat selection and success in Wyoming.**
Holloran, M. J.; Heath, B. J.; Lyon, A. G.; Slater, S. J.; Kuipers, J. L.; and Anderson, S. H.
Journal of Wildlife Management 69(2): 638-649. (2005)
NAL Call #: 410 J827; ISSN: 0022541X.
Notes: doi: 10.2193/0022-541X(2005)069 [0638:GSNHSA]2.0.CO;2.
Descriptors: Centrocercus urophasianus/ habitat/ nest/ residual grass/ sage-grouse/ sagebrush/ Wyoming/ habitat management/ habitat selection/ nest site/ nesting success/ Wyoming/ Artemisia tridentata/ Centrocercus urophasianus
Abstract: Nesting habitat degradation and its negative effect on nesting success might contribute to the recent population and distributional declines of greater sage-grouse (Centrocercus urophasianus) throughout North America. We used radiotelemetry to locate greater sage-grouse nests in 7 different areas of central and southwestern Wyoming between 1994 and 2002; we studied each area for 2 to 4 years. Using binary logistic regression, we compared microsite vegetal data collected at nests (n = 457) and random (n = 563) sites and successful (n = 211) and unsuccessful (n = 238) nests to test hypotheses concerning greater sage-grouse nesting habitat selection and vegetal conditions associated with nesting success. We used Akaike's Information Criterion (AICc and model averaging to make inference about the weighted support for the importance of individual habitat variables through the comparison of sets of competing models. Selected nest sites were located in areas with increased total shrub canopy cover (relative importance [RI] = 1.00), residual grass cover (RI = 0.47), and residual grass height (RI = 0.77) compared to random sites. Successful nests had increased residual grass cover (RI = 0.43) and height (RI = 0.48) relative to unsuccessful nests. Additionally, annual nest success rates (i.e., above vs. below our study's average) were related to the preceding year's spring (Apr-May; RI = 0.44) and winter-early spring (Jan-Jun) precipitation (RI = 0.32). Correct classification rates for weighted average models that we derived through the 3 comparisons were between 60 and 70%, suggesting the variables adequately differentiated between plot types. However, high model selection uncertainty (i.e., the total number of models included in the sets of AICc-selected models) suggested that nest site selection and nesting success may be influenced by factors not considered in the modeling process. Management strategies that protect dense sagebrush stands and enhance residual grass cover and height within those stands should be used to maintain nesting habitat and increase nesting success of greater sage-grouse.

554. **Greater sage-grouse response to sagebrush management in Utah.**
Dahlgren, D. K.; Chi, R.; and Messmer, T. A.
Wildlife Society Bulletin 34(4): 975-985. (2006)
NAL Call #: SK357.A1W5; ISSN: 00917648.
Notes: doi: 10.2193/0091-7648(2006)34 [975:GSRTSM]2.0.CO;2.
Descriptors: 2002 Farm Bill/ Artemisia spp./ brood-rearing/ Centrocercus urophasianus/ Dixie harrow/ greater sage-grouse/ habitat management/ Lawson aerator/ sagebrush/ Tebuthiuron/ Utah
Abstract: Greater sage-grouse (Centrocercus urophasianus) populations throughout much of their range have been declining. These declines have largely been attributed to the loss or deterioration of sagebrush (Artemisia spp.) habitat. In response government agencies such as the United States Department of Agriculture, Natural Resources Conservation Service are cost-sharing on management practices designed to improve habitat conditions for sage-grouse. Little is known regarding sage-grouse response to various sagebrush management techniques. We studied the effects of reducing sagebrush canopy cover using 2 mechanical (Dixie harrow and Lawson aerator) treatments and 1 chemical (Tebuthiuron) treatment on greater sage-grouse use of brood-rearing habitats on Parker Mountain, Utah, USA. To conduct this experiment, we identified 19 40.5-ha plots that exhibited >40% mountain big sagebrush (A. tridentata vaseyana) canopy cover and randomly assigned 16 as treatment or controls (4 replicates each). Tebuthiuron and Dixie-harrow-treated plots had more forb cover than did control plots (P = 0.01 and 0.02, respectively) in post-treatment periods. Greater sage-grouse brood use was higher in Tebuthiuron than control plots (P = 0.01). We believe this was attributed to increased herbaceous cover, particularly forb cover. However, in all plots, sage-grouse use was greatest within 10 m of the edge of the treatments where adjacent sagebrush cover was still available. Although the treatments we studied resulted in the plots achieving sage-grouse brooding-rearing habitat guidelines, caution should be exercised in applying these observations at lower elevations, on sites with less annual precipitation, or on a

different subspecies of big sagebrush. Prior to using these techniques to implement large-scale sagebrush treatments, the specific rationale for conducting them should be clearly identified. Large-scale projects using the techniques we studied would not be appropriate within sage-grouse wintering or nesting habitat.

555. **Green-tailed towhee response to prescribed fire in montane shrubland.**
Jehle, Gretchen; Savidge, Julie A.; and Kotliar, Natasha B.
Condor 108(3): 634-646. (2006)
NAL Call #: QL671.C6; ISSN: 0010-5422
Descriptors: Emberizidae/ Passeriformes/ Pipilo chlorurus/ Fringillidae/ common juniper/ green-tailed towhee/ Juniperus communis/ environmental factors/ biogeography/ breeding season/ Colorado/ conservation/ wildlife management/ habitat use/ fires-burns/ fire management/ ecosystems/ habitat availability/ habitat management/ habitat quality/ habitat suitability/ land zones/ montane shrubland/ montane habitat/ nest survival rate/ nest-site selection/ population ecology/ reproduction/ Rocky Mountain National Park/ shrub grasslands/ nest success/ nest survival
Abstract: Fire alters the structure and composition of shrublands and affects habitat quality for the associated avifauna. Because shrubland ecosystems have been greatly reduced from their original extent in western North America and fire is increasingly being used to manage these landscapes, a better understanding of how fire affects the associated vegetation and wildlife is imperative. We evaluated the response of Green-tailed Towhees (Pipilo chlorurus) to prescribed fire in the montane shrublands of Rocky Mountain National Park, Colorado during 2002 and 2003. Three to five years following prescribed burning, Green-tailed Towhee density and shrub cover were generally higher in unburned areas. Nests (n = 179) were located in unburned vegetation; within burned sites, all nests were in remnant patches. Green-tailed Towhee nest survival was 57% (95% CI = 49%-65%) across the two years of the study. More than half of the nests were in common juniper (Juniperus communis) shrubs, and nest survival was higher for nests in junipers than those in other shrub species. Daily nest survival rates were lower at the site with the highest density of towhees and declined over the breeding season. With regard to shrub cover, opposite trends were observed for nest-site selection and nest survival: nest plots had greater shrub cover than non-nest plots, but nest survival decreased with increasing shrub cover. Because shrub cover affects towhee density and nest survival in conflicting ways, fire management at Rocky Mountain National Park alters both habitat availability and suitability for Green-tailed Towhees.

556. **Guidelines for managing lesser prairie-chicken populations and their habitats.**
Hagen, Christian A.; Jamison, Brent E.; Giesen, Kenneth M.; and Riley, Terry Z.
Wildlife Society Bulletin 32(1): 69-82. (2004)
NAL Call #: SK357.A1W5; ISSN: 0091-7648
Descriptors: conservation measures/ terrestrial habitat/ land zones/ Tympanuchus pallidicinctus: conservation measures/ habitat management/ grassland/ United States/ Aves, Galliformes, Phasianidae/ birds/ chordates/ vertebrates

557. **Guidelines to manage sage grouse populations and their habitats.**
Connelly, J. W.; Schroeder, M. A.; Sands, A. R.; and Braun, C. E.
Wildlife Society Bulletin 28(4): 967-985. (2000)
NAL Call #: SK357.A1W5; ISSN: 00917648
Descriptors: Artemisia/ Centrocercus urophasianus/ guidelines/ habitat/ management/ populations/ sage grouse/ sagebrush/ gamebird/ population decline/ wildlife management/ Artemisia/ Centrocercus urophasianus
Abstract: The status of sage grouse populations and habitats has been a concern to sportsmen and biologists for >80 years. Despite management and research efforts that date to the 1930s, breeding populations of this species have declined throughout much of its range. In May 1999, the western sage grouse (C. urophasianus phaios) in Washington was petitioned for listing under the Endangered Species Act because of population and habitat declines (C. Warren, United States Fish and Wildlife Service, personal communication). Sage grouse populations are allied closely with sagebrush (Artemisia spp.). Despite the well-known importance of this habitat to sage grouse and other sagebrush obligates, the quality and quantity of sagebrush habitats have declined for at least the last 50 years. Braun et al. (1977) provided guidelines for maintenance of sage grouse habitats. Since publication of those guidelines, much more information has been obtained on sage grouse. Because of continued concern about sage grouse and their habitats and a significant amount of new information, the Western States Sage and Columbian Sharp-tailed Grouse Technical Committee, under the direction of the Western Association of Fish and Wildlife Agencies, requested a revision and expansion of the guidelines originally published by Braun et al. (1977). This paper summarizes the current knowledge of the ecology of sage grouse and, based on this information, provides guidelines to manage sage grouse populations and their habitats.

558. **Guild structure of a riparian avifauna relative to seasonal cattle grazing.**
Knopf, F. L.; Sedgwick, J. A.; and Cannon, R. W.
Journal of Wildlife Management 52(2): 280-290. (1988)
NAL Call #: 410 J827; ISSN: 0022-541X
Descriptors: Salix spp./ Dendroica petechia/ Passerculus sandwichensis/ Melospiza melodia/ Melospiza lincolnii/ Empidonax traillii/ Zonotrichia leucophrys/ Turdus migratorius/ Agelaius phoeniceus/ Molothrus ater/ habitat/ generalist/ specialist/ population density/ community structure/ vegetation structure/ Arapaho National Wildlife Refuge/ Colorado, USA
Abstract: The avifauna within the willow (Salix spp.) community on the Arapaho National Wildlife Refuge [Colorado, USA] (NWR) was dominated (96% of all observations each year) by 11 species of passerine birds during the summers of 1980-81. Using 28 vegetation variables measured or calculated for randomly selected points and points where birds were sighted, we assigned the species to 3 distinct response guilds relative to historical patterns of seasonal grazing. A eurytopic

response guild (habitat generalists) included yellow warblers (Dendroica petechia) (YEWA), savannah sparrows (Passerculus sandwichensis) (SASP), and song sparrows (Melospiza melodia) (SOSP). A stenotopic response guild (habitat specialists) included willow flycatchers (Empidonax traillii) (WIFL). Lincoln's sparrows (Melospiza lincolnii) (LISP), and white- crowned sparrows (Zonotrichia leucophrys) (WCSP). The intermediate, mesotopic response guild included American robins (Turdus migratorius) (AMRO), red-winged blackbirds (Agelaius phoeniceus) (RWBL), and brown-headed cowbirds (Molothrus ater) (BHCO). Population densities of the eurytopic response guild differed little between healthy (historically winter-grazed) and decadent (historically summer-grazed) willow communities within a year. Densities of species in the mesotopic response guild differed more dramatically, and stenotopic response-guild species were absent or accidental in decadent willows. Information on habitat use patterns of the individual species between years supported the definition of response guilds; vegetation structure was most variable in habitats of eurytopic species and least variable in habitats of stenotopic species. Comparisons between used and available vegetation features indicated that species in the stenotopic response guild used locations that differed from random on the basis of bush spacing. We hypothesize that the response-guild structure primarily reflects the impact of cattle upon the horizontal patterning of the vegetative community.

559. **Habitat acquisition strategies for grassland birds in an urbanizing landscape.**
Snyder, S. A.; Miller, J. R.; Skibbe, A. M.; and Haight, R. G.
Environmental Management 40(6): 981-992. (2007)
NAL Call #: HC79.E5E5 ; ISSN: 0364152X.
Notes: doi: 10.1007/s00267-007-9025-y.
Descriptors: open space/ optimization/ reserve design/ site selection/ urbanization
Abstract: Habitat protection for grassland birds is an important component of open space land acquisition in suburban Chicago. We use optimization decision models to develop recommendations for land protection and analyze tradeoffs between alternative goals. One goal is to acquire (and restore if necessary) as much grassland habitat as possible for a given budget. Because a viable habitat for grassland birds consists of a relatively large core area with additional parcels of grassland habitat nearby, the second goal is to minimize total pairwise distance between newly protected parcels and large existing reserves. We also use the concept of an effective grassland habitat area, which considers influences that neighboring land covers have on grassland habitat suitability. We analyze how the parcels selected for protection change as total protected effective area is traded off against total distance. As area is weighted more heavily, the selected parcels are scattered and unconnected. As total distance is weighted more heavily, the selected parcels coalesce around core reserves but protect less area. The differences in selected parcels as we change the objective function weights are caused by the differences in price per unit of effective habitat area across parcels. Parcels located in close proximity to the existing cores have relatively high prices per hectare of effective grassland area as a consequence of high restoration costs and adverse influences from roads, urban areas and/or forestland. As a result, these parcels have lower priority for selection when the area objective is weighted more heavily for a given budget.

560. **Habitat and avifaunal recovery from livestock grazing in a riparian meadow system of the northwestern Great Basin.**
Dobkin, David S.; Rich, Adam C.; and Pyle, William H.
Conservation Biology 12(1): 209-221. (1998)
NAL Call #: QH75.A1C5 ; ISSN: 0888-8892
Descriptors: avifaunal composition/ avifaunal recovery/ habitat recovery/ livestock grazing/ riparian meadow system/ species abundance/ species richness
Abstract: Riparian habitats are centers of biological diversity in arid and semiarid portions of western North America, but despite widespread loss and degradation of these habitats there is little quantitative information concerning restoration of native riparian biota. We examined the recovery of a riparian meadow system in the context of long-term versus short-term release from livestock grazing. We compared the structure and dynamics of plant and avian communities on 1.5-ha plots inside a long-term (>30 years) livestock enclosure ("exclosure plots"), with adjacent plots outside the enclosure ("open plots") for 4 years following removal of livestock from open plots. Throughout the study, sedge cover, forb cover, and foliage height diversity of herbs were greater on exclosure plots, bare ground, litter cover, shrub cover, and shrub foliage height diversity were greater on open plots. Forb, rush, and cryptogamic cover increased on open plots but not on enclosure plots. Grass cover increased, whereas litter and bare ground decreased on all plots in conjunction with increased availability of moisture. Sedge cover did not change. Avian species richness and relative abundances were greater on enclosure plots, species composition differed markedly between exclosure and open plots (Jaccard Coefficient = 0.23-0.46), with exclosure plots dominated by wetland and riparian birds and open plots dominated by upland species. The appearance of key species of wet-meadow birds on open plots in the third and fourth years following livestock removal signaled the beginning of restoration of the riparian avifauna. We interpret the recovery of riparian vegetation and avifaunal composition inside the exclosure as a consequence of livestock removal, which led to a rise in the water table and an expansion of the byporheic zone laterally from the stream channel. The lack of change in sedge and shrub cover on open plots suggests that restoration to a sedge-dominated meadow will not happen quickly.

561. **Habitat edge, land management, and rates of brood parasitism in tallgrass prairie.**
Patten, M. A.; Shochat, E.; Reinking, D. L.; Wolfe, D. H.; and Sherrod, S. K.
Ecological Applications 16(2): 687-695. (2006)
NAL Call #: QH540.E23 ; ISSN: 10510761
Descriptors: brood parasitism/ brown-headed cowbird/ burning/ edge effects/ grazing/ land management/ Molothrus ater/ Oklahoma, USA/ regression trees/ tallgrass prairie
Abstract: Bird populations in North America's grasslands have declined sharply in recent decades. These declines

are traceable, in large part, to habitat loss, but management of tallgrass prairie also has an impact. An indirect source of decline potentially associated with management is brood parasitism by the Brown-headed Cowbird (Molothrus ater), which has had substantial negative impacts on many passerine hosts. Using a novel application of regression trees, we analyzed an extensive five-year set of nest data to test how management of tallgrass prairie affected rates of brood parasitism. We examined seven landscape features that may have been associated with parasitism: presence of edge, burning, or grazing, and distance of the nest from woody vegetation, water, roads, or fences. All five grassland passerines that we included in the analyses exhibited evidence of an edge effect: the Grasshopper Sparrow (Ammodramus savannarum), Henslow's Sparrow (A. henslowii), Dickcissel (Spiza americana), Red-winged Blackbird (Agelaius phoeniceus), and Eastern Meadowlark (Sturnella magna). The edge was represented by narrow strips of woody vegetation occurring along roadsides cut through tallgrass prairie. The sparrows avoided nesting along these woody edges, whereas the other three species experienced significantly higher (1.9-5.3x) rates of parasitism along edges than in prairie. The edge effect could be related directly to increase in parasitism rate with decreased distance from woody vegetation. After accounting for edge effect in these three species, we found evidence for significantly higher (2.5-10.5x) rates of parasitism in grazed plots, particularly those burned in spring to increase forage, than in undisturbed prairie. Regression tree analysis proved to be an important tool for hierarchically parsing various landscape features that affect parasitism rates. We conclude that, on the Great Plains, rates of brood parasitism are strongly associated with relatively recent road cuts, in that edge effects manifest themselves through the presence of trees, a novel habitat component in much of the tallgrass prairie. Grazing is also a key associate of increased parasitism. Areas managed with prescribed fire, used frequently to increase forage for grazing cattle, may experience higher rates of brood parasitism. Regardless, removing trees and shrubs along roadsides and refraining from planting them along new roads may benefit grassland birds. © 2006 by the Ecological Society of America.

562. **Habitat management for the endangered Stephens' kangaroo rat: The effect of mowing and grazing.**
Kelt, D. A.; Konno, E. S.; and Wilson, J. A.
Journal of Wildlife Management 69: 424-429. (Jan. 2005)
NAL Call #: 410 J827
Descriptors: Dipodomys/ rodents/ endangered species/ threatened species/ wildlife habitats/ grasslands/ wildlife management/ mowing/ grazing/ population size/ population density/ California/ Dipodomys stephensi/ natural resources, environment, general ecology, and wildlife conservation/ animal ecology and behavior
This citation is from AGRICOLA.

563. **Habitat relationships of birds overwintering in a managed coastal prairie.**
Baldwin, Heather Q.; Grace, James B.; Barrow, Wylie C.; and Rohwer, Frank C.
Wilson Journal of Ornithology 119(2): 189-197. (2007)
NAL Call #: QL671.W55; ISSN: 15594491
Descriptors: Certhiidae/ Fringillidae/ Passeriformes/ Ammodramus leconteii/ Cistothorus platensis/ Le Conte's sparrow/ Melospiza georgiana/ Passerculus sandwichensis/ Savannah sparrow/ sedge wren/ swamp sparrow
Abstract: Grassland birds are considered to be rapidly declining in North America. Management approaches for grassland birds frequently rely on prescribed burning to maintain habitat in suitable condition. We evaluated the relationships among years since burn, vegetation structure, and overwintering grassland bird abundance in Coastal prairie. Le Conte's Sparrows (Ammodramus leconteii) were most common in areas that had: (1) been burned within the previous 2 years. (2) medium density herbaceous vegetation, and (3) sparse shrub densities. Savannah Sparrows (Passerculus sandwichensis) were associated with areas: (1) burned within 1 year. (1) with sparse herbaceous vegetation, and (3) with sparse shrub densities. Sedge Wrens (Cistothorus platensis) were most common in areas that bad: (1) burned greater than 2 years prior and (2) dense herbaceous vegetation. Swamp Sparrows (Melospiza georgiana): (1) were most common in areas of dense shrubs. (2) not related to time since burnings, and (3) demonstrated no relationship to herbaceous vegetation densities. The relationships to fire histories for all four bird species could be explained by the associated vegetation characteristics indicating the need for a mosaic of burn rotations and modest levels of woody vegetation.

564. **Habitat selection by the Texas tortoise in a managed thornscrub ecosystem.**
Kazmaier, Richard T.; Hellgren, Eric C.; and Ruthven, Donald C.
Journal of Wildlife Management 65(4): 653-660. (2001)
NAL Call #: 410 J827; ISSN: 0022-541X
Descriptors: radiotelemetry: monitoring method/ Tamaulipan Biotic Province/ brush invasion [brush encroachment]/ canopy cover/ community ecology/ conservation biology/ grazing pastures/ habitat change/ habitat management/ habitat selection/ land use/ old field pastures/ riparian habitats/ semiarid shrublands: habitat/ thornscrub ecosystems/ vegetation types
Abstract: Brush encroachment on semiarid shrublands resulting from livestock grazing has created global concern. Southern Texas is dominated by Prosopis-Acacia mixed brush communities typical of the Tamaulipan Biotic Province, and the geographic range of the state-threatened Texas tortoise (Gopherus berlandieri) is nearly identical to the boundaries of this biotic province in Texas. In light of the perceived threat to Texas tortoises because of habitat change caused by brush encroachment, we monitored 36 Texas tortoises by radiotelemetry during 1994-1996 to assess habitat selection on a site containing grazed and ungrazed pastures. Tortoises did not exhibit habitat selection at the level of locations within home ranges. Differential habitat selection at the level of home ranges within study areas was not apparent for sex, but was evident for treatment (grazed or ungrazed). Analysis of pooled data indicated that tortoises exhibited broad-scale selection for home ranges within study areas. Selection was expressed as preferential avoidance of old-field and riparian habitats, which represented vegetational extremes of canopy cover. However, tortoises tolerated the broad continuum of other brush communities on the study site. Apparent treatment differences may be an artifact of our

inability to adequately pair study areas given the scale of tortoise movement. Our data indicate that increases in the extent of woody canopy cover resulting from grazing-induced brush encroachment will not be detrimental to Texas tortoises. Furthermore, large-scale range improvement practices, such as root-plowing, create unsuitable habitats for this species.

565. **Habitat shifts by mule deer the influence of cattle grazing.**
Loft, E. R.; Menke, J. W.; and Kie, J. G.
Journal of Wildlife Management 55(1): 16-26. (1991)
NAL Call #: 410 J827; ISSN: 0022-541X
Descriptors: Odocoileus hemionus/ Populus tremuloides/ riparian habitat/ competition
Abstract: We studied the effects of cattle on selection of home ranges and habitats by female mule deer (Odocoileus hemionus) on summer range in the Sierra Nevada, California. Three grazing levels (no grazing, moderate grazing, and heavy grazing) were imposed on 3 fenced range units over 3 years. Habitat selection by 13 radio-collared female mule deer was estimated each summer; habitat selection by radio-collared cattle was estimated at the 2 grazing levels. In the absence of grazing, meadow-riparian habitat comprised a greater proportion of deer home ranges than during grazing. During moderate and heavy grazing, a greater proportion of montane shrub habitat was included within deer home ranges than when ungrazed. Within home ranges, deer preferred meadow-riparian habitat at all grazing levels, whereas aspen (Populus tremuloides) habitat was preferred only during no grazing. Deer preference for meadow-ripairan habitat declined over the summer, more so with cattle grazing. Cattle also preferred meadow-riparin and aspen habitat. The greatest effect of cattle on habitat selection by female mule deer occurred during late summer with heavy grazing when forage and cover were at a minimum in preferred habitats. Female mule deer shifted habitat use by reducing their use of habitats preferred by cattle and increasing their use of habitats avoided by cattle. These results were consistent with expectations of competition and habitat selection theory.

566. **Habitat-suitability bounds for nesting cover of northern bobwhites on semiarid rangelands.**
Arredondo, Juan A.; Hernandez, Fidel; Bryant, Fred C.; Bingham, Ralph L.; and Howard, Ronnie
Journal of Wildlife Management 71(8): 2592-2599. (Nov. 2007)
NAL Call #: 410 J827
Descriptors: Colinus virginianus/ habitat selection/ nesting habitat/ northern bobwhite/ radiotelemetry/ Texas
Abstract: Northern bobwhite (Colinus virginianus) is a species for which extensive knowledge exists regarding its ecology, life history, and habitat. Although the qualitative aspects of bobwhite habitat have been described and known for many decades, researchers have neglected to characterize bobwhite habitat quantitatively (i.e., habitat selection). Thus, biologists have been capable of identifying components that compose bobwhite habitat but have only been able to speculate on how much of each component was necessary. We documented selection–avoidance behavior of nesting bobwhites in Brooks County, Texas, USA, during May–August, 2004–2005. We measured 5 vegetation features (i.e., nesting-substrate ht and width, suitable nest clump density, herbaceous canopy coverage, and radius of complete visual obstruction) at nest sites (n = 105) and at random points (n = 204). We used continuous selection functions to assess habitat use and identify bounds of suitability. Selection domains for nesting-substrate height and radius of complete visual obstruction were 16.9–31.2 cm and 1.05–4.35 m, respectively. Across all measurements, bobwhites selected for nest sites with a nesting-substrate width ≥Ą22.4 cm, suitable nest-clump density ≥Ą730 nest clumps/ha, and herbaceous canopy coverage ≥Ą36.7%. This knowledge will provide an important foundation for managers to evaluate current nesting conditions on semiarid rangelands and provide a basis for habitat management aimed at creating suitable nesting habitat for bobwhites.

567. **Habitat type conservation and restoration for the Karner blue butterfly. A case study from Wisconsin.**
Kleintjes, Paula K.; Sporrong, Jill M.; Raebel, Christopher A.; and Thon, Stephen F.
Ecological Restoration 21(2): 107-115. (2003); ISSN: 1522-4740
Descriptors: conservation measures/ terrestrial habitat/ land zones/ Lycaeides melissa samuelis: habitat management/ sand prairie habitat mitigation and management case study/ grassland/ sand prairie/ Wisconsin/ Fairchild/ Insecta, Lepidoptera, Glossata, Heteroneura, Papilionoidea, Lycaenidae/ arthropods/ insects/ invertebrates/ Lepidopterans

568. **Habitat use by loggerhead shrikes (Lanius ludovicianus) at Midewin National Tallgrass Prairie, Illinois: An application of Brooks and Temple's habitat suitability index.**
Fornes, G. L.
American Midland Naturalist 151(2): 338-345. (2004)
NAL Call #: 410 M58; ISSN: 00030031
Descriptors: bird/ ecological modeling/ habitat quality/ habitat use/ index method/ Illinois/ Midewin National Tallgrass Prairie/ Lanius ludovicianus
Abstract: Declines in loggerhead shrike populations have been attributed to pesticide use and habitat loss on the breeding grounds and factors outside the breeding range. To determine the role of breeding habitat limitation, Brooks and Temple (1990) designed a habitat suitability index for shrikes based on data from Minnesota. This paper describes an application of their model to a site in Illinois. Like Brooks and Temple, I found that breeding habitat does not appear to limit shrike populations and shrikes seem to be making settlement choices based on discernable habitat criteria. I suggest changes to the model for adaptation to Illinois shrike populations, including an adjustment of the cutoff for "suitable" habitat, an adjustment of the conversions of variables leading to the calculation of the index (V4 to SI4), the use of GIS to measure variables (usable foraging habitat) and the addition of variables (length of fence) used in the model.

569. **Habitat use, nest success, and management recommendations for grassland birds of the Canaan Valley National Wildlife Refuge, West Virginia.**
Warren, Kelly Ann. West Virginia University, 2002.
Notes: Degree: MS; Advisor: Anderson, James T.
Descriptors: birds/ grasslands/ mowing/ habitat management/ grazing/ pasture/ prairie/ meadows/ breeding/ survival/ urbanization/ wind/ Canaan Valley National Wildlife Refuge/ West Virginia
Abstract: Grassland bird populations have been declining due to increased habitat fragmentation, urbanization, and conversion of farmlands to other uses throughout the United States. However, idle hayfields and pastures in the eastern United States may provide adequate nesting habitat for grassland species displaced from their native habitat. The objectives of this study were to: (1) compare grassland bird abundance, diversity, and richness of species between 3 idle hayfields and 3 pastures and between mowed and unmowed treatments, and (2) compare grassland bird nest success between hayfields and pastures, and between mowed and unmowed treatments on the Canaan Valley National Wildlife Refuge, West Virginia during the summers of 1999-2000. A total of 27 species was found on the refuge. The predominant grassland species were bobolinks Dolichonyz oryzivorus, savannah sparrows Passerculus sandwichensis , and eastern meadowlarks Sturnella magna. Overall bird abundance differed between mowed (x- = 0.61; SE = 0.09) and unmowed (x- = 0.32; SE = 0.06) treatments in pastures P = 0.033). Grassland bird diversity differed between mowed plots of hayfields (x- = 0.85; SE = 0.21) and pastures (x- = 1.57; SE = 0.26) P = 0.026). Mayfield nest survival did not differ between nests found in hayfields and pastures, and mowed and unmowed treatments. While nest success did not differ between mowed and unmowed treatments, mowing these fields at the conclusion of the breeding season will provide long team advantages to grassland birds nesting on the refuge. Additionally, grassland birds appeared to be responding to the vegetative structure and vertical diversity within fields rather than field size. Management should focus on removal of internal edges (i.e., remnant fencelines, hedgerows, and wind breaks) found throughout the grasslands on the refuge.
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570. **Habitat use of western spotted skunks and striped skunks in Texas.**
Neiswenter, Sean A. and Dowler, Robert C.
Journal of Wildlife Management 71(2): 583-586. (2007)
NAL Call #: 410 J827; ISSN: 0022-541X
Descriptors: Carnivora/ Mustelidae/ Mephitis mephitis/ Spilogale gracilis/ wildlife management/ habitat use/ foraging habitat use in fragmented habitat/ mixed open pasture and mesquite stands/ ecosystems/ Texas/ Tom Green County, San Angelo/ land zones
Abstract: Little information on foraging habitats of sympatric species of skunks in Texas, USA, is available. We compared 11 western spotted skunks (Spilogale gracilis) and 10 striped skunks (Mephitis mephitis) using radiotelemetry data to assess habitat use during foraging at broad levels of selection in a fragmented habitat. Western spotted skunks used areas with more large mesquite (Prosopis glandulosa) trees than did striped skunks and randomly selected points. Striped skunk habitat use was not different from randomly chosen locations. Contrary to previous research, both species appear to avoid agricultural habitat. A habitat management plan may be difficult to implement for striped skunks in Texas because they did not favor any available habitat. Conservation of western spotted skunks in west-central Texas should focus on areas with older mesquite trees, areas that are now often brush controlled for management of livestock.
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571. **Hayfield management and wildlife conservation: Can the needs of the farmer fit with habitat needs of wildlife?**
Parsons, G.; Nocera, J. J.; Milton, G. R.; and Fredeen, A. H.
Canadian Journal of Plant Science 87(3): 529. (2007)
NAL Call #: 450 C16; ISSN: 0008-4220.
Notes: Annual Conference of the Canadian-Society-of-Agronomy/Canadian-Society-for-Horticultural-Science/Canadian-Society-of-Animal-Science, Halifax, Canada; August 01 -04, 2006. http://nsac.ca/pas/instind/pasturec/Conferences/Symposium_2003/Grasslands/Schedule_Abstracts.htm
Descriptors: terrestrial ecology: ecology, environmental sciences/ wildlife management: conservation/ wildlife conservation/ agro ecosystem/ grassland habitat/ hayfield management/ management scheme/ bird breeding/ habitat needs/ ecologically productive area/ habitat conservationist/ delayed hay cutting
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572. **A home on the range.**
Peabody, E. and McGinnis, L.
Agricultural Research 54(11-12): 10-13. (Nov. 2006-Dec. 2006)
NAL Call #: 1.98 Ag84
Descriptors: range management/ rangelands/ Centrocercus urophasianus/ wildlife habitats/ habitat conservation/ Artemisia/ prescribed burning/ plant production range and pasture grasses/ natural resources, environment, general ecology, and wildlife conservation
This citation is from AGRICOLA.

573. **Home range and dispersal of Texas tortoises, gopherus berlandieri, in a managed thornscrub ecosystem.**
Kazmaier, Richard T.; Hellgren, Eric C.; and Ruthven, Donald C.
Chelonian Conservation and Biology 4(2): 488-496. (2002); ISSN: 1071-8443
Descriptors: conservation measures/ behavior/ ecology/ terrestrial habitat/ land zones/ Gopherus berlandieri: habitat management/ home range/ patterns and influences/ distribution within habitat/ Dispersal/ scrub/ managed thornscrub ecosystem/ Texas/ Chaparral Wildlife Management Area/ Reptilia, Anapsida, Testudines, Cryptodira, Testudinidae/ chordates/ reptiles/ vertebrates
Abstract: Southern Texas is dominated by Prosopis-Acacia mixed brush communities typical of the Tamaulipan Biotic Province, and the geographic range of the state-threatened Texas tortoise (Gopherus berlandieri) is nearly identical to the boundaries of this biotic province in Texas. In light of habitat fragmentation throughout southern Texas, we assessed home range use, movements, and natal dispersal of Texas tortoises at a managed site in the western Rio

Grande Plains. Home ranges were larger for males (7-46 ha) than females (3-9 ha) regardless of method of home range calculation. Home range sizes determined by minimum convex polygon and bivariate normal methods were larger for individuals in ungrazed pastures (4-46 ha) relative to grazed pastures (3-15 ha), but home ranges derived from fixed and adaptive kernel estimators did not differ by treatment. Apparent treatment differences may be an artifact of an inability to adequately pair study areas given the scale of tortoise movement. Average distance between relocations indicated that males (74-153 m) moved more than females (31-41 m), but we did not detect differences in movement distances associated with grazing by cattle. Based on recapture distances of juveniles and adults, Texas tortoises appeared to exhibit male-biased natal dispersal. Our data suggest that Texas tortoises are highly mobile and may be capable of recolonizing across long distances following disturbance. Large home ranges suggest tortoises require large blocks of habitat to maintain stable populations. Populations of tortoises inhabiting small thornscrub fragments in the Lower Rio Grande Valley maybe constrained by patch size of available habitat and have reduced recruitment because of dispersal losses.

574. **Home-range size, response to fire, and habitat preferences of wintering Henslow's sparrows.**
Bechtoldt, C. L. and Stouffer, P. C.
Wilson Bulletin 117(3): 211-225. (2005)
NAL Call #: 413.8 W692; ISSN: 00435643
Descriptors: burning/ habitat selection/ home range/ movement/ overwintering/ passerines/ range size/ relative abundance/ Louisiana/ Ammodramus henslowii/ Andropogon/ Aves/ Passeridae/ Pinus palustris
Abstract: Henslow's Sparrow (Ammodramus henslowii) is a declining, disturbance-dependent grassland bird that winters in the longleaf pine (Pinus palustris) ecosystem of the southeastern United States. During two winters (2001, 2002), we estimated the relative abundances, movement patterns, and habitat associations of Henslow's Sparrows wintering in habitat patches differing in time since last burn (burn treatment). We conducted our study in southeastern Louisiana in Andropogon spp.-dominated longleaf pine savanna habitat. Henslow's Sparrows were most abundant in savannas burned the previous growing season, with a mean relative abundance of 2.6 individuals/ha. The most dramatic decline occurred between burn year 0 and year 1 (first and second winters after burning), when mean relative abundance dropped to 1.0 individual/ha. Home-range size of radio-tagged birds was not correlated with burn treatment. All radio-tagged individuals maintained stable home ranges, with a mean size of 0.30 ha. Vegetation characteristics differed significantly among burn treatments. Sites burned the previous growing season had low vegetation density near the ground, vegetation taller than 1.0 m, and high seed abundance. These variables were all highly correlated with Henslow's Sparrow relative abundance, but seed density best predicted Henslow's Sparrow numbers. We recommend a biennial, rotational burn regime to maintain habitat characteristics correlated with Henslow's Sparrow abundance.

575. **The impact of buffer strips and stream-side grazing on small mammals in southwestern Wisconsin.**
Chapman, E. W. and Ribic, C. A.
Agriculture, Ecosystems and Environment 88(1): 49-59. (2002)
NAL Call #: S601.A34; ISSN: 0167-8809
Descriptors: pastures/ habitats/ cattle/ small mammals/ ecosystems/ streams/ animal husbandry/ rotational grazing/ species diversity/ farm management/ riparian buffers/ plant litter/ intensive livestock farming
Abstract: The practice of continuously grazing cattle along streams has caused extensive degradation of riparian habitats. Buffer strips and managed intensive rotational grazing (MIRG) have been proposed to protect and restore stream ecosystems in Wisconsin. However, the ecological implications of a switch from traditional livestock management to MIRG or buffer strip establishment have not been investigated. Differences in small mammal communities associated with riparian areas on continuously grazed and MIRG pastures, as well as vegetative buffer strips adjacent to row crops, were investigated in southwestern Wisconsin during May-September 1997 and 1998. More species (mean of 6-7) were found on the buffer sites than on the pasture sites (mean of 2-5). Total small mammal abundance on buffer sites was greater than on the pastures as well; there were 3-5 times as many animals on the buffer sites compared to the pasture sites, depending on year. There were no differences in species richness or total abundance between MIRG and continuously grazed pastures in either year. Total small mammal abundance was greater near the stream than away from the stream, regardless of farm management practice but there were no differences in species richness. Buffer strips appear to support a particularly rich and abundant small mammal community. Although results did not detect a difference in small mammal use between pasture types, farm-wide implications of a conversion from continuous to MIRG styles of grazing may benefit small mammals indirectly by causing an increase in the prevalence of pasture in the agricultural landscape.
This citation is from AGRICOLA.

576. **Impact of grazing management on biodiversity of grasslands.**
Tallowin, J. R. B.; Rook, A. J.; and Rutter, S. M.
Animal Science 81(2): 193-198. (2005)
NAL Call #: SF1.A56; ISSN: 1357-7298
Descriptors: biodiversity/ biological indicators/ botanical composition/ fauna/ grassland management/ grasslands/ grazing/ lowland areas/ nature conservation/ plant succession/ species diversity/ species richness/ stand structure/ weeds
Abstract: This paper reviews recent work carried out by the Institute of Grassland and Environmental Research and collaborating organizations that addresses some of the impacts of grazing management on both species-rich and species-poor lowland neutral grassland. Results indicate that for species-rich grassland, lenient grazing pressure maintained botanical diversity and the abundance of positive indicator species of nature conservation value over a 5-year period and also enhanced faunal diversity and abundance reflecting improvements in spatial, architectural and temporal structure. However, there was no enhancement in positive indicator species and there was also an increase in pernicious weeds suggesting that

grazing alone may not suffice to deliver all the biodiversity goals for these grasslands and that additional management interventions may be required. For species-poor grassland, results indicate that distinctive differences in structure can lead to differences in faunal diversity. There is also some tentative evidence that livestock breed may affect invertebrate species assemblages.

577. **Impact of herbivores on nitrogen cycling: Contrasting effects of small and large species.**
Bakker, E. S.; Olff, H.; Boekhoff, M.; Gleichman, J. M.; and Berendse, F.
Oecologia (Berlin) 138(1): 91-101. (2004)
NAL Call #: QL750.O3; ISSN: 0029-8549
Descriptors: biomass/ body size/ exclosure experiments/ floodplain grasslands: habitat/ grazing behavior/ herbivory/ laboratory conditions/ litter accumulation/ microclimates/ nitrogen cycling/ plant animal interactions/ soil parameters/ vegetation
Abstract: Herbivores are reported to slow down as well as enhance nutrient cycling in grasslands. These conflicting results may be explained by differences in herbivore type. In this study we focus on herbivore body size as a factor that causes differences in herbivore effects on N cycling. We used an exclosure set-up in a floodplain grassland grazed by cattle, rabbits and common voles, where we subsequently excluded cattle and rabbits. Exclusion of cattle lead to an increase in vole numbers and a 1.5-fold increase in net annual N mineralization at similar herbivore densities (corrected to metabolic weight). Timing and height of the mineralization peak in spring was the same in all treatments, but mineralization in the vole-grazed treatment showed a peak in autumn, when mineralization had already declined under cattle grazing. This mineralization peak in autumn coincides with a peak in vole density and high levels of N input through vole faeces at a fine-scale distribution, whereas under cattle grazing only a few patches receive all N and most experience net nutrient removal. The other parameters that we measured, which include potential N mineralization rates measured under standardized laboratory conditions and soil parameters, plant biomass and plant nutrient content measured in the field, were the same for all three grazing treatments and could therefore not cause the observed difference. When cows were excluded, more litter accumulated in the vegetation. The formation of this litter layer may have added to the higher mineralization rates under vole grazing, through enhanced nutrient return through litter or through modification of microclimate. We conclude that different-sized herbivores have different effects on N cycling within the same habitat. Exclusion of large herbivores resulted in increased N annual mineralization under small herbivore grazing.

578. **The impact of land-use practices on native earthworm populations in California grasslands.**
Winsome, Thais; Hendrix, Paul F.; and Epstein, Lynn E.
In: 86th Annual Meeting of the Ecological Society of America. Madison, Wisconsin; 2001.
Notes: Meeting abstract (poster session).
http://abstracts.co.allenpress.com/pweb/esa2001/document/?ID=28775
Descriptors: terrestrial ecology: ecology, environmental sciences/ wildlife management: conservation/ disturbance intensity/ grasslands: land use practices, native earthworm populations
Abstract: California's grasslands and oak woodlands support a unique, indigenous earthworm fauna that may be vulnerable to displacement by exotic earthworm species, especially in areas impacted by human activity. As part of an ongoing conservation effort, we conducted a 3-year study in a northern California grassland to identify land-use factors that facilitate the displacement of native species. Populations were sampled within habitats ranging from unmanaged grassland-woodland reserve areas to intensively managed pastures, vineyards, and orchards. Spatial analysis of the data revealed that at the landscape scale, disturbance intensity was the best predictor of native earthworm abundance. Probabilities for the occurrence of native species ranged from 0 in croplands to 1 in undisturbed chaparral and grassland-oak woodland reserves. Probabilities for exotic species were almost exactly the opposite and ranged from <0.1 in wildland reserves to 1 in the intensively managed pastures and croplands. In pastures supporting a mixture of native and exotic species, the abundance of native species was significantly lower ($P<0.001$) in clover-amended, fertilized pastures (0-15 m^{-2}) compared with unmanaged pastures (78-201 m^{-2}). Our results suggest that complete displacement of native by exotic species is likely to occur only in heavily disturbed areas or where environmental conditions (e.g. resource quality) are optimal. Thus, critical strategies for the conservation of native earthworm species are those that focus on limiting habitat loss and alteration

579. **The impact of livestock on lapwing Vanellus vanellus breeding densities and performance on coastal grazing marsh.**
Hart, J. D.; Milsom, T. P.; Baxter, A.; Kelly, P. F.; and Parkin, W. K.
Bird Study 49(1): 67-78. (2002); ISSN: 0006-3657
Descriptors: grazing/ livestock/ marshes/ population density/ breeding sites/ breeding success/ agriculture/ environmental impact/ nature conservation/ population dynamics/ Vanellus vanellus/ northern lapwing/ livestock grazing/ aquatic birds
Abstract: Even at very low stocking densities, livestock reduce breeding densities of adult Lapwings and increase the risk of nest loss due to predation. To assess the effects of livestock on Lapwings breeding on coastal grazing marshes. Densities of breeding adults, clutch sizes, laying dates, incubation schedules, clutch and chick survival were compared between marshes grazed at low stocking densities (0.2-0.51 livestock units/ha) and marshes where livestock had been excluded. Repeated measurements of sward heights were also made. Breeding densities in 1995 and 1997, but not 1996, were negatively correlated with the presence of livestock. Though few nests were trampled, livestock disrupted incubation schedules and increased the risk of nest predation. Clutches were smaller on grazed marshes than on ungrazed marshes, while more clutches were also laid later on grazed marshes. Grazed swards remained shorter, and more suitable for nesting, longer than ungrazed swards but clutches laid later in the season were more likely to be predated. The exclusion of livestock from selected areas to increase the nesting success of

lapwings is a desirable option on coastal grazing marshes where the rate of grass growth is slow in spring. Grazing regimes are suggested that would maintain relatively short swards, provide refuge to Lapwings from livestock during the peak nesting period, and allow grazers to exploit all of their marshes.

580. **Impact of precipitation and grazing on the water vole in the Beartooth Mountains of Montana and Wyoming, U.S.A.**
Klaus, M.; Moore, R. E.; and Vyse, E.
Arctic Antarctic and Alpine Research 31(3): 278-282. (1999)
NAL Call #: GB395.A73; ISSN: 1523-0430
Descriptors: grazing/ mountain grasslands/ precipitation/ indicators/ survival/ watersheds/ nature conservation/ Microtus richardsoni
Abstract: The influence of increased precipitation levels and grazing on the demographics of Microtus richardsoni was examined. Water voles were trapped and marked during the summers of 1990, 1991 and 1992 along four headwater watersheds of the Clark's Fork of the Yellowstone River in Wyoming and Montana. The summer of 1992 had more than double the precipitation of either 1990 or 1991. During the wet summer of 1992, capture success was significantly greater, as was the proportion of young voles captured. In 1992, several factors contributed to increased water vole populations. There were significantly more indications of male reproductive activity. Class I water voles (13-49 g) of both sexes showed signs of reproductive activity indicating they were reaching sexual maturity at smaller body mass. Significantly more embryos/trap-killed female were found. In 1995, the water vole was listed as a sensitive species because it is rare and requires specific alpine riparian habitat that is declining and may be damaged by poor grazing practices. Capture success was significantly greater, and there were significantly more young water voles in ungrazed drainages. Measured indicators of reproductive activity did not vary significantly between grazed and ungrazed drainages. It is concluded that grazing might affect survival of young water voles and should be studied further.

581. **Impact of prescribed burning on endophytic insect communities of prairie perennials (Asteraceae: Silphium spp.).**
Tooker, John F. and Hanks, Lawrence M.
Biodiversity and Conservation 13(10): 1875-1888. (2004)
NAL Call #: QH75.A1B562; ISSN: 0960-3115
Descriptors: conservation measures/ ecology/ terrestrial habitat/ abiotic factors/ physical factors/ land zones/ Insecta: habitat management/ prescribed burning/ Impact on endophytic community of prairie perennials/ community structure/ Endophytic taxa of prairie perennials/ impact of prescribed burning/ grassland/ prairie perennials/ Endophytic community/ fire/ Illinois/ Central/ Endophytic communities of prairie perennials/ Insecta/ arthropods/ insects/ invertebrates
Abstract: Prescribed burning currently is used to preserve endemicity of plant communities in remnant tallgrass prairies. Although some types of arthropods benefit from changes in plant communities brought about by burning, other species that are endemic to prairies may be threatened. Because they inhabit the 'fuel layer' of prairies, endophytic insects would seem particularly susceptible to this management tactic. In this paper, we assess the impact of prescribed burning on endophytic insect communities inhabiting stems of Silphium laciniatum L. and S. terebinthinaceum Jacquin (Asteraceae), endemic prairie plants. Populations of these insects were decimated by burning, with mortality approaching 100% in most cases. Their populations nevertheless began to rebound within a single growing season, with densities moderately but significantly reduced 1 year after the burn. Even when a prairie remnant was completely incinerated, plant stems were recolonized by insects within one growing season. Our findings suggest that sufficient numbers of endophytic insects survive burns in remains of Silphium to recolonize burned areas the following year.

582. **The impact of recreational trails and grazing on small mammals in the Colorado piedmont.**
Meaney, Carron A.; Ruggles, Anne K.; Clippinger, Norman W.; and Lubow, Bruce C.
Prairie Naturalist 34(3-4): 115-136. (2002)
NAL Call #: QH540.P7; ISSN: 0091-0376
Descriptors: Akaiki's information criteria: mathematical and computer techniques/ analysis of variance: mathematical and computer techniques/ grazing/ recreational trails/ relative abundance/ species diversity/ species richness
Abstract: We conducted a three-year study of the impact of recreational trails and grazing on species richness, relative abundance, and species diversity of small mammals at six paired sites with and without trails along South Boulder Creek, Boulder, Colorado. In our analysis, we used a set of alternative models, which we evaluated using Akaiki's Information Criteria (AIC) to compute strength of evidence supporting each alternative and then made all inferences based on weighted averages of these model results. Our data provided strong evidence for an increase (2.0 individuals per 100 trap nights ± 0.51 SE) of deer mice (Peromyscus maniculatus) on the grazed sites, but little evidence for effects on relative abundance of other species or on species richness or diversity. Repeated measures ANOVA results for paired trail and non-trail sites showed only weak evidence for a negative effect of trails on species richness, species diversity, and relative abundance. In addition to small mammal trapping, we employed mark-recapture techniques on Preble's meadow jumping mouse (Zapus hudsonius preblei), a federally listed threatened subspecies of the meadow jumping mouse, to determine linear population density estimates of this subspecies on the trail and non-trail sides of the creek. Repeated measures ANOVA for these density estimates provided weak evidence for a possible negative trail effect (-11.6 individuals/km ± 9.5 SE) that was greater in males than females. Although the low precision of these estimates makes the results inconclusive, the magnitude of the estimated effect (a 31% lower population density of Preble's meadow jumping mice on sites with trails) highlights the need for careful management and additional research. Our data revealed large natural temporal and spatial variation in these populations that resulted in poor precision of estimated effects of interest.

583. **Impact of soybean conservation systems on bobwhite quail habitat and mortality.**
Eggert, D.; Frederick, J. R.; Robinson, S. J.; and Bowerman, W.
In: Proceedings of the 26th Southern Conservation Tillage-Conference for Sustainable Agriculture. Raleigh, NC.; pp. 237-245; 2004.
Descriptors: beneficial organisms/ conservation tillage/ habitats/ mortality/ no tillage/ soyabeans/ tillage/ Colinus virginianus/ Glycine Fabaceae/ Glycine max
Abstract: Conservation-tillage systems on the Southeastern Coastal Plain now utilize practices such as minimum surface tillage, narrow row widths, and planting of herbicide-tolerant varieties. These systems can result in many economical, environmental, and ecological benefits, including providing a more suitable habitat for wildlife such as the northern bobwhite quail (Colinus virginianus). Our research objectives were to assess the possible ecological impacts of both an innovative soybean (Glycine max L. Merr) tillage system (no-till) and traditional soybean system (tilled) on quail habitat and preference. Variables measured were insect abundance, canopy closure and pen-raised quail habitat use. No-till soybean fields were found to have the greatest abundance of orthopteran (crickets/grasshoppers), arachnid (spiders), and coleopteran/hemipteran (centipedes/beetles) insects. Insect numbers were higher in the no-till system than in the tilled system, field borders, and forested areas. The tilled system generally had the second highest number of insects, followed by field borders and forested areas. Canopy closure as estimated by light transmittance through the canopy, was faster and more complete in the no-till system than the tilled system due to the narrower row width used with the no-till system. Pen-raised quail were found more frequently in the no-till system than the tilled system a majority of the time. Greater quail use of the tilled system only occurred at one field. Field borders and forested areas were used less than either tillage systems. Averaged over treatments and release days, the greatest cause of mortality was due to mammals. These results indicate that no-till systems are more beneficial to quail than traditional systems in terms of habitat quality.
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584. **Impact on rodents of mowing strips in old fields of eastern Kansas.**
Slade, Norman A. and Crain, Shelley
Journal of Mammalogy 87(1): 97-101. (2006)
NAL Call #: 410 J823; ISSN: 0022-2372
Descriptors: Muridae/ Rodentia/ Microtus ochrogaster/ Peromyscus leucopus/ Peromyscus maniculatus/ Reithrodontomys megalotis/ Sigmodon hispidus/ deer mice/ harvest mice/ hispid cotton rat/ Microtus ochrogaster/ Peromyscus leucopus/ prairie vole/ white-footed mice/ biogeography/ conservation/ wildlife management/ habitat use/ grasslands/ ecosystems/ grassland habitat management/ Jefferson County/ Nelson Environmental Study Area/ Kansas/ land zones/ old field habitat/ population ecology/ strip mowing/ woody vegetation invasion/ abundance/ disturbance/ habitat fragmentation/ microtus/ movements/ landscape management/ prairie/ dispersion/ field technique
Abstract: To minimize impact on small mammals while preventing invasion of woody vegetation, we mowed alternating 15-m strips Oil Our area. We their compared numbers and movements of 5 species of rodents on mowed and unmowed strips. Numbers of hispid cotton rats (Sigmodon hispidus) and prairie voles (Microtus ochrogaster) were reduced temporarily in the mowed strips, whereas numbers of white-footed mice (Peromyscus leucopus), deer mice (P. maniculatus), and western harvest mice (Reithrodontomys megalotis) did not change significantly. Movements of cotton rats, prairie voles, and harvest mice across mowed strips were reduced, whereas movements within unmowed strips were relatively unaffected, decreasing only for white-footed and harvest mice in I of 2 temporal replicates. Changes in numbers and movements were of short duration, and hence mowing narrow strips when vegetation Could recover rapidly had little sustained impact on this rodent community.
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585. **Impacts of a late season grazing scheme on nongame wildlife in a Wallowa Mountain riparian ecosystem.**
Kauffman, J. B.; Kreuger, W. C.; and Vavra, M.
In: Proceedings of the Wildlife-Livestock Relationships Symposium. Coeur D'alene, Idaho. Peek, James M. and Dalke, P. D. (eds.)
Moscow, Idaho: Forest, Wildlife and Range Experiment Station, University of Idaho; pp. 208-220; 1982.
NAL Call #: SF84.84.W5 1981
Descriptors: Oregon/ grazing/ livestock/ wildlife/ riparian areas

586. **Impacts of domestic livestock grazing on small mammals of forest grazing allotments in southeastern Idaho.**
Johnson, S. J.
In: Proceedings of the Wildlife-Livestock Relationships Symposium. Coeur D'alene, Idaho. Peek, James M. and Dalke, P. D. (eds.)
Moscow, Idaho: Forest, Wildlife and Range Experiment Station, University of Idaho; pp. 242-250; 1982.
NAL Call #: SF84.84.W5 1981
Descriptors: Idaho/ livestock/ grazing/ small mammals/ wildlife
This citation is from AGRICOLA.

587. **Impacts of rotational grazing and riparian buffers on physicochemical and biological characteristics of southeastern Minnesota, USA, streams.**
Sovell, Laurie A.; Vondracek, Bruce; Frost, Julia A.; and Mumford, Karen G.
Environmental Management 26(6): 629-641. (2000)
NAL Call #: HC79.E5E5 ; ISSN: 0364-152X
Descriptors: principal component analysis: pca, mathematical method/ canopy cover/ grass buffers/ pastures: continuously grazed, rotationally grazed/ percent fines: streambed/ physical habitat: stream quality parameter/ riparian buffer management/ riparian management/ stream quality/ stream restoration/ turbidity/ water chemistry: stream quality parameter/ watershed/ wood buffer
Abstract: We assessed the relationship between riparian management and stream quality along five southeastern Minnesota streams in 1995 and 1996. Specifically, we examined the effect of rotationally and continuously grazed pastures and different types of riparian buffer strips on water chemistry, physical habitat, benthic

macroinvertebrates, and fish as indicators of stream quality. We collected data at 17 sites under different combinations of grazing and riparian management, using a longitudinal design on three streams and a paired watershed design on two others. Continuous and rotational grazing were compared along one longitudinal study stream and at the paired watershed. Riparian buffer management, fenced trees (wood buffer), fenced grass, and unfenced rotationally grazed areas were the focus along the two remaining longitudinal streams. Principal components analysis (PCA) of water chemistry, physical habitat, and biotic data indicated a local management effect. The ordinations separated continuous grazing from sites with rotational grazing and sites with wood buffers from those with grass buffers or rotationally grazed areas. Fecal coliform and turbidity were consistently higher at continuously grazed than rotationally grazed sites. Percent fines in the streambed were significantly higher at sites with wood buffers than grass and rotationally grazed areas, and canopy cover was similar at sites with wood and grass buffers. Benthic macroinvertebrate metrics were significant but were not consistent across grazing and riparian buffer management types. Fish density and abundance were related to riparian buffer type, rather than grazing practices. Our study has potentially important implications for stream restoration programs in the midwestern United States. Our comparisons suggest further consideration and study of a combination of grass and wood riparian buffer strips as midwestern stream management options, rather than universally installing wood buffers in every instance.

588. **The implications of grassland and heathland management for the conservation of spider communities: A review.**
Bell, J. R.; Wheater, C. P.; and Cullen, W. R.
Journal of Zoology 255(3): 377-387. (2001)
NAL Call #: QL1.J68; ISSN: 0952-8369
Descriptors: grassland management/ grasslands/ grazing/ habitats/ wildlife conservation
Abstract: Both intensity and type of habitat management in grasslands and heathlands affect spider communities. With high intensity management, spider communities often lack diversity and are dominated by a few r-selected species affiliated with bare ground. Low intensity management produces more complex communities introducing more niches for aerial web spinners and climbing spiders. The preferred management will be site-dependent and may not be appropriate for all spiders in all situations, particularly for some rare or threatened species. Providing natural cover is recommended when using extreme forms of management or intensive grazing (particularly by sheep). In extreme cases, or where trampling is heavy, the litter layer should be conserved. We advocate research and survey before and after major management implementation. Habitat management for spiders should not be considered alone, but integrated into a holistic plan. Management for spiders may conflict with rare plant conservation and small reserves should examine the viability of providing two contrasting regimes.

589. **The importance and future condition of western riparian ecosystems as migratory bird habitat.**
Skagen, Susan K.; Hazlewood, Rob; and Scott, Michael L.
In: Bird Conservation Implementation and Integration in the Americas: Proceedings of the Third International Partners in Flight Conference, General Technical Report-PSW 191/ Ralph, C. J. and Rich, T. D.; Albany, CA: Pacific Southwest Research Station, Forest Service, U.S. Department of Agriculture, 2005. pp. 525-527.
Notes: 0196-2094 (ISSN).
Descriptors: conservation measures/ ecology/ terrestrial habitat/ land zones/ habitat management/ riparian ecosystems/ migratory species/ habitat utilization/ riparian habitat/ United States, western region/ Aves/ birds/ chordates/ vertebrates
Abstract: Riparian forests have long been considered important habitats for breeding western landbirds, and growing evidence reinforces their importance during the migratory period as well. Extensive modification of natural flow regimes, grazing, and forest clearing along many rivers in the western U.S. have led to loss and simplification of native riparian forests and to declines and endangerment of riparian- dependent birds species. Efforts to conserve, restore, and manage the distinctive biological diversity of riparian ecosystems must rest upon a clear understanding of the primary physical and biological process that structure and maintain that diversity on a landscape scale.

590. **Importance of in situ survival, recolonization, and habitat gaps in the postfire recovery of fire-sensitive prairie insect species.**
Panzer, R.
Natural Areas Journal 23(1): 14-21. (2003)
NAL Call #: QH76.N37; ISSN: 08858608
Descriptors: Homoptera/ Lepidoptera/ prairie insects/ prescribed burning/ tallgrass prairie/ community dynamics/ habitat management/ insect/ prairie/ prescribed burning/ recolonization/ survival/ United States/ Aflexia rubranura/ Cicadellidae/ Homoptera/ Lepidoptera/ Noctuidae/ Papaipema eryngii
Abstract: I investigated the roles of in situ survival and recolonization in the postfire recovery of fire-sensitive insect species within isolated tallgrass prairie remnants in Illinois, northwest Indiana, and southeast Wisconsin, USA. I examined the extent to which commonly encountered habitat gaps suppress recovery among several taxa and tested the pivotal assumption that small populations are readily extirpated when their requisite habitats are completely burned. Both in situ survival and recolonization were found to contribute appreciably to postfire recovery within the spatial and temporal scales examined. Combined recovery times for 22 species separated from unburned units by roads or other barriers were not greater than those for populations in burn units abutting unburned tracts. The flightless leafhopper Aflexia rubranura (DeLong) and the sedentary moth Papaipema eryngii Bird readily crossed habitat gaps as large as 36 m and 25 m, respectively. When 6-m gaps were covered with tar paper in the Aflexia experiment, colonization of outlying patches was reduced, but not stopped. I conclude that burn unit designs that provide adjacent or nearby refugia, coupled with procedures that promote patchiness within burned units, can be expected to contribute appreciably to the rapid recovery of fire-sensitive species.

591. **Importance of riparian habitats for small mammal and herpetofaunal communities in agricultural landscapes of southern Quebec.**
Maisonneuve, C. and Rioux, S.
Agriculture, Ecosystems and Environment 83(1-2): 165-175. (2001)
NAL Call #: S601.A34; ISSN: 01678809.
Notes: doi: 10.1016/S0167-8809(00)00259-0.
Descriptors: agricultural landscapes/ herpetofauna/ Quebec/ riparian strips/ small mammals/ agricultural ecosystem/ community structure/ herpetofauna/ riparian zone/ Amphibia/ Anura/ Blarina brevicauda/ Bufo americanus/ Clethrionomys gapperi/ Cricetinae/ Mammalia/ Peromyscus maniculatus/ Rana pipiens/ Rana sylvatica/ Reptilia/ Riparia/ Sorex cinereus/ Sorex fumeus/ Zapus hudsonius
Abstract: The presence of adequate riparian strips in agricultural landscapes is generally recognized to contribute to the reduction of the impacts of agricultural practices on the water quality of streams, to regularize water temperature and to help in the creation of important wildlife habitats. This study aimed at determining the importance of riparian strips in agricultural landscapes of southern Quebec for small mammal and herpetofaunal communities, and verifying farmers' general belief that these habitats become shelters for species considered as agricultural pests. Abundance, composition and diversity of communities were compared between three types of riparian strips: herbaceous, shrubby and wooded. A total of 1460 small mammals belonging to 14 species and 329 amphibians and reptiles belonging to 11 species were captured with line trapping and drift fences. The generalist species Sorex cinereus, Zapus hudsonius, Blarina brevicauda, and Bufo americanus were abundant in all three types of riparian strips. Peromyscus maniculatus, Sorex fumeus, Clethrionomys gapperi, and Rana pipiens were associated more closely to wooded strips, whereas Rana sylvatica was captured mostly in shrubby strips. The abundance of small mammals and herpetofauna increased with complexity of vegetation structure. Small mammal diversity was higher in herbaceous and wooded riparian strips, whereas the herpetofaunal community was more diverse in shrubby strips. Proportion and abundance of pest species diminished with complexity of vegetation structure, whereas insectivores increased in abundance. Maintaining woody vegetation in riparian strips should increase abundance and diversity of wildlife within agricultural landscapes where increasing development pressure is presently contributing to the conversion of such habitats to herbaceous strips. Such a management approach should also help reducing the risk of riparian strips becoming shelters for pest species.

592. **Improvement of Great Basin deer winter range with livestock grazing.**
Neal, D. L.
In: Proceedings of the Wildlife-Livestock Relationships Symposium. Coeur D'alene, Idaho. Peek, James M. and Dalke, P. D. (eds.)
Moscow, Idaho: Forest, Wildlife and Range Experiment Station, University of Idaho; pp. 61-73; 1982.
NAL Call #: SF84.84.W5 1981
Descriptors: deer/ livestock/ grazing/ Great Basin

593. **Improving northern bobwhite habitat by converting tall fescue fields to native warm-season grasses.**
Washburn, B. E.; Barnes, T. G.; and Sole, J. D.
Wildlife Society Bulletin 28(1): 97-104. (2000)
NAL Call #: SK357.A1W5; ISSN: 00917648
Descriptors: Festuca arundinacea/ glyphosate/ herbicides/ Imazapic/ native warm-season grasses/ northern bobwhite/ burning/ habitat management/ methodology/ species conservation/ wildlife management/ Colinus virginianus/ Festuca arundinacea/ Neotyphodium coenophialum
Abstract: Tall fescue (Festuca arundinacea) grasslands infected with an endophyte (Neotyphodium coenophialum) are poor wildlife habitat, and birds and mammals feeding thereon experience nutritional and reproductive problems. Converting tall fescue fields to native warm-season grasses (NWSG) is an accepted method to improve this habitat. The objective of our study was to evaluate the efficacy of techniques to kill tall fescue and establish NWSG to improve habitat for the northern bobwhite (Colinus virginianus). We tested combinations of prescribed burns and spring or fall pre-emergence applications of glyphosate (N-[phosphonomethyl]glycine) or imazapic ([±]-2-[4,5-dihydro-4-methyl-4(1-methylethyl)-5-oxo-1H-imidazol-2-yl]-5-meth yl-3-pyridinecarboxylic acid) herbicide with and without a post-emergence imazapic application. Prescribed burns, herbicide applications, and NWSG plantings were implemented in 0.1-ha treatment plots in spring and fall 1997 on 9 tall fescue fields in Kentucky. Resulting plant communities were described in fall 1998. Spring imazapic and glyphosate applications reduced ($P < 0.05$) tall fescue cover compared to the untreated controls. Among the spring treatments, imazapic applications resulted in greater ($P < 0.05$) coverage of NWSG than glyphosate applications. The best treatment to kill tall fescue and establish NWSG was a spring burn followed by a pre-emergence imazapic application and seeding NWSG. Regardless of treatment, tall fescue conversion improved the habitat characteristics of grasslands for northern bobwhites.

594. **Improving wildlife habitat on the prairies: An evaluation of the habitat conservation partnership agreement in southwestern Manitoba.**
Ramsey, D. and Walberg, B.
Environments 29(2): 43-58. (2001); ISSN: 07116780
Descriptors: agriculture/ incentives/ partnerships/ stewardship/ wildlife habitat preservation/ habitat conservation/ partnership approach/ prairie/ wildlife management/ Canada/ Anas
Abstract: Southern Manitoba's landscape, vastly altered through a century of agricultural settlement, has become further transformed with the industrialization of agriculture in recent years. One of the impacts of these changes has been the further loss of wildlife habitat. The Habitat Conservation Partnership Agreement (HCPA), financed by Ducks Unlimited Canada and coordinated through six of Manitoba's Conservation Districts in southwestern Manitoba, was a three year program (1998-2000) that offered assistance to land owners on a range of habitat initiatives. In evaluating the HCPA, this paper argues that each of the programs is innovative in attempting to maintain and improve habitat for wildlife in one of the most intensively farmed regions of Canada. Following a

description of the partnership agreement, the benefits and constraints of the initiatives within the HCPA are examined by analysing the results of a survey administered to program participants (n=123) in February 2000. The paper concludes by suggesting that because the economic conditions facing prairie farmers ultimately hinder altruistic concerns about wildlife habitat, partnership programs such as the HCPA provide important contributions to reducing the impacts of farming on such habitat.

595. **In my opinion: Grousing and grazing on national grasslands.**
Sidle, John G.
Wildlife Society Bulletin 33(3): 1139-1144. (2005)
NAL Call #: SK357.A1W5; ISSN: 0091-7648
Descriptors: Galliformes/ Phasianidae/ sharp-tailed grouse/ Tympanuchus cupido/ Tympanuchus cupido Pinnatus/ Tympanuchus phasianellus/ Tympanuchus phasianellus Jamesi/ livestock/ wildlife habitat/ habitat management/ grasslands/ South Dakota
Abstract: The article presents the author's opinion regarding livestock adjustments for wildlife habitat management on federal lands. The author's observations and opinion center around plains sharp-tailed grouse, Tympanuchus phasianellus jamesii, and greater prairie chicken, Tympanuchus cupido pinnatus, habitat on Fort Pierre National Grassland, South Dakota. These species need substantial vegetation cover and the author recognizes the role of grazing, even heavy grazing, on national grasslands. The grassland of Fort Pierre includes about 47,000 ha of mixed-grass vegetation on a rolling hill landscape just west of the Missouri River near Pierre, South Dakota. The most prevalent grass species of this island is Western wheat grass. It is an important area on the northern plains for the conservation of prairie grouse. After receiving complaints about inadequate levels of vegetation cover after livestock grazing, Fort Pierre began to develop and implement grazing management strategies to improve prairie grouse habitat conditions.

596. **Influence of cattle stocking rate on the structural profile of deer hiding cover.**
Loft, E. R.; Menke, J. W.; Kie, J. G.; and Bertram, R. C.
Journal of Wildlife Management 51(3): 655-664. (1987)
NAL Call #: 410 J827; ISSN: 0022-541X
Descriptors: Odocoileus hemionus californicus/ Odocoileus hemionus hemionus/ Populus tremuloides/ Salix spp./ Veratrum californicum/ fawn/ meadow/ riparian habitat/ grazing habitat deterioration/ Sierra Nevada/ California
Abstract: Hiding cover available for California (Odocoileus hemionus californicus) and Rocky Mountain (O. h. hemionus) mule deer was monitored during summer under no, moderate, and heavy cattle stocking rates in quaking aspen (Populus tremuloides) and meadow-riparian habitats in the central Sierra Nevada, California [USA]. Use of willow (Salix spp.) and herbaceous vegetation in meadow-riparian habitat was also measured using exclosure plots. Hiding cover in aspen and corn lily (Veratrum californicum) vegetation types was not reduced through mid-season in ungrazed treatments but was significantly ($P < 0.05$) reduced under moderate and heavy grazing. Increases in cover of aspen understory were detected after 2 years of cattle exclusion. Willow vegetation was resilient to the impacts of cattle under moderate grazing, but hiding cover was significantly ($P < 0.05$) reduced with heavy stocking rates. Browsing of willows by deer was light in ungrazed treatments but increased as the season progressed in cattle-grazed areas and as stocking rate increased. Natural weathering was partly responsible for overall hiding cover lost during the summer but reductions prior to mid-summer were attributed to cattle. The high proportion of hiding cover lost early in the season coincided with the 1st 2 months of life for fawns.

597. **Influence of fire and juniper encroachment on birds in high-elevation sagebrush steppe.**
Noson, Anna C.; Schmitz, Richard A.; and Miller, Richard F.
Western North American Naturalist 66(3): 343-353. (2006)
NAL Call #: QH1.G7; ISSN: 1527-0904
Descriptors: habitat/ terrestrial habitat/ abiotic factors/ physical factors/ land zones/ Oreoscoptes montanus/ Pipilo chlorurus/ Pooecetes gramineus/ Spizella breweri: disturbance by man/ fire suppression/ Influence on habitat vegetation structure/ breeding distributions/ forest and woodland/ sagebrush steppe/ grassland/ scrub/ fire/ decreased fire frequency/ Oregon/ Steens Mountain/ Aves, Passeriformes, Emberizidae/ birds/ chordates/ vertebrates
Abstract: We examined relationships between high-elevation sagebrush (Artemisia spp.) steppe habitats altered by prescribed fire and western juniper (Juniperus occidentalis) encroachment on breeding distributions of Brewer's Sparrows (Spizella breweri), Vesper Sparrows (Pooecetes gramineus), Green-tailed Towhees (Pipilo chlorurus), and Sage Thrashers (Oreoscoptes montanus) on Steens Mountain in Southeastern Oregon. In 2000 we conducted fixed-radius point count surveys at 172 sites encompassing burned and unburned sagebrush habitat and a range of juniper densities. For each bird species we developed habitat models using local variables measured in the field and landscape variables derived from remotely sensed data. Akaike's Information Criterion (AICc) was used to select the best-approximating model from a suite of a priori candidate models. Brewer's Sparrows, Sage Thrashers, and Green-tailed Towhees were positively related to increasing local sagebrush cover or percent sagebrush in the landscape, whereas Vesper Sparrows were negatively associated with sagebrush cover and positively related to increases in sagebrush fragmentation at local and landscape scales. Including a measure of juniper encroachment Substantially improved models for all species in the analysis. Green-tailed Towhees showed a curvilinear response to the amount of juniper in the landscape. All other species showed a strong negative relationship with juniper. Our results indicate that, although changes in sagebrush habitat associated with fire had a negative influence on sagebrush birds, juniper encroachment due to fire suppression also impacted this high-elevation sagebrush bird community.

598. **Influence of fire and other anthropogenic practices on grassland and shrubland birds in New England.**
Vickery, Peter D.; Zuckerberg, Benjamin; Jones, Andrea L.; Gregory Shrjver, W.; and Weik, Andrew P.
Studies in Avian Biology (30): 139-146. (2005)
NAL Call #: QL671.S8; ISSN: 0197-9922
Descriptors: upland sandpiper/ upland sandpipers/ vesper sparrow/ vesper sparrows/ blueberry barrens/ farmland/ grassland birds/ New England/ prescribed fire/ shrubland birds
Abstract: The extent of grassland and shrubland habitat in New England has changed dramatically over the past 400 yr. as a result of changing land uses. Presently, grasslands and shrublands in New England have been created and maintained primarily as a result of four types of habitat management: mowing, livestock grazing, clearcutting, and prescribed burning. Hayfields and pastures comprise the largest proportion of open land, approximately 718,500 ha. Clearcutting has created extensive shrubland patches in northern Maine, where 3.5% (243,000 ha) of the commercial forestland has been harvested in the past 20 yr. creating ephemeral, early successional shrublands used by a wide variety of warblers, sparrows, and other birds. The most widespread use of prescribed fire is agricultural and takes place on commercial lowbush blueberry (Vaccinium angustjfolium) barrens in Maine, where approximately 3,000 ha are burned annually. These barrens are especially important habitats for Upland Sandpipers (Bartramia longicauda) and Vesper Sparrows (Pooecetes gramineus). The scale of ecological prescribed burns in New England for habitat management of endangered ecosystems has been small; in recent years fewer than 300 ha have been burned annually. The effects of burning differ in grasslands versus shrublands. In native grasslands, burning has a strong effect on vegetation structure, which, in turn, has clear effects on most grassland specialist birds. Shrubland fires have less impact on shrubland birds because most of the woody structure remains intact.
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599. **Influence of grazing by bison and cattle on deer mice in burned tallgrass prairie.**
Matlack, Raymond S.; Kaufman, Donald W.; and Kaufman, Glennis A.
American Midland Naturalist 146(2): 361-368. (2001)
NAL Call #: 410 M58; ISSN: 0003-0031
Descriptors: commercial activities/ nutrition/ diet/ ecology/ population dynamics/ terrestrial habitat/ abiotic factors/ physical factors/ land and freshwater zones/ Bos bison (Bovidae): food plants/ impact on habitat/ grassland/ Kansas/ Flint Hills/ Konza Prairie Biological Station/ grazing impact on small mammalian population size/ tallgrass prairie habitat/ Bovidae/ Artiodactyla/ Mammalia/ chordates/ mammals/ vertebrates
Abstract: We studied the influence of grazing by bison (Bos bison) and by cattle (B. taurus) on deer mice (Peromyscus maniculatus) in tallgrass prairie at the Konza Prairie Biological Station in 1997 and 1998. Small mammals were sampled by one 10-station trapline in each of four bison-grazed enclosures, four cattle-grazed enclosures and four ungrazed sites. Enclosures were 4.9 ha and the biomass of grazers in each was similar. All sites were burned annually. We sampled small mammals for 4 consecutive nights in spring before fire, in spring after fire and in autumn. Deer mice were the most abundant species (n=285; 83% of all small mammals) captured in all treatments and in each trapping period. Deer mice were significantly more abundant in bison-grazed and cattle-grazed sites than in ungrazed sites in spring before fire ($P<0.01$ and $P<0.05$, respectively), but were similar in abundance in grazed and ungrazed sites following fire. Abundance of deer mice was significantly higher in bison-grazed sites than in cattle-grazed and ungrazed sites in autumn ($P<0.05$ and $P<0.001$, respectively). Bison and cattle differ in grazing and nongrazing behaviors (e.g., wallowing by bison) that result in differences in vegetation structure. It is likely that differences in deer mouse abundance between bison-grazed and cattle-grazed treatments were due to differences in vegetation structure caused by the two types of grazers.
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600. **Influence of grazing treatments on nongame birds and vegetation structure in south central North Dakota.**
Messmer, Terry Allan. North Dakota State University, 1991.
Descriptors: behavior/ breeding/ birds/ habitat use/ habitat alterations/ grazing/ livestock/ habitat disturbance/ habitat changes/ Ammodrmus savannarum/ food supply/ North Dakota
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601. **The influence of habitat diversity and structure on bird use of riparian buffer strips in coastal forests of British Columbia, Canada.**
Shirley, S.
Canadian Journal of Forest Research 34(7): 1499-1510. (2004)
NAL Call #: SD13.C35; ISSN: 00455067.
Notes: doi: 10.1139/X04-038.
Descriptors: forestry/ vegetation/ coastal forests/ habitat structures/ riparian habitats/ biodiversity/ abundance/ avifauna/ buffer zone/ community structure/ coniferous forest/ habitat structure/ riparian forest/ species richness/ biodiversity/ birds/ plants/ British Columbia/ Canada/ North America/ Vancouver Island/ Aves/ Riparia
Abstract: I investigated the role of habitat structure in explaining bird species richness and abundance in riparian buffer strips of old-growth coniferous forest on western Vancouver Island, British Columbia. Using buffer strips of varying widths and a control from undisturbed riparian forest, I tested the hypothesis that vegetation differs in buffer strips of varying width. I selected 10 summary variables to represent broad-scale vegetation attributes of riparian habitat. Deciduous tree density was higher, and shrub richness was lower in wide buffers compared with narrow buffers. I then used Akaike information criterion to examine whether vegetation structure or buffer width best explained patterns of bird richness and abundance in riparian habitats. Species richness and abundance in several foraging guilds were explained better by buffer width than by vegetation. Abundances of three bird habitat guilds: riparian specialists, forest-interior, and open-edge species, and 6 of 10 species were best explained by specific vegetation features. Differences in vegetation, particularly deciduous tree density and shrub cover, explained part of the variation in abundance of several riparian forest-dwelling species

and may be useful in evaluating specific forest management practices. Because deciduous tree density is also positively correlated with buffer width, wide buffers (>100 m) may benefit not only those species associated with coniferous upland forests and forest generalists sensitive to buffer width, but also those species whose abundance is associated with deciduous trees.

602. **Influence of precipitation on demographics of northern bobwhites in southern Texas.**
Hernandez, F.; Hernandez, F.; Arredondo, J. A.; Bryant, F. C.; Brennan, L. A.; and Bingham, R. L.
Wildlife Society Bulletin 33(3): 1071-1079. (2005)
NAL Call #: SK357.A1W5; ISSN: 00917648.
Notes: doi: 10.2193/0091-7648(2005)33 [1071:IOPODO]2.0.CO;2.
Descriptors: Colinus virginianus/ drought/ northern bobwhites/ population dynamics/ Texas/ weather/ birds/ drought/ precipitation intensity/ rangelands
Abstract: Northern bobwhite (Colinus virginianus) populations in southwestern rangelands are influenced by precipitation; populations increase during relatively wet periods and decrease during drought. Understanding the demographic responses of bobwhites to fluctuations in precipitation might provide a basis for identifying mechanisms responsible for the phenomenon. We compared 10 population variables (bobwhite survival, nesting-season length, nest success, hen success, percent hens nesting and renesting, nesting rate, percent juveniles in fall harvest sample (Nov-Feb), clutch size, and egg hatchability) between a dry (Sep 2000-Aug 2001; 51 cm precipitation) and wet period (Sep 2002-Aug 2003; 93 cm precipitation) in Brooks County, Texas. We monitored radiomarked bobwhites on 3 sites during the dry (n=263 bobwhites) and wet period (n=191 bobwhites) to obtain estimates of survival and reproductive effort. Bobwhite survival curves differed between the dry period (0.30±0.04; S' ±SE, n=102 bobwhites) and wet period (0.60± 0.06; n=71 bobwhites; P≤0.001) during fall-winter (Sep-Feb). A lower proportion of hens nested during the dry period (95% CI: 52.6±22.5 %; n=19 hens) compared to the wet period (100%; n=15 hens). Of hens that nested, the dry period exhibited a lower nesting rate (95% CI: 1.2±0.3 nests/hen) compared to the wet period (95% CI: 2.3±0.5 nests/hen). The dry period also experienced a shorter nesting season (69 days) compared to wet period (159 days). Lastly, percent juveniles (Nov-Feb) was lower during the dry period (95% CI: 69.3±0.3 %; n=740 harvested bobwhites) compared to wet period (95% CI: 78.3±2.1%; n=1,415 harvested bobwhites). Our field study highlights 4 demographic variables (i.e., survival, percentage of hens nesting, nesting rate, and nesting-season length) that warrant further research to identify causal factors responsible for the boom-and-bust phenomenon in bobwhites. Further, our data suggest that drought negatively impacts bobwhite reproductive effort such that harvest should be reduced or ceased during drought (e.g., <50 cm annual precipitation).

603. **Influence of prescribed fire on lesser prairie-chicken habitat in shinnery oak communities in western Oklahoma.**
Boyd, Chad S. and Bidwell, Terrence G.
Wildlife Society Bulletin 29(3): 938-947. (2001)
NAL Call #: SK357.A1W5; ISSN: 0091-7648
Descriptors: conservation measures/ nutrition/ reproduction/ reproductive behavior/ terrestrial habitat/ abiotic factors/ physical factors/ land and freshwater zones/ Tympanuchus pallidicinctus (Phasianidae): habitat management/ food availability/ breeding site/ nest site/ scrub/ shinnery oak habitat/ fire/ Oklahoma/ Roger Mills County/ Black Kettle National Grassland/ prescribed fire/ habitat quality/ Phasianidae/ Galliformes, Aves/ birds/ chordates/ vertebrates

604. **Influence of rest-rotation cattle grazing on mule deer and elk habitat use in east-central Idaho.**
Yeo, J. J.; Peek, J. M.; Wittinger, W. T.; and Kvale, C. T.
Journal of Range Management 46(3): 245-250. (1993)
NAL Call #: 60.18 J82 ; ISSN: 0022-409X.
http://jrm.library.arizona.edu/Volume46/Number3/azu_jrm_v46_n3_245_250_m.pdf
Descriptors: grazing systems/ selective grazing/ wild animals/ rest rotation grazing/ grazing behavior
Abstract: Elk (Cervus elaphus), mule deer (Odocoileus hemionus) and cattle (Bos taurus) distributions were determined year round from 1975 to 1979 on a rest-rotation grazing system established in steep mountainous terrain. Following implementation of the grazing system, cattle progressively used higher altitudes and steeper slopes in each succeeding year. Elk preferred rested pastures during the grazing season (June-Oct.) and avoided habitat frequented by cattle by using higher altitudes and steeper slopes. Few mule deer used the allotment during summer, but during the winter, deer selected habitats grazed previously by cattle. Elk appeared to adjust to the grazing system by making greater use of pastures with cattle present, although preference for pastures without cattle continued.

605. **Influence of thorns and tannins on white-tailed deer browsing after mowing.**
Schindler, Jason R.; Fulbright, Timothy E.; and Forbes, T. D. A.
Journal of Arid Environments 55(2): 361-377. (2003)
NAL Call #: QH541.5.D4J6; ISSN: 0140-1963
Descriptors: Artiodactyla/ Cervidae/ Odocoileus virginianus/ Acacia/ Celtis/ Prosopis/ browsing/ foods-feeding/ San Patricio County/ Texas/ diets/ land zones/ nutrition/ white-tailed deer/ vegetation/ strategy/ forest damage/ disturbance/ food/ plant secondary metabolites/ experiment/ fence/ honey mesquite
Abstract: We used caged and uncaged plants to compare shoot growth, biomass, spinescence, nutrient, and tannin content of blackbrush acacia (Acacia rigidula Benth.), honey mesquite (Prosopis glandulosa Torr.), and spiny hackberry (Celtis pallida Torr.) 6 and 12 weeks after mowing, and estimated white-tailed deer (Odocoileus virginianus Raf.) use of sprouts of each species stripped of spines and unstripped. Blackbrush acacia grew slowly and had more thorns, protein-precipitating tannins, and fiber than honey mesquite or spiny hackberry. Spiny hackberry,

a shrub adapted to fertile sites, grew slower and was more physically defended than honey mesquite but lower in tannins than blackbrush acacia, and was the most palatable to deer of the three species. Thorn removal did not alter palatability of the three species to deer.

606. **Influence of topography on density of grassland passerines in pastures.**
Renfrew, R. B. and Ribic, C. A.
American Midland Naturalist 147(2): 315-325. (2002)
NAL Call #: 410 M58; ISSN: 00030031
Descriptors: grassland/ habitat management/ passerines/ population density/ topographic effect/ vegetation structure/ United States/ Ammodramus savannarum/ Cistothorus platensis/ Dolichonyx oryzivorus/ Passerculus sandwichensis/ Sturnella magna/ Sturnella neglecta
Abstract: Pastures provide substantial habitat for grassland birds of management concern in the Driftless Area of southwestern Wisconsin. The rolling topography in this region is characterized by lowland valleys surrounded by relatively steep and often wooded slopes which are set apart from more expansive treeless uplands. We hypothesized that there would be lower densities of area sensitive grassland passerines in lowland grasslands compared to upland grasslands because of their preference for larger more open grasslands. To test this hypothesis and assess how well pasture area and vegetation structure predicted grassland passerine density compared to upland/lowland status, we conducted point counts of birds in 60 pastures in May-June 1997 and 1998. Upland pastures generally supported greater densities of grassland passerines than lowland pastures. Densities of Savannah sparrow (Passerculus sandwichensis) and bobolink (Dolichonyx oryzivorus) were significantly higher in upland pastures than in lowland pastures. Grasshopper sparrow (Ammodramus savannarum) density was significantly higher on uplands in one of the study years. The density of eastern meadowlark (Sturnella magna), western meadowlark (S. neglecta) and sedge wren (Cistothorus platensis) did not differ significandy between uplands and lowlands. Grassland passerine density was also predicted by pasture size and vegetation structure. Densities of bobolink and grasshopper sparrow were higher in larger pastures. Bobolink and Savannah sparrow occurred on pastures with greater vegetation height-density and less bare ground; bobolink also preferred shallower litter depths. Lowland pastures supported grassland bird species of management concern and should not be neglected. However, we recommend that pasture management for grassland passerines in areas of variable topography favor relatively large upland pastures that will contain higher densities of species of management concern.

607. **Influences of livestock grazing on sage grouse habitat.**
Beck, Jeffrey L. and Mitchell, Dean L.
Wildlife Society Bulletin 28(4): 993-1002. (2000)
NAL Call #: SK357.A1W5; ISSN: 0091-7648
Descriptors: habitat/ livestock grazing/ sage grouse/ sagebrush rangelands
Abstract: Livestock grazing has been identified as one factor associated with the widespread decline and degradation of sage grouse (Centrocercus urophasianus) habitat. We identified n = 17 positive and negative impacts of livestock on sage grouse and habitat. Little information is currently available concerning the directs impacts of livestock grazing on sage grouse habitat. Indirect impacts are better understood than direct impacts. Chemical and mechanical treatments intended to provide increased quantities of grass forage for livestock have indirectly reduced the acceptability of sagebrush (Artemisia spp.) rangelands for sage grouse. Our paper examines: 1) potential mechanisms whereby livestock grazing in big sagebrush (A. tridentata) communities can modify sage grouse habitat and 2) the indirect influences of livestock production on sage grouse habitat. Overall, livestock grazing appears to most affect productivity of sage grouse populations. Residual grass cover following grazing is essential to conceal sage grouse nests from predators. Future research needs are identified and management implications related to livestock grazing in sage grouse habitats are included.

608. **Influences of management regimes on breeding bird densities and habitat in mixed-grass prairie: An example from North Dakota.**
Lueders, Andrea S.; Kennedy, Patricia L.; and Johnson, Douglas H.
Journal of Wildlife Management 70(2): 600-606. (2006)
NAL Call #: 410 J827; ISSN: 0022-541X
Descriptors: commercial activities/ ecology/ population dynamics/ terrestrial habitat/ land zones/ Aves: farming and agriculture/ grazing management regimes/ habitat structure/ prairie/ population density/ breeding populations/ grassland/ mixed grass prairie/ North Dakota/ birds/ chordates/ vertebrates

609. **Initial effects of prescribed fire on morphology, abundance, and phenology of forbs in big sagebrush communities in southeastern Oregon.**
Wrobleski, D. W. and Kauffman, J. B.
Restoration Ecology 11(1): 82-90. (2003)
NAL Call #: QH541.15.R45R515; ISSN: 10612971
Descriptors: Antennaria dimorpha/ Astragalus malachus/ Astragalus purshii/ Centrocercus urophasianus/ Crepis modocensis/ fire-enhanced flowering/ Hart mountain National Antelope Refuge/ Lomatium canbyi/ Lomatium nevadense/ Lomatium watsonii/ morphology/ Phenology/ Phlox gracilis/ Phlox longifolia/ prescribed fire/ restoration/ sage grouse/ sagebrush/ abundance/ herb/ morphology/ phenology/ prescribed burning/ restoration ecology/ shrubland/ United States/ Antennaria dimorpha/ Artemisia tridentata/ Astragalus malachus/ Centrocercus urophasianus/ Crepis modocensis/ Lomatium nevadense/ Phlox gracilis/ Phlox longifolia
Abstract: Historic fire return intervals in Artemesia tridentata (big sagebrush) ecosystems have been altered by livestock grazing, fire suppression, and other land management techniques resulting in ecological changes in these areas. Increases in abundance of woody vegetation may be causing declines in native herbaceous understory species. We examined the effects of prescribed fire on the morphology, abundance, and phenology of nine abundant forb (herbaceous dicot) species used selectively by Centrocercus urophasianus (Sage Grouse). In September 1997 prescribed fire was applied to four of eight randomly

assigned 400-ha A.t. wyomingensis (Wyoming big sagebrush) study plots at Hart Mountain National Antelope Refuge, Oregon. Livestock had not grazed experimental plots since 1991. Burning caused morphological changes such as significantly greater numbers of racemes and flowers per raceme in Astragalus malachus (shaggy milkvetch-Legumoideae) (9 in burn vs. 6 in control; 23 in burn vs. 21 in control, respectively). Also, prescribed burning caused greater numbers of flowers in Phlox gracilis (microsteris Polemoniaceae) (57 vs. 13), greater numbers of umbels and umbelletts in Lomatium nevadense (Nevada desert parsley-Umbellifereae) (4 vs. 2 and 59 vs. 31, respectively), greater numbers of flower heads in Crepis modocensis (Modoc hawksbeard-Compositae) (32 vs. 21), and greater number of flowers/cm3 in Phlox longifolia (longleaf phlox-Polemoniaceae) (0.11 vs. 0.06). Crown volume of Crepis modocensis (7,085 vs. 4,179 cm3) and Astragalus malachus (2,854 vs. 1,761 cm3) plants was greater in burned plots than control plots. However, burning resulted in a smaller crown area of Antennaria dimorpha (low pussytoes-Compositae) (20 vs. 37 cm^2). Phenology and time of flowering were also affected by fire. The period of active growth for each species was extended later into the summer in burned plots ($p < 0.01$). In addition, Crepis modocensis and Lomatium nevadense flowered 12 to 14 days earlier in burned plots. Fire had no effect on frequency, density, and relative abundance of seven of the nine studied species. Fire reduced the frequency and relative abundance of A. dimorpha and Phlox longifolia and reduced the density of A. dimorpha.

610. **Initial results of experimental studies of prairie dogs in arid grasslands: Implications for landscape conservation and the importance of scale.**
Curtin, Charles
Grasslands Ecosystems, Endangered Species, and Sustainable Ranching in the Mexico-U.S. Borderlands: Conference Proceedings RMRS-P 40: 57-61. (2006).
Notes: U.S. Forest Service Rocky Mountain Research Station Proceedings (RMRS-P) no. 40.
http://www.fs.fed.us/rm/pubs/rmrs_p040.pdf
Descriptors: conservation/ ecology/ terrestrial habitat/ land zones/ Cynomys ludovicanus: conservation/ habitat management/ land management/ arid grasslands/ New Mexico/ Mammalia, Rodentia, Sciuridae/ chordates/ mammals/ rodents/ vertebrates

611. **Insect diversity in two burned and grazed grasslands.**
Fay, Philip A.
Environmental Entomology 32(5): 1099-1104. (2003)
NAL Call #: QL461.E532; ISSN: 0046-225X
Descriptors: Sorensen's similarity index: mathematical and computer techniques/ sweep sampling: applied and field techniques/ burning/ grazing/ species diversity/ species richness/ tallgrass prairie
Abstract: This study examined insect diversity in two native grassland ecosystems undergoing burning and grazing by bison and cattle, the Niobrara Valley Preserve (Nebraska) and the Tallgrass Prairie Preserve (Oklahoma). Sweep-sampling for insects was conducted during July 1994 and 1995 along transects in management units that were grazed by bison and partially burned, grazed by cattle and either burned (Tallgrass) or unburned (Niobrara), or ungrazed and unburned. At both sites, species richness (S) and diversity (log series alpha) were higher and similarity (Sorensen's index) lower for bison than for cattle or ungrazed management units. High bison management unit diversity was associated with significantly higher S and alpha in burned (Tallgrass) and unburned (Niobrara) portions of bison units compared with their respective cattle units, suggesting that habitat heterogeneity in terms of plant productivity, composition, and structure were higher in bison versus cattle and ungrazed management units. Replicated factorial experiments and sampling of additional taxa and time points are needed to verify how fire and grazing management impacts insect diversity in these grasslands.

612. **Integrating economic costs into the analysis of flexible conservation management strategies.**
Drechsler, M.; Johst, K.; Watzold, F.; and Westphal, M. I.
Ecological Applications 16(5): 1959-1966. (Oct. 2006)
NAL Call #: QH540.E23
Descriptors: wildlife management/ economic analysis/ cost analysis/ stochastic processes/ dynamic programming/ endangered species/ Lycaenidae/ habitats/ grasslands/ mowing/ ecological economic model/ stochastic dynamic programming/ flexible conservation management/ Maculinea teleius/ natural resources, environment, general ecology, and wildlife conservation/ animal ecology and behavior/ entomology related
This citation is from AGRICOLA.

613. **Interacting effects of landownership, land use, and endangered species on conservation of southwestern U.S. rangelands.**
Sayre, N. F.
Conservation Biology 19(3): 783-792. (2005)
NAL Call #: QH75.A1C5; ISSN: 08888892.
Notes: doi: 10.1111/j.1523-1739.2005.00192.x.
Descriptors: collaborative management/ Endangered Species Act/ fire/ livestock grazing/ riparian areas/ threatened species/ conservation management/ grazing/ habitat conservation/ land tenure/ land use/ prescribed burning/ rangeland/ Arizona/ New Mexico/ Riparia
Abstract: The contemporary southwestern United States is characterized by fire-adapted ecosystems; large numbers of federally listed threatened and endangered species; a patchwork of federal, state, and private landownership; and a long history of livestock grazing as the predominant land use. I compared eight sites in southern Arizona and New Mexico to assess the interacting effects of these characteristics on conservation practices and outcomes. There was widespread interest and private-sector leadership in restoring fire to southwestern rangelands, and there is a shortage of predictive scientific knowledge about the effects of fire and livestock grazing on threatened and endangered species. It was easier to restore fire to lands that were either privately owned or not grazed, in part because of obstacles created by threatened and endangered species on grazed public lands. Collaborative management facilitated conservation practices and

outcomes and periodic removal of livestock may be necessary for conservation, but permanent livestock exclusion may be counterproductive because of interactions with land-use and landownership patterns.

614. **Invertebrate availability for upland game birds in tall fescue and native warm-season grass fields.**
Fettinger, Jennifer L.; Harper, Craig A.; and Dixon, Charles E.
Tennessee Academy of Science. Journal 77(4): 83-87. (2002); ISSN: 0040-313X
Descriptors: Galliformes/ wildlife-invertebrate relationships/ upland habitat/ invertebrates/ habitat management/ grasslands/ foods-feeding/ food supply/ ecosystems/ broods/ brooding/ birds/ behavior/ Tennessee
Abstract: This study is about the availability of invertebrates for upland game birds in tall fescue and native warm-season grass fields across Tennessee, U.S.A. Native warm-season grasses are recommended for converting fields from non-native perennial grasses to enhance the structure of wildlife habitat. Big bluestem, little bluestem, broomsedge bluestem, Indian grass, and switchgrass are some warm-season bunchgrasses native to Tennessee. These grasses with associated forbs are used to restore wildlife habitat. The diet of young upland game birds mainly consists of invertebrates, which provide protein and calcium essential for chick development. Populations of gallinaceous birds are affected by changes in invertebrate availability, arising from changes in vegetation. Invertebrate samples were collected from ten fields of tall fescue and ten fields of native warm-season grass located across Tennessee. There was no difference in overall invertebrate density in the fields of tall fescue and native warm-season grass fields. Density and biomass of Hemiptera was greater in tall fescue fields, while density of Orthoptera was higher in native grass fields. This study suggests that other parameters such as vegetation structure and presence of forbs, have a greater influence on the use of fields by young gallinaceous birds.

615. **Invertebrate biomass: Associations with lesser prairie-chicken habitat use and sand sagebrush density in southwestern Kansas.**
Jamison, B. E.; Robel, R. J.; Pontius, J. S.; and Applegate, R. D.
Wildlife Society Bulletin 30(2): 517-526. (2002)
NAL Call #: SK357.A1W5; ISSN: 00917648
Descriptors: Artemisia filifolia/ invertebrate biomass/ Kansas/ lesser prairie-chicken/ sand sagebrush/ Tympanuchus pallidicinctus/ biomass/ food availability/ gamebird/ habitat management/ habitat use/ invertebrate/ prairie/ predator-prey interaction/ wildlife management/ United States/ Artemisia filifolia/ Tympanuchus pallidicinctus
Abstract: Invertebrates are important food sources for lesser prairie-chicken (Tympanuchus pallidicinctus) adults and broods. We compared invertebrate biomass in areas used and not used by lesser prairie-chicken adults and broods. We used radiotelemetry to determine use and non-use areas in sand sagebrush (Artemisia filifolia) prairie in southwestern Kansas and sampled invertebrate populations during summer 1998 and 1999. Sweepnet-collected biomass of short-horned grasshoppers (Acrididae) and total invertebrate biomass generally were greater in habitats used by lesser prairie-chickens than in paired non-use areas. We detected no differences in pitfall-collected biomass of Acrididae (P=0.81) or total invertebrate biomass (P=0.93) among sampling areas with sand sagebrush canopy cover of 0 to 10%, 11 to 30%, and >30%. Results of multivariate analysis and regression model selection suggested that forbs were more strongly associated with invertebrate biomass than shrubs, grasses, or bare ground. We could not separate lesser prairie-chicken selection for areas of forb cover from selection of areas with greater invertebrate biomass associated with forb cover. Regardless of whether the effects of forbs were direct or indirect, their importance in sand sagebrush habitat has management implications. Practices that maintain or increase forb cover likely will increase invertebrate biomass and habitat quality in southwestern Kansas.

616. **Invertebrate conservation and agricultural ecosystems.**
New, T. R.
New York: Cambridge Univ Press. (2005); ISBN: 0521825032.
Descriptors: ecology: environmental sciences/ agriculture/ wildlife management: conservation/ biological control/ applied and field techniques/ pest management/ applied and field techniques/ pasture management/ applied and field techniques/ agricultural ecosystem/ biodiversity/ landscape ecology/ field margin/ invertebrate diversity/ invertebrate conservation/ agricultural disturbance/ cropping area extension
Abstract: This 368-page book, entitled "Invertebrate Conservation and Agricultural Ecosystems", is part of the series "Ecology, Biodiversity and Conservation", and this volume provides an introduction to invertebrate conservation biology for agriculturalists and to crop protection for conservation biologists, demonstrating how these two disparate fields may draw on each other for greater collective benefit. This volume makes use of recent literature to show how invertebrate conservation in highly altered landscapes may be promoted and enhanced. The book deals with problems of, and approaches to invertebrate conservation in highly managed agricultural ecosystems, and examines how biodiversity may be promoted without compromising agricultural production. This volume is structured into 10 chapters. The first chapter provides an introduction, and the second chapter discusses the place of invertebrates in agriculture and biodiversity. Chapters 3 and 4 respectively discuss the effects of agriculture on invertebrate diversity and conservation, and agricultural disturbance in terms of diversity and effects on invertebrates. Other chapter topics include: biological control and invertebrate conservation; cultural aspects of pest management; extension beyond cropping areas; field margins and landscape ecology; pasture management and conservation; and towards a more holistic management for invertebrates. The text is written in English. Each chapter is divided into specific sections within the chapter scope. The final chapter is followed by a list of references and an index. The book is illustrated with 68 line drawings and 54 tables. This book was written for pest managers, agriculturalists, ecologists and conservationists.

617. **Land use and vegetation associated with greater prairie-chicken leks in an agricultural landscape.**
Niemuth, N. D.
Journal of Wildlife Management 64(1): 278-286. (2000)
NAL Call #: 410 J827; ISSN: 0022541X
Descriptors: agriculture/ GIS/ grassland birds/ grazing/ greater prairie-chicken/ habitat selection/ land use/ landscape/ lek/ scale/ Wisconsin/ agricultural development/ gamebird/ habitat loss/ land use/ population decline/ United States/ Tympanuchus cupido
Abstract: Greater prairie-chickens (Tympanuchus cupido pinnatus) have declined dramatically across their range because of habitat loss, primarily agricultural development. In Wisconsin, most prairie-chicken populations are found in grassland reserves managed primarily for prairie-chickens. However a few remnant populations persist in an agricultural landscape with little or no management for prairie-chickens. I compared land use within 2.4 km of 29 prairie-chicken leks and 25 random points in an agricultural landscape to determine habitat associated with presence of prairie-chickens in central Wisconsin. Areas around leks had higher proportions of grasslands, wetlands, and shrubs than around random points, and lower proportions of forests, row crops, and hay fields. Differences between leks and random points varied with scale of sampling. Leks were unevenly distributed in the landscape, with mean distance to nearest lek shorter for leks than random points ($P < 0.001$). Leks were positively correlated with proportion of grass, shrub, and pasture, and negatively correlated with distance to nearest lek. Number of displaying males was negatively correlated with proportion of row crops and positively correlated with proportion of grassland in the landscape. Correlates of number of males also varied with scale of sampling.

618. **Landscape composition, patch size, and distance to edges: Interactions affecting duck reproductive success.**
Horn, D. J.; Phillips, M. L.; Koford, R. R.; Clark, W. R.; Sovada, M. A.; and Greenwood, R. J.
Ecological Applications 15(4): 1367-1376. (2005)
NAL Call #: QH540.E23; ISSN: 10510761
Descriptors: ducks/ edge effects/ field size/ habitat fragmentation/ landscape composition/ nest success/ North Dakota/ patch size/ Prairie Pothole Region/ edge effect/ landscape structure/ patch size/ reproductive success/ waterfowl/ Anas/ Aves
Abstract: Prairies and other North American grasslands, although highly fragmented, provide breeding habitat for a diverse array of species, including species of tremendous economic and ecological importance. Conservation and management of these species requires some understanding of how reproductive success is affected by edge effects, patch size, and characteristics of the landscape. We examined how differences in the percentage Of grassland in the landscape influenced the relationships between the success of nests of upland-nesting ducks and (1) field size and (2) distance to nearest field and wetland edges. We collected data on study areas composed of 15-20% grassland and areas composed of 45-55% grassland in central North Dakota, USA during the 1996 and 1997 nesting seasons. Daily survival rates (DSRs) of duck nests were greater in study areas with 45-55% grassland than with 15-20% grassland. Within study areas, we detected a curvilinear relationship between DSR and field size: DSRs were highest in small and large fields and lowest in moderately sized fields. In study areas with 15-20% grassland, there was no relationship between probability of hatching and distance to nearest field edge, whereas in study areas with 45-55% grassland, there was a positive relationship between these two variables. Results of this study support the conclusion that both landscape composition and configuration affect reproductive success of ground-nesting birds. We are prompted to question conservation strategies that favor clustering moderately sized patches of nesting habitat within agricultural landscapes because our results show that such patches would have low nest success, most likely caused by predation. Understanding the pattern of nest success, and the predator-prey mechanisms that produce the pattern, will enable design of patch configurations that are most conducive to meeting conservation goals. © 2005 by the Ecological Society of America.

619. **Landscape fragmentation and grassland patch size effects on non-game grassland birds in xeric mixed-grass prairies of western South Dakota.**
DeJong, J. R. 2001.
Notes: Project Number: SD W-107-R/Study No. 1011; Wildlife Coop. Unit Report - Thesis
Descriptors: animals, non-game/ birds/ cultivated farmland/ grassland/ habitat changes/ habitat management for wildlife/ nests and nesting/ prairie/ predation/ sampling/ surveys/ vegetation/ wildlife-habitat relationships/ South Dakota, western region
Abstract: Purpose was to inventory non-game birds on xeric mixed-grass prairies of various sizes in fragmented and non-fragmented landscapes of western South Dakota to determine what effects landscape fragmentation and grassland patch size have on avian communities.

620. **Landscape requirements of prairie sharp-tailed grouse Tympanuchus phasianellus Campestris in Minnesota, USA.**
Hanowski, J. M; Christian, D. P; and Niemi, G. J
Wildlife Biology 6(4): 257-263. (2000)
NAL Call #: SK351.W663; ISSN: 0909-6396
Descriptors: animal behavior/ natural grasslands/ prairies/ grasslands/ forests/ mountain forests/ wetlands/ mathematical models/ nature conservation/ wild birds/ birds
Abstract: The prairie sharp-tailed grouse Tympanuchus phasianellus campestris occurs throughout the north central region of North America. It is of management concern because it has decreased in the southeast portion of its range over the past three decades, including marked declines in Minnesota and the Great Lakes region, USA. Although there is general knowledge about the habitat requirements for this species, no quantitative lek site or landscape information has been documented. We quantified landscape composition around active and inactive sharp-tailed grouse lek sites and random points in brush landscapes in northeast Minnesota at multiple scales (200-3,000 m radii circles). Our objective was to compare landscape composition among these sites. We also developed a model to predict the probability of grouse lek site occurrence in the study area. Landscape composition around active and inactive lek sites differed from each other

primarily at the 500 m and 1,000 m radii scales. Inactive sites had higher proportions of upland forest and brush cover types and active sites had a higher percentage of native grass than inactive sites. No differences were found in landscape composition between site types at the 200 m radius scale and only one landscape variable (number of cover types) was different at the 3,000 m radius scale. We found non-random distributions of this grouse species at four different scales. Random brush land sites differed from both active and inactive sites having higher percentages of forest and brush cover. In contrast, lek sites had more bare ground, emergent aquatic vegetation, bog brush and roads than the random points. A regression model for the grouse at the 3,000 m scale was used to predict the probability of grouse occurrence in the landscape. The model resulted in a spatial map with about 8% of the area having a probability of grouse occurrence of >80%. This information can be used to locate new lek sites and to guide management activities for this species.

621. **Landscape vs. local habitat scale influences to insect communities from tallgrass prairie remnants.**
Stoner, K. J. L. and Joern, A.
Ecological Applications 14(5): 1306-1320. (2004)
NAL Call #: QH540.E23 ; ISSN: 10510761
Descriptors: arthropod conservation/ Coccinellidae/ Curculionidae/ fragmentation/ Insect communities/ landscapes/ Lepidoptera/ LISREL algorithm/ Orthoptera/ structural equation modeling/ tallgrass prairie/ community composition/ conservation management/ guild structure/ habitat fragmentation/ insect/ landscape ecology/ prairie/ scale effect/ North America/ Arthropoda/ Coccinellidae/ Coleoptera/ Curculionidae/ Hexapoda/ Insecta/ Lepidoptera/ Orthoptera/ Ungulata
Abstract: Habitat loss and fragmentation currently threaten ecosystems worldwide, yet remain difficult to quantify because within-fragment habitat and landscape-scale influences often, interact in unique ways. Although individual species respond to fragmentation differently, large-scale conservation planning must unavoidably target multiple species. Although information on a population's response to fragmentation is critical, and measurements of species richness provide useful insights, exclusive reliance on these responses may mask important information about the taxonomic composition of assemblages in response to fragmentation. The North American tallgrass prairie ecosystem is one of the most threatened and fragmented ecosystems in the world, and insects are significant contributors to its biodiversity. In remaining grassland fragments, we evaluated within-fragment influences in conjunction with landscape-scale responses of representative insect communities from four feeding guilds: generalists, specialists, multiple life stage habitat use, and predators. Fragment-specific attributes capable of influencing insect diversity include plant species composition, plant biomass, abundance of blooming flowers, and vertical habitat heterogeneity created by the vegetation. Landscape-scale factors expected to influence patterns of insect species diversity include fragment size and shape as well as the spatial configuration of fragments. Ordination techniques were used to summarize composition of each feeding guild assemblage of each fragment, and structural equation modeling was used to examine the direct and indirect effects of fragmentation with influences from local habitats. Generalists (Orthoptera), mixed-modality feeding that changes with life stage (Lepidoptera), and specialist herbivores (Curculionidae) all responded directly to within-site characterizations of the plant community. Site management from large ungulate grazing or mowing for hay production consistently had an indirect effect on the insect community through influences on plant community composition. The predator assemblage (Coccinellidae) was influenced directly by fragment shape. To maintain insect biodiversity in tallgrass prairie fragments, these results indicate that conservation practices should focus on communities in order to maintain insect biodiversity in tallgrass prairie fragments. Landscape-scale factors must also be considered when making conservation decisions, primarily because predators (top trophic level organisms) are more likely to respond to regional changes.

622. **Lark sparrow (Chondestes grammacus) nest-site selection and success in a mixed-grass prairie.**
Lusk, J. J.; Wells, K. S.; Guthery, F. S.; and Fuhlendorf, S. D.
Auk 120(1): 120-129. (2003)
NAL Call #: 413.8 AU4 ; ISSN: 00048038
Descriptors: ecological modeling/ habitat structure/ nest site/ nesting success/ prairie/ site selection/ United States/ Chondestes grammacus
Abstract: Lark Sparrows (Chondestes grammacus) are declining throughout most of their range. Effective management for this species is hampered because relatively little is known about nesting ecology. We studied habitat characteristics affecting Lark Sparrow nest-site selection and nest success at nine study pastures in a southern mixed-grass prairie in Oklahoma. We used a neural-network technique to discriminate between nest and random locations, and bootstrapping with 95% confidence intervals to compare habitat features of successful and unsuccessful nests. We quantified habitat features at the nest and random points during the breeding seasons of 1999 and 2000 among three grazing treatments (control, moderate, and heavy). We located 40 nests during two years of the study, for which crude nest-success was 26.3%. Most nests were located in either moderately grazed pasture (55%) or heavily grazed pasture (40%). The neural model correctly identified nest and random points 91% of the time. Percentage of structural cover, distance to nearest structural element, bare-ground exposure, and percentage of litter cover were the most important nest-site selection criteria according to the model. Simulation analysis indicated points were classified as nest sites if they were <270 cm from structural elements, <87% bare-ground exposure, <74% litter cover, and >9% structural cover. Successful nests had less bare-ground exposure ($\bar{x}$ = 6.2 ± 1.9% [SE]) and more litter cover ($\bar{x}$ = 18.0 ± 4.6%) compared to unsuccessful nests ($\bar{x}$ = 17.5 ± 3.8% and 10.1 ± 1.6%, respectively). These results suggest that habitat management for Lark Sparrows in mixed-grass prairie should focus on creating abundant structural cover with moderate levels of litter accumulation and bare ground.

623. **Leaf miner assemblies effects of plant succession and grazing management.**
Sterling, P. H.; Gibson, C. W. D.; and Brown, V. K.
Ecological Entomology 17(2): 167-178. (1992)
NAL Call #: QL461.E4; ISSN: 0307-6946
Descriptors: insect/ secondary succession/ calcareous grassland
Abstract: 1. Changes in leaf-miner assemblies during 4 years of secondary succession, under different controlled sheep-grazing treatments, are described and compared to the miner fauna of older grazed grassland nearby. 2. Multivariate analyses were used in conjunction with examination of individual common species to assess the independent effects of time, grazing treatment, plant species composition and architecture on the leaf-miner assemblies. 3. Leaf-miner species composition was strongly related to plant species composition, but was modified by plant structure under different grazing treatments. There was a strong successional trend in miner assemblies, even when the effects of changes in plant composition had been taken into account. Conversely, local variation in miner species composition generally reflected foodplant distribution alone. 4. Grazed treatments had fewer mines than controls, but there were also species specializing in grazed areas, despite the abundance of their foodplants elsewhere. There was a weak indication that miner species in grazed treatments were more likely to fluctuate in abundance than those in controls. 5. The results are discussed in relation to the assembly of grassland insect communities during succession, and the use of 'indicator groups' in management for nature conservation.

624. **The legacy of bobwhite research in south Texas.**
Hernandez, F.; Guthery, F. S.; and Kuvlesky, W. P.
Journal of Wildlife Management 66(1): 1-18. (2002)
NAL Call #: 410 J827; ISSN: 0022541X
Descriptors: boom-bust population dynamics/ Colinus virginianus/ grazing/ heat stress/ northern bobwhite/ phosphorus deficiency/ population dynamics/ Texas/ Vitamin A/ water deprivation/ autecology/ gamebird/ habitat management/ population dynamics/ semiarid region/ wildlife management/ United States/ Colinus virginianus
Abstract: More than a half century of research on northern bobwhites (Colinus virginianus) in south Texas has provided a legacy of information for ecologists and managers. South Texas is a semiarid and subtropical environment with highly variable weather, a land base consisting of large private ranches devoted to livestock production, a perennial problem of brush encroachment on rangelands, and a strong tradition of fee-lease hunting. These physical, biotic, and social conditions focused research efforts on descriptive natural history (ca. 1930-1980) and evaluation of grazing and brush management practices (ca. 1980-1990). By natural evolution of knowledge, these efforts led to the development of unified theory that synthesized descriptive anti applied information about bobwhite management (ca. 1990-2000). In the context of grazing on rangeland subject to encroachment by woody plants, descriptive studies focused on bobwhite home ranges, mobility, flight behavior, nesting cover, resting cover, and whistling posts, among other aspects of habitat use and behavior. The purpose of these studies was to determine how different plant structures and communities should be dispersed in space and time to maximize their value as bobwhite habitat. South Texas studies revealed that the dogmatic principle, "bobwhites are early successional species," holds poorly in semiarid, subtropical environments. Research in south Texas led to formalization of the usable-space-in-time hypothesis on bobwhite density. The hypothesis states that, within ordinary limits, mean abundance of bobwhites on an area is correlated more strongly with the quantity of permanent cover to which they are adapted and less strongly with (human) perceptions of habitat quality (foods, interspersion, edge, diversity). Space-time seems to be an omnibus variable that can be assessed in a variety of management and ecological settings. In association with highly variable rainfall patterns anti amounts in south Texas, bobwhite populations exhibit boom-bust population behavior. Research on the cause-effect process governing booms anti busts has led to rejection of hypotheses on phosphorus, calcium, phytoestrogens, vitamin A, macronutrition, water, and stress-related hormones as causally involved in the phenomenon. Heat-mediated variation in productivity remains a viable hypothesis that is, of course, open to challenge. The information legacy from research on bobwhites in south Texas has led to revision of knowledge emanating from the southeastern United States; the revised knowledge better fits bobwhites and other quails that inhabit semiarid environments.

625. **Lesser prairie-chicken brood habitat in sand sagebrush: Invertebrate biomass and vegetation.**
Hagen, C. A.; Salter, G. C.; Pitman, J. C.; Robel, R. J.; and Applegate, R. D.
Wildlife Society Bulletin 33(3): 1080-1091. (2005)
NAL Call #: SK357.A1W5; ISSN: 00917648.
Notes: doi: 10.2193/0091-7648(2005)33[1080:LPBHIS]2.0.CO;2.
Descriptors: Acrididae/ Artemisia filifolia/ habitat use/ invertebrate biomass/ Kansas/ lesser prairie-chicken/ sand sagebrush/ Tympanuchus pallidicinctus/ food availability/ gamebird/ habitat management/ habitat use/ Invertebrata/ Phasianidae
Abstract: Invertebrates are an important food source for grouse chicks, especially within the first 2 weeks of life. Invertebrate abundance is highly patchy and dependent upon herbaceous cover and vegetation structure. We examined the relationship between invertebrate biomass (from sweepnet samples) and habitat structure at lesser prairie-chicken (Tympanuchus pallidicinctus) brood-use and non-use areas during 2001 and 2002 in a sand sagebrush (Artemisia filifolia) prairie vegetation community of southwestern Kansas. We delineated use and non-use areas from paired sampling points within and outside 95% utilization distributions of radiomarked brood females, respectively, during the first 60 days post-hatch. We measured vegetation cover and invertebrate biomass (Acrididae and "other" invertebrates) at 71 paired points on 2 study sites (Site I=4 broods, Site II= 12 broods). Both Acrididae and other invertebrate biomasses were greater at brood areas than non-use areas on both study sites, suggesting this food source likely had a greater influence on brood habitat use than vegetation type. Vegetation structure described brood-use areas better than vegetation type because brood-use areas had greater visual obstruction readings (VORs) than non-use areas regardless of dominant cover type. We also examined the predictive

relationship between vegetation type and invertebrate biomass. Sand sagebrush density was the best linear predictor of Acrididae biomass, with lower densities having the greatest Acrididae biomass. We propose experiments to determine best management practices that produce abundant invertebrate biomasses for lesser prairie-chicken brood habitat, using our study as a baseline.

626. **Linking landscape management with the conservation of grassland birds in Wisconsin.**
Sample, David W.; Ribic, Christine A.; and Renfrew, Rosalind B.
In: Landscape Ecology and Resource Management./ Bissonette, J. A. and Storch, I. Washington, DC: Island Press, 2003.
Notes: Literature review; 1559639733 (ISBN).
Descriptors: conservation measures/ terrestrial habitat/ land zones/ Aves: habitat management/ grassland habitats/ Grassland/ Wisconsin/ Grassland habitat management/ Aves/ birds/ chordates/ vertebrates

627. **Linking occurrence and fitness to persistence: Habitat-based approach for endangered greater sage-grouse.**
Aldridge, C. L. and Boyce, M. S.
Ecological Applications 17(2): 508-526. (2007)
NAL Call #: QH540.E23 ; ISSN: 10510761
Descriptors: Alberta, Canada/ Centrocercus urophasianus/ Cox proportional hazard/ fitness/ greater sage-grouse/ habitat/ logistic regression/ occurrence/ persistence/ population viability/ sagebrush
Abstract: Detailed empirical models predicting both species occurrence and fitness across a landscape are necessary to understand processes related to population persistence. Failure to consider both occurrence and fitness may result in incorrect assessments of habitat importance leading to inappropriate management strategies. We took a two-stage approach to identifying critical nesting and brood-rearing habitat for the endangered Greater Sage-Grouse (Centrocercus urophasianus) in Alberta at a landscape scale. First, we used logistic regression to develop spatial models predicting the relative probability of use (occurrence) for Sage-Grouse nests and broods. Secondly, we used Cox proportional hazards survival models to identify the most risky habitats across the landscape. We combined these two approaches to identify Sage-Grouse habitats that pose minimal risk of failure (source habitats) and attractive sink habitats that pose increased risk (ecological traps). Our models showed that Sage-Grouse select for heterogeneous patches of moderate sagebrush cover (quadratic relationship) and avoid anthropogenic edge habitat for nesting. Nests were more successful in heterogeneous habitats, but nest success was independent of anthropogenic features. Similarly, broods selected heterogeneous high-productivity habitats with sagebrush while avoiding human developments, cultivated cropland, and high densities of oil wells. Chick mortalities tended to occur in proximity to oil and gas developments and along riparian habitats. For nests and broods, respectively, approximately 10% and 5% of the study area was considered source habitat, whereas 19% and 15% of habitat was attractive sink habitat. Limited source habitats appear to be the main reason for poor nest success (39%) and low chick survival (12%). Our habitat models identify areas of protection priority and areas that require immediate management attention to enhance recruitment to secure the viability of this population. This novel approach to habitat-based population viability modeling has merit for many species of concern. © 2007 by the Ecological Society of America.

628. **A literature review of insect responses to fire, compared to other conservation managements of open habitat.**
Swengel, Ann B.
Biodiversity and Conservation 10(7): 1141-1169. (2001)
NAL Call #: QH75.A1B562; ISSN: 0960-3115
Descriptors: haying: management method/ mowing: management method/ conservation management/ ecological adaptations/ grasslands/ grazing intensity/ insect responses/ niche diversity/ open habitats: burning/ recolonization/ savannas/ vegetational composition/ vegetational structure/ wildfires
Abstract: This literature review concerns insect responses to fire, compared to other feasible and appropriate conservation managements of open habitats. Many insect groups decline markedly immediately after fire, with the magnitude of reduction related to the degree of exposure to the flames and mobility of the insect. Niche diversity is lower in recently burned habitat, and the rate of insect increase following fire also relates to the species' ability to gain access to the regrowing vegetation. Postburn flora can be quite attractive to some recolonizing insects, possibly to some degree a result of fire-caused insect mortality which provides plants with short-term release from insect herbivory. Insect declines may follow immediately after mowing, but usually of lesser degree and shorter duration than after a fire of comparable timing and size. Season and scale of cutting may affect how much and which species showed positive or negative responses. Cut areas offer the vegetational structure and composition preferred by some insects, but cutting-or cutting at certain scales, seasons, or frequencies-may also be unfavorable for some species. Heavy grazing results in niche and assemblage simplification. Nonetheless, some invertebrates prefer the short turfs and bare ground resulting from heavier grazing. Other species vary in whether they peak in abundance and diversity in intermediate, light, or no grazing. In comparisons of mowing/haying and grazing regimes of similar compatibility with maintenance of the same habitat types, responses of particular species and species groups varied as to whether they had a preference for one or the other. Characteristics associated with insect responses to fire related to the degree of exposure to lethal temperature and stress experienced in the post-fire environment, suitability of post-treatment vegetation as habitat, and ability to rebuild numbers in the site (from survivors and/or colonizers). These factors appear equally useful for explicating insect responses to other managements such as haying, mowing, and grazing. By contrast, the assumption that the most habitat-restricted species will be most adapted to ecological forces believed to be prevalent in that ecosystem appears less efficacious for predicting insect management preferences.

629. **Live fences and landscape connectivity in a neotropical agricultural landscape.**
Leon, M. C. and Harvey, C. A.
Agroforestry Systems 68(1): 15-26. (2006)
NAL Call #: SD387.M8A3; ISSN: 01674366.
Notes: doi: 10.1007/s10457-005-5831-5.
Descriptors: agroecosystems/ cattle production systems/ Costa Rica/ fragmented landscapes/ landscape structure/ linear elements
Abstract: Live fences are common elements in neotropical agricultural landscapes and could play important roles in the conservation of biodiversity by enhancing landscape connectivity, however, little is known about their abundance and spatial arrangement. The objectives of this study were to characterize the abundance and spatial patterns of live fences in a fragmented landscape dominated by pastures in Río Frío, Costa Rica, to determine their contribution to landscape structure and connectivity and to examine their role as tools for landscape conservation planning. Live fences accounted for 45.4% of all fences in the landscape and occurred with a mean density of 50.5 linear meters per hectare. Although live fences covered only a small total area of the landscape (<2%), they had an important effect on landscape structure and connectivity, increasing total tree cover, dividing pastures into smaller areas, creating rectilinear networks that cross the landscape and providing direct physical connections to forest patches. Simulations showed that the conversion of all existing wooden fences to live fences would greatly enhance landscape connectivity by more than doubling the area, density and number of direct connections to forest habitats, and reducing the average distance between tree canopies. Our study demonstrates that live fences play key roles in defining the structure and composition of neotropical agricultural landscapes and merit consideration in both conservation efforts and agricultural policies designed to enhance landscape connectivity and promote biodiversity conservation. © Springer 2006.

630. **Livestock as manipulators of mule deer winter habitats in northern Utah.**
Urness, P. J.
In: Can livestock be used as a tool to enhance wildlife habitat?, General Technical Report-RM 194/ Severson, Kieth E., ed.; Fort Collins, Colo.: Rocky Mountain Forest and Range Experiment Station, Forest Service, U.S. Department of Agriculture, 1990. pp. 25-40.
Notes: 43rd Annual Meeting of the Society for Range Management, Reno, Nev., February 13, 1990.
NAL Call #: aSD11.A42 no. 194
Descriptors: commercial activities/ conservation measures/ nutrition/ diet/ terrestrial habitat/ land and freshwater zones/ Odocoileus hemionus (Cervidae): farming and agriculture/ livestock grazing/ conservation aspects/ habitat management/ food plants/ important species changes/ conservation role of livestock grazing/ grassland/ heathland/ Utah/ north/ winter habitat manipulation by livestock grazing/ Cervidae/ Artiodactyla/ Mammalia/ chordates/ mammals/ vertebrates

631. **Livestock as tools for managing big game winter range in the intermountain West.**
Urness, P. J.
In: Proceedings of the Wildlife-Livestock Relationships Symposium. Coeur D'alene, Idaho. Peek, James M. and Dalke, P. D. (eds.)
Moscow, Idaho: Forest, Wildlife and Range Experiment Station, University of Idaho; pp. 20-31; 1982.
NAL Call #: SF84.84.W5 1981
Descriptors: livestock/ wildlife/ game animals/ grazing/ rangelands

632. **Livestock exclusion: Consequences on nocturnal rodents in Baja California Sur.**
Ortega Rubio, Alfedo; Romero Schmidt, Heidi; Arguelles Mendez, Cerafina; Coria Benet, Rocio; and Solis Marin, Francisco
Revista de Biologia Tropical 41(3B): 907-909. (1994)
NAL Call #: 442.8 R328; ISSN: 0034-7744
Descriptors: commercial activities/ biometrics/ ecology/ population dynamics/ land and freshwater zones/ Perognathus spinatus (Heteromyidae)/ Neotoma lepida/ Peromyscus eva (Muridae): farming and agriculture/ livestock grazing exclusion/ size and weight relationships/ population density/ Mexico/ Baja California Sur/ La Sierra de la Laguna/ livestock grazing exclusion effects/ Heteromyidae/ Rodentia/ Mammalia/ chordates/ mammals/ vertebrates

633. **Livestock grazing: A tool to improve wildlife habitat.**
Severson, Kieth E. and Urness, Philip J.
In: Ecological implications of livestock herbivory in the West/ Vavra, Martin; Laycock, William A.; and Pieper, Rex D.
Denver, Colo.: Society for Range Management, 1994; pp. 232-249.
Notes: Literature review.
NAL Call #: SF85.35.A17E28 1994
Descriptors: commercial activities/ conservation measures/ land and freshwater zones/ comprehensive zoology: farming and agriculture/ habitat management/ United States, western region/ livestock grazing/ wildlife habitat

634. **Livestock grazing and wildlife: Developing compatibilities.**
Vavra, M.
Rangeland Ecology and Management 58(2): 128-134. (2005)
NAL Call #: SF85.J67; ISSN: 15507424.
Notes: doi: 10.2111/1551-5028(2005)58<128:LGAWDC>2.0.CO;2.
Descriptors: cattle/ deer/ elk/ facilitation/ herbivory/ facilitation/ grazing/ grazing management/ livestock/ Bos taurus/ Centrocercus urophasianus/ Cervidae/ Cervus elaphus/ Cervus elaphus nelsoni/ Phasianidae
Abstract: Livestock grazing has been considered detrimental to wildlife habitat. Managed grazing programs, however, have the potential to maintain habitat diversity and quality. In cases in which single-species management predominates (sage-grouse [Centrocercus urophasianus] or elk [Cervus elaphus nelsoni] winter range), grazing systems specific to species' needs can be implemented. Managed

livestock grazing can have 4 general impacts on vegetation: 1) alter the composition of the plant community, 2) increase the productivity of selected species, 3) increase the nutritive quality of the forage, and 4) increase the diversity of the habitat by altering its structure. Implementing a grazing management plan to enhance wildlife habitat requires an interdisciplinary approach. Knowledge of plant community dynamics, habitat requirements of affected wildlife species, and potential effects on the livestock used are basic to successful system design. However, any habitat change made for a featured species may create adverse, neutral, or beneficial changes for other species. Management actions, other than development of a grazing system, are often required for habitat manipulations to be successful. More research efforts are needed to understand complementary grazing systems on a landscape scale.

635. **Livestock grazing: Animal and plant biodiversity of shortgrass steppe and the relationship to ecosystem function.**
Milchunas, D. G.; Lauenroth, W. K.; and Burke, I. C.
Oikos 83(1): 65-74. (1998)
NAL Call #: 410 OI4; ISSN: 0030-1299
Descriptors: behavior/ birds/ ecosystems/ grasslands/ species diversity/ habitat use/ mammals/ prairies/ trophic relationships/ wildlife-habitat relationships/ wildlife-livestock relationships/ Colorado
Abstract: The responses of plants, lagomorphs, rodents, birds, macroarthropods, microarthropods, and nematodes to long-term grazing on North American shortgrass prairies were studied. Diversity, abundance, dominance, and dissimilarity responses to long-term grazing were variable across classes of organisms.

636. **Livestock grazing effects in western North America.**
Saab, Victoria A.; Bock, Carl E.; Rich, Terrell D.; and Dobkin, David S.
In: Ecology and management of neotropical migratory birds: A synthesis and review of critical issues/ Finch, Deborah M. and Martin, Thomas E.
New York: Oxford University, 1995; pp. 311-353.
Notes: ISBN: 0195084403.
NAL Call #: QL680.E28 1995
Descriptors: commercial activities/ conservation measures/ ecology/ terrestrial habitat/ man-made habitat/ land and freshwater zones/ North America/ Aves: farming and agriculture/ habitat management/ migrants/ population dynamics/ abundance/ forest and woodland/ grasslands/ riparian habitat/ cultivated land habitat/ United States/ livestock/ grazing/ migrants/ birds/ chordates/ vertebrates

637. **Livestock grazing effects on ant communities in the eastern Mojave Desert, USA.**
Nash, Maliha S.; Bradford, David F.; Franson, Susan E.; Neale, Anne C.; Whitford, Walter G.; and Heggem, Daniel T.
Ecological Indicators 4(3): 199-213. (2004); ISSN: 1470-160X
Descriptors: commercial activities/ ecology/ terrestrial habitat/ land zones/ farming and agriculture/ livestock grazing/ community structure/ environmental indicators/ desert habitat/ United States/ Mojave Desert/ Formicidae/ Formicoidea/ Aculeata/ Apocrita/ Hymenoptera/ Insecta/ arthropods/ hymenopterans/ insects/ invertebrates
Abstract: The effects of livestock grazing on composition and structure of ant communities were examined in the eastern Mojave Desert, USA for the purpose of evaluating ant communities as potential indicators of rangeland condition. Metrics for ant communities, vegetation, and other ground-cover elements were evaluated as a function of distance from livestock water tanks, which represents a gradient in level of livestock activity in desert settings. Data were collected at six isolated water tanks used by cattle during early summer, with seven plots (90 m + 90 m; 100 pitfall traps) per tank. Thirty-eight species of ants were recorded, with an average of 14 ant species per plot. Ant species richness did not differ as a function of distance from the water tank. Also, overall species composition, as measured by a similarity index for species presence/absence for paired-comparisons of plots, did not show differences attributable to the gradient in grazing impact. In contrast, the relative abundance of several taxa and functional groups was significantly related to distance from the water tank. The predominant pattern was for the greatest abundance to occur at the water tank, with little difference in ant abundance among plots away from the water tank. This pattern was shown by the abundant ants species, Conomyrma bicolor and Pheidole tucsonica, and the groups Conomyrma spp., Pheidole spp., homopteran tenders, and plant foragers. However, two species, Aphaenogaster megommata and Monomorium wheelerorum showed the greatest relative abundance at a distance away from the water tank. A number of ant metrics were significantly related to ground-cover metrics (R^2 > 0.5). Organic debris was the variable most frequently related significantly to ant abundance metrics, always in a positive direction, followed by cover for perennial grasses, annual forbs, and shrubs, and bare patch size. Ant community metrics in the study region appear to have little potential to serve as indicators of rangeland condition because differences were evident primarily in severely degraded localized conditions rather than in intermediate widespread conditions.

638. **Livestock grazing effects on forage quality of elk winter range.**
Clark, P. E.; Krueger, W. C.; Bryant, L. D.; and Thomas, D. R.
Journal of Range Management 53(1): 97-105. (2000)
NAL Call #: 60.18 J82 ; ISSN: 0022-409X.
http://jrm.library.arizona.edu/Volume53/Number1/azu_jrm_v53_n1_97_105_m.pdf
Descriptors: sheep/ grazing/ Pseudoroegneria spicata/ Carex/ Festuca Idahoensis/ stocking rate/ Cervus elaphus/ rain/ stems/ in vitro digestibility/ crude protein/ biomass/ canopy/ savannas/ shrubs/ forage/ Oregon
Abstract: Carefully-managed livestock grazing has been offered as a tool to improve the forage quality of graminoids on big game winter range. Formal testing of this theory has thus far been done using hand clippers rather than livestock grazing. We report winter standing reproductive culm, crude protein, in vitro dry matter digestibility, and standing crop responses of bluebunch wheatgrass (Agropyron spicatum [Pursh] Scribn. & Smith), Idaho fescue (Festuca idahoensis Elmer), and elk sedge (Carex geyeri Boott) to late-spring

domestic sheep grazing. The study was conducted in 1993 and 1994 on a big game winter range in the Blue Mountains of northeastern Oregon. Sheep grazing and exclusion treatments were applied to 20-ha plots at 3 sites on the study area Targeted utilization for grazed plots was 50% graminoid standing crop removal during the boot stage of bluebunch wheatgrass. Grazing did not influence the number of standing reproductive culms per plant in bluebunch wheatgrass. Crude protein and in vitro dry matter digestibility of bluebunch wheatgrass in grazed plots increased by 1.0 and 4.3 percentage points, respectively over ungrazed plots. Grazing reduced the standing crop of bluebunch wheatgrass by 116.9 kg ha-1 DM. Standing Idaho fescue reproductive culms decreased by 0.7 culms plant-1 under grazing. Crude protein of Idaho fescue in grazed plots was 1.3 percentage points greater than in unglazed plots. Crude protein and in vitro dry matter digestibility responses of elk sedge were inconsistent between years and may be related to utilization or growth differences between years. The levels of forage quality improvement in bluebunch wheatgrass and Idaho fescue obtained in this study could benefit the nutritional status of wintering Rocky Mountain elk (Cervus elaphus nelsoni Bailey). More research is needed regarding the effects of grazing on the winter forage quality of elk sedge.
This citation is from AGRICOLA.

639. **Livestock grazing impacts on rangeland ecosystems.**
Holechek, J.
Journal of Soil and Water Conservation 35(4): 162-164. (1980)
NAL Call #: 56.8 J822 ; ISSN: 0022-4561.
Notes: Literature review.
Descriptors: grazing systems/ environmental impact/ rangelands/ grazing/ ecology/ livestock farming/ range management/ arid regions
Abstract: The impacts of livestock grazing, both controlled and uncontrolled on the rangeland ecosystem of the USA are discussed. Research provides strong evidence that controlled grazing by domestic livestock is compatible with other resources provided by rangelands and may be a valuable tool to enhance these resources. Research needs for the practice of multiple use of public lands are examined.
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640. **Livestock grazing interactions with sage grouse.**
Klebenow, D. A.
In: Proceedings of the Wildlife-Livestock Relationships Symposium. Coeur D'alene, Idaho. Peek, James M. and Dalke, P. D. (eds.)
Moscow, Idaho: Forest, Wildlife and Range Experiment Station, University of Idaho; pp. 113-123; 1982.
NAL Call #: SF84.84.W5 1981
Descriptors: Nevada/ sage grouse/ livestock/ grazing
This citation is from AGRICOLA.

641. **Livestock impacts on the herbaceous components of sage grouse habitat: A review.**
Hockett, Glenn A.
Intermountain Journal of Sciences 8(2): 105-114. (2002); ISSN: 1081-3519.
Notes: Literature review.
Descriptors: commercial activities/ conservation measures/ terrestrial habitat/ Centrocercus urophasianus (Phasianidae): farming and agriculture/ livestock impacts on herbaceous components of sagebrush habitat/ habitat management/ grassland/ scrub/ sagebrush habitat/ Phasianidae/ Galliformes/ Aves/ birds/ chordates/ vertebrates
Abstract: Sage grouse are a bird of climax vegetation. Productive sage grouse habitat is more than a "sea of sagebrush." The grass/forb understory supplies food and cover components seasonally. Within the sagebrush community, a dense, residual herbaceous understory increases the likelihood of sage grouse nest success. Forbs and insects are essential foods for sage grouse from early spring to early fall. Although riparian areas typically make up less than 2 percent of the sagebrush landscape, interspersed springs, streams, and meadows offer watering and feeding sites for sage grouse during summer and early fall. Livestock selectively remove grasses and forbs within the sagebrush landscape while showing a strong preference for riparian meadows once upland vegetation cures. Livestock use can impact the amount and composition of herbaceous understory depending on the class of livestock, season of use, and grazing intensity. I reviewed the literature regarding sage grouse habitat and livestock impacts to the herbaceous understory. Ungrazed comparison areas, based on the seasonal needs of sage grouse, are lacking. Controls are recommended to advance our understanding of grazing impacts.
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642. **Livestock management and productivity of willow flycatchers in the central Sierra Nevada.**
Valentine, B. E.; Roberts, T. A.; Boland, S. P.; and Woodman, A. P.
Transactions of the Western Section of the Wildlife Society 24: 105-114. (1988)
NAL Call #: SK351.W523; ISSN: 0893-214X
Descriptors: Passeriformes/ wildlife management/ animal husbandry/ wildlife-livestock relations/ grazing/ California
This citation is from AGRICOLA.

643. **Local gradients of cowbird abundance and parasitism relative to livestock grazing in a western landscape.**
Goguen, Christopher B. and Mathews, Nancy E.
Conservation Biology 14(6): 1862-1869. (2000)
NAL Call #: QH75.A1C5 ; ISSN: 0888-8892
Descriptors: livestock grazing/ mixed conifer forest: habitat/ parasitism rate/ pinyon juniper forest: habitat/ species abundance
Abstract: We studied local patterns of Brown-headed Cowbird (Molothrus ater) abundance, parasitism rates, and nest success of a common host, the Plumbeous Vireo (Vireo plumbeus), in relation to the distribution of livestock grazing in an undeveloped region of northeastern New Mexico, 1992-1997. We predicted that both cowbird abundance and parasitism rates of vireo nests would decrease with increasing distance from active livestock grazing, and that the nesting success of vireos would increase. We measured cowbird abundance and host density and located and monitored vireo nests in pinyon-juniper and mixed-conifer habitats that ranged from actively grazed to isolated from livestock grazing by up to 12 km. Cowbird abundance declined with distance from active livestock grazing and was not related to host density or

habitat type. Brood parasitism levels of vireo nests (n = 182) decreased from >80% in actively grazed habitats to 33% in habitats that were 8-12 km from active grazing but did not vary by habitat type or distance to forest edge. Vireo nesting success was higher in mixed-conifer habitat than in pinyon-juniper but was unrelated to distance from active livestock grazing. Nest losses due to parasitism declined with distance from active livestock grazing. Our results suggest that cowbird abundance and parasitism rates of hosts may be distributed as a declining gradient based on distance from cowbird feeding sites and that isolation from feeding sites can reduce the effects of parasitism on host populations. These findings provide support for management techniques that propose to reduce local cowbird numbers and parasitism levels by manipulating the distribution of cowbird feeding sites. The presence of parasitized nests >8 km from active livestock grazing suggests that, in some regions, management efforts may need to occur at larger scales than previously realized.

644. **Location and success of lesser prairie-chicken nests in relation to vegetation and human disturbance.**
Pitman, J. C.; Hagen, C. A.; Robel, R. J.; Loughin, T. M.; and Applegate, R. D.
Journal of Wildlife Management 69: 1259-1269. (July 2005)
NAL Call #: 410 J827
Descriptors: wildlife management/ prairies/ game birds/ nesting/ vegetation/ anthropogenic activities/ Kansas/ habitat management for wildlife/ Tympanuchus pallidicinctus/ wildlife habitat relationships/ natural resources, environment, general ecology, and wildlife conservation/ animal ecology and behavior
This citation is from AGRICOLA.

645. **Long-term effects of vegetation treatments in the Chaparral transition zone.**
Fuhrmann, K. N. and Crews, T. E.
Rangelands 23(1): 13-16. (2001)
NAL Call #: SF85.A1R32; ISSN: 01900528
Descriptors: cattle/ herbicide/ vegetation cover/ wildfire/ United States
Abstract: Since European settlement, the impacts of cattle production and wood harvesting in the West have affected the structure and transformed the composition of juniper-pinyon and chaparral. In the past, wildfires were more common in the juniper-pinyon and chaparral communities of the Southwest where they burned at intervals of 10-30 years. The regular occurrence of fire appears to have restricted the establishment of woody species to more shallow, rocky soils on which grasses do not thrive. The canopy cover and density of juniper-pinyon and chaparral can have a direct impact on the production of grasses and herbaceous plants. The removal of this canopy by various means has been implemented in many woody plant communities in an attempt to increase the production of herbaceous forage for livestock and habitat improvement for wildlife. The main objective of the application of original herbicide, fire, and mechanical push vegetation treatments (applied in 1964-1981) sampled in this study was to encourage the growth of herbaceous vegetation for cattle production. The disturbances caused by the treatments were intended to, at a minimum, set succession back to a grass/forb community, or ideally to shift the community towards a stable more permanent herbaceous community. The three range treatment techniques were undertaken to improve the potential for herbaceous species to effectively compete with larger woody species in an ecosystem affected by climatic and edaphic constraints, and impacted by livestock grazing. Tree abundance, dominance, and cover were to be limited on chosen sites. In 1997, we compared the effectiveness of herbicide, fire and mechanical push range treatment techniques decades after they were implemented. Long-term assessment is critical for both economic and ecological reasons. Economically, it is important to know how long "woodland conversion" range treatments last given the expense that can be incurred to implement them. Ecologically, it is important to monitor species diversity and abundance in post-treatment communities to evaluate the effects that different treatment methods have on biodiversity.

646. **Macroinvertebrates in North American tallgrass prairie soils: Effects of fire, mowing, and fertilization on density and biomass.**
Callaham, M. A.; Blair, J. M.; Todd, T. C.; Kitchen, D. J.; and Whiles, M. R.
Soil Biology and Biochemistry 35(8): 1079-1093. (2003)
NAL Call #: S592.7.A1S6; ISSN: 0038-0717
Descriptors: commercial activities/ conservation measures/ ecology/ community structure/ population dynamics/ terrestrial habitat/ abiotic factors/ physical factors/ land zones/ Macroinvertebrata: farming and agriculture/ mowing and fertilization effects on tallgrass prairie soil communities/ habitat management/ biomass/ tallgrass prairie soil community responses to fire/ mowing and fertilization/ relative abundance/ population density/ grassland/ community responses to fire/ soil habitat/ tallgrass prairie soils/ fire/ effects on tallgrass prairie soil communities/ Kansas/ Flint Hills/ Konza Prairie Biological Station/ invertebrates
Abstract: The responses of tallgrass prairie plant communities and ecosystem processes to fire and grazing are well characterized. However, responses of invertebrate consumer groups, and particularly soil-dwelling organisms, to these disturbances are not well known. At Konza Prairie Biological Station, we sampled soil macroinvertebrates in 1994 and 1999 as part of a long-term experiment designed to examine the effects and interactions of annual fire, mowing, and fertilization (N and P) on prairie soil communities and processes. For nearly all taxa, in both years, responses were characterized by significant treatment interactions, but some general patterns were evident. Introduced European earthworms (Aporrectodea spp. and Octolasion spp.) were most abundant in plots where fire was excluded, and the proportion of the total earthworm community consisting of introduced earthworms was greater in unburned, unmowed, and fertilized plots. Nymphs of two Cicada genera were collected (Cicadetta spp. and Tibicen spp.). Cicadetta nymphs were more abundant in burned plots, but mowing reduced their abundance. Tibicen nymphs were collected almost exclusively from unburned plots. Treatment effects on herbivorous beetle larvae (Scarabaeidae, Elateridae, and Curculionidae) were variable, but nutrient additions (N or P) usually resulted in greater densities, whereas mowing usually resulted in lower densities. Our results suggest that departures from historical disturbance regimes (i.e. frequent fire and grazing) may render soils more susceptible to

increased numbers of European earthworms, and that interactions between fire, aboveground biomass removal, and vegetation responses affect the structure and composition of invertebrate communities in tallgrass prairie soils.

647. **Management of conservation buffers for upland wildlife in Illinois.**
Mankin, P. C.; L.A. Kammin, L. A.; Hoffman, C. L.; Hubert, P. D.; Teisberg, J. E.; and Warner, R. E.
Springfield, IL. Illinois Department of Natural Resources, 2005. 72 pp.
Notes: Federal Aid in Wildlife Restoration Act Project P-R W-144-R.
Descriptors: filter strips/ conservation buffers/ grassland birds/ wildlife cover/ wildlife forage/ mowing

648. **Management of livestock to improve and maintain prairie chicken habitat on the Sheyenne National Grasslands.**
Eng, R. L.; Toepfer, J. E.; and Newell, J. A.
In: Prairie chickens on the Sheyenne National Grasslands, General Technical Report-RM 159/ Bjugstad, Ardell J., ed.; Fort Collins, Colo.: Rocky Mountain Forest and Range Experiment Station, Forest Service, U.S. Department of Agriculture (Series: General Technical Report RM 159), 1988. pp. 55-57.
Notes: 0277-5786 (ISSN); Paper presented at a "Symposium on Prairie Chickens on the Sheyenne National Grasslands," September 18, 1987, Crookston, Minnesota. Includes references.
NAL Call #: aSD11.A42
Descriptors: birds/ wildlife/ grasslands/ grazing/ range management/ North Dakota
This citation is from AGRICOLA.

649. **Managing bison to restore biodiversity.**
Truett, Joe C.; Phillips, Michael; Kunkel, Kyran; and Miller, Russell
Great Plains Research 11(1): 123-144. (2001)
NAL Call #: QH104.5.G73 G755; ISSN: 1052-5165
Descriptors: wildlife management: conservation/ biodiversity/ burrowing activities/ ecological restoration/ endangered species management/ grasslands/ grazing behavior/ pastoralism/ prairies/ trampling/ vegetation changes/ wallowing
Abstract: Prior to their demise in the late 1800s, bison coexisted with and helped sustain a diverse and spectacular assemblage of animals and plant communities on the Great Plains. Bison, in concert with fire, exerted strong control on the structure of the vegetation by grazing, trampling, and wallowing. The changes in the vegetation induced changes in many animal populations. These impacts, coupled with the bison's role as the major converter of grass to meat, so greatly affected other species that some have called bison a "keystone" species in the Great Plains ecosystem. The black-tailed prairie dog, dependent on bison grazing over a large part of the Great Plains, amplified the keystone influence of bison by its own grazing and burrowing activities and its utility as prey. Although modern bison-growing practices usually will preclude restoration of the large predators and scavengers that once were a part of the great faunal spectacle, other species can return, often even on small acreages. Maintenance of a habitat mosaic is the key to restoring some of the original biodiversity lost to the historic pursuit of single-species pastoralism.

650. **Managing exotic grasses and conserving declining species.**
Germano, David J.; Rathbun, Galen B.; and Saslaw, Larry R.
Wildlife Society Bulletin 29(2): 551-559. (2001)
NAL Call #: SK357.A1W5; ISSN: 0091-7648
Descriptors: Dipodomys ingens/ Dipodomys nitratoides/ Ammospermophilus nelsoni/ Gambelia sila/ mammals/ amphibians and reptiles/ behavior/ habitat use/ habitat management/ exotic species/ ecosystems/ conservation/ endangered-threatened species/ wildlife-habitat relationships/ livestock/ grazing/ giant kangaroo rat/ San Joaquin kanagaroo rat/ San Joaquin antelope squirrel/ blunt-nosed leopard lizard/ reptiles/ Atriplex spp./ California: San Joaquin Valley/ San Joaquin River Valley
Abstract: California's southern San Joaquin Valley, as with much of western North America, has been invaded by exotic plant species during the past 100-200 years. The herbaceous cover of these introduced grasses and forbs often creates an impenetrable thicket for small ground-dwelling vertebrates. Contrary to some earlier descriptions of upland habitat of the southern and western San Joaquin Valley as perennial grasslands, recent evidence suggests that most of this area was a desert vegetated by saltbush scrub with sparse cover of native annual grasses and forbs. Many of the small vertebrates that evolved in these habitats, some of which are listed as threatened or endangered, are desert-adapted. These species evolved in sparsely vegetated habitats and rely on open ground to forage and avoid predation. Preliminary research indicates that populations of giant kangaroo rats (Dipodomys ingens), San Joaquin kangaroo rats (D. nitratoides), San Joaquin antelope squirrels (Ammospermophilus nelsoni), and blunt-nosed leopard lizards (Gambelia sila), all listed as threatened endangered, are affected negatively by thick herbaceous cover. This cover also may adversely effect several listed plant species. Removing anthropogenic disturbances does not reduce or eliminate these exotic plants. Fire is effective in reducing herbaceous cover but kills native saltbush and often is costly to implement or control. Although livestock may have contributed originally to habitat destruction and introduction of exotic plants, the authors believe that in some years, moderate to heavy grazing by livestock is the best way to decrease the dense cover created by these exotics. Recent decisions to decrease or eliminate livestock grazing on conservation lands without definitive studies of grazing in these habitats may lead to further declines of native species and possible local extinction of some listed plants and animals.

651. **Managing for grassland diversity: A study on grazing-fire interactions in the Flint Hills (Kansas).**
Weigelt, M. L.
Ecological Restoration 24: 41-42. (Mar. 2006)
Descriptors: rangelands/ prairies/ range management/ ecosystem management/ wildlife habitats/ wild birds/ prescribed burning/ ecological restoration/ Kansas/ homestead range Renewal Initiative/ Sturnella magna/ Ammodramus savannarum/ Tympanuchus cupido/ Ammodramus henslowii/ plant production range and pasture grasses/ animal ecology and behavior/ land resources/ plant ecology/ animal nutrition
This citation is from AGRICOLA.

652. **Managing livestock grazing for grassland birds: A caution against extrapolating results from outside the Southwest.**
Zwartjes, P. W.; Stoleson, P. L. L.; Haussamen, W. C.; and Crane, T. E.
NMOS Bulletin 29(2): 24-25. (2001).
Notes: Published by the New Mexico Ornithological Soc.
Descriptors: Sturnella magna/ Aimophila cassinii/ birds/ wildlife-livestock relationships/ grazing/ grasslands/ semi-arid habitat/ habitat alterations/ agricultural practices/ habitat management/ wildlife-habitat relationships/ eastern meadowlark/ Cassin's sparrow/ Arizona/ New Mexico
Abstract: The U.S. Forest Service is currently engaged in a large-scale project to assess the impact of gazing on terrestrial vertebrate species in Arizona and New Mexico (hereafter, "the southwest"), including a variety of grassland bird species. Using the scientific literature to determine whether and under what conditions grazing can be compatible with native species of birds in the southwest is complicated by a variety of factors. These include a lack of standardized definitions of grazing regimes or intensities, and a lack of studies specific to the southwest that document the response of vegetation to various grazing regimes. These issues become especially important when making grazing management decisions that consider avian species whose breeding range includes areas (perhaps predominantly) outside of the desert southwest. Reliance on studies that (a) measure grazing intensities in terms of animals per hectare or general qualitative measures such as "heavy", "moderate", and "light"; (b) fail to use quantitative measures of vegetative responses to grazing (such as stubble height or residual vegetation); and (c) were conducted in grasslands with different precipitation patterns, species of grasses, soil composition, etc., can result in grazing practices that degrade the habitat required by these bird species in the southwest. The eastern meadowlark (Sturnella magna) and Cassin's sparrow (Aimophila cassinii) are examples of such species; grazing regimes which have been recommended for other areas would likely have an adverse impact on the habitat required by these species in southwestern grasslands. Managers who utilize the results of grazing-impact studies to develop grazing regimes that consider the habitat needs of grassland birds should critically assess both the locality of these studies and how grazing levels are quantified before extrapolating the results to southwestern grasslands. In addition, further research is needed to assess the response of geographically wide-ranging species of grassland birds specifically to grazing regimes in the southwest.

653. **Managing livestock grazing for mule deer (Odocoileus hemionus) on winter range in the Great Basin.**
Austin, Dennis D.
Western North American Naturalist 60(2): 198-203. (2000)
NAL Call #: QH1.G7; ISSN: 1527-0904
Descriptors: environmental management/ livestock grazing effects/ winter range habitat
Abstract: History and technical literature describing potential effects of livestock grazing on mule deer (Odocoileus hemionus) populations and winter range habitat are reviewed. Recommendations for livestock grazing on winter ranges within the Great Basin are advanced.

654. **Managing rangelands for wildlife.**
Bleich, Vernon C.; Kie, John G.; Loft, Eric R.; Stephenson, Thomas R.; Oehler, Michael W.; and Medina, Alvin L. In: Techniques for wildlife investigations and management/ Braun, C. E., 2005; pp. 873-897.
Notes: ISBN: 0933564155.
http://www.treesearch.fs.fed.us/pubs/24852
Descriptors: commercial activities/ conservation measures/ land zones/ comprehensive zoology: farming and agriculture/ grazing/ rangeland habitat/ habitat management/ wildlife/ terrestrial habitat/ United States

655. **Managing rotationally grazed pastures for forage production and grassland birds.**
Paine, L. K.; Undersander, D. J.; Temple, S. A.; and Sample, D. W.
American Forage and Grassland Council Proceedings 6: 54-58. (1997)
NAL Call #: SB193.F59
Descriptors: range management/ rotational grazing/ birds/ nesting
This citation is from AGRICOLA.

656. **Managing tallgrass prairie remnants: The effects of different types of land stewardship on grassland bird habitat.**
Higgins, Jeremy J.; Larson, Gary E.; and Higgins, Kenneth F.
Ecological Restoration 20(1): 18-22. (2002); ISSN: 1522-4740
Descriptors: commercial activities/ conservation measures/ terrestrial habitat/ land zones/ Aves: farming and agriculture/ prairie management/ habitat management/ requirements/ land use practices/ habitat characteristics/ grassland/ tallgrass prairie remnants/ North Dakota/ Aves/ birds/ chordates/ vertebrates

657. **Microclimate versus predation risk in roost and covert selection by bobwhites.**
Miller, T. L. and Guthery, F. S.
Journal of Wildlife Management 69(1): 140-149. (2005)
NAL Call #: 410 J827; ISSN: 0022541X.
Notes: doi: 10.2193/0022-541X(2005)069 <0140:MVPRIR>2.0.CO;2.
Descriptors: Blackbody temperature/ bobwhites/ Colinus virginianus/ covert/ energetics/ microclimate/ predation risk/ roost/ telemetry/ thermoregulation/ gamebird/ habitat

management/ habitat selection/ microclimate/ predation risk/ roost site/ thermoregulation/ Colinus/ Colinus virginianus
Abstract: Knowledge of factors that influence habitat selection by wildlife leads to better understanding of habitat ecology and management. Therefore, we compared microclimate and predation risk as factors influencing the selection of stopping points (mid-day coverts, nocturnal roosts) by northern bobwhites (Colinus virginianus). Stopping points were located using radiomarked bobwhites in the Texas Panhandle, USA, during 2002-2003. We obtained blackbody temperatures of microclimates and assessed predation risk (angles of obstruction for aerial predators, vegetation profiles for terrestrial predators) at stopping points and paired random points. Summer coverts showed fewer degree-minutes of hyperthermic exposure (blackbody temperatures >39°C; $\bar{x}$ = 655.0, SE = 4.1 for coverts, $\bar{x}$ = 2,255.5, SE = 4.9 for random; 1200-1600 hr) and a lower risk to predators (e.g., 95% confidence intervals [CIs] of angles of obstruction = 87.8-90.8° for coverts, 55.9-70.6° for random). Summer roost temperatures were similar to paired random sites ($\bar{x}$ = 13.9°C, SE = 0.6 for roost, $\bar{x}$ = 13.9°C, SE = 0.7 for random) as were winter roost temperatures ($\bar{x}$ = -1.3°C, SE = 0.7 for roosts, $\bar{x}$ = -1.4°C, SE = 0.8 for random). There were minor issues of habitat selection of winter or summer roosts based on predation risk (e.g., 95% CIs of vegetation profiles of summer roosts and random sites did not overlap at lower strata). We concluded other selection factors likely exist for winter roosts because microclimate and predation risk assessments between winter roosts and random sites showed no difference. Similarly, other selection factors may exist for summer roosts, as they showed only a weak difference in terrestrial predation risk and no difference in microclimate in comparison to random sites. We concluded microclimate was the primary selection factor for coverts because prevention of hyperthermia necessitated that bobwhites select cooler microclimates within the study area.

658. **Microhabitat selection by Texas horned lizards in southern Texas.**
Burrow, Anna L.; Kazmaier, Richard T.; Hellgren, Eric C.; and Ruthven, Donald C.
Journal of Wildlife Management 65(4): 645-652. (2001)
NAL Call #: 410 J827; ISSN: 0022-541X
Descriptors: Phrynosoma cornutum/ horned lizards/ Texas horned lizard/ amphibians and reptiles/ microhabitat/ behavior/ habitat use/ conservation/ status/ habitat management/ fires-burns/ livestock/ grazing/ telemetry/ monitoring/ wildlife-habitat relationships/ diurnal rhythm/ seasonal activities/ Texas, Southern/ Texas: Dimmit County/ Texas: La Salle County
Abstract: The Texas horned lizard (Phrynosoma cornutum) has declined throughout its range. Understanding habitat selection by the Texas horned lizard is an important factor in its conservation. The authors examined daily and seasonal habitat requirements of Texas horned lizards and determined whether habitat selection differed among land management treatments in southern Texas. They used five study sites, each with a different burning and grazing treatment. Adult lizards caught in the study sites were fitted with backpacks carrying radiotransmitters and relocated daily. Habitat characteristics at radio locations and random points 10 m from the lizard were assessed using 50-X 20-cm quadrats. Relocations were made during three time intervals (morning, afternoon, evening) and two seasons (active, inactive). Horned lizards used bare ground and herbaceous vegetation similar to their availability in the morning and evening for thermoregulation and foraging purposes, but avoided bare ground in the afternoon. In the afternoons, lizards selected woody vegetation and litter as thermal refuges and cover from predators. Lizards also appeared less dependent on herbaceous vegetation and more dependent on woody vegetation and litter in the inactive season compared to the active season as a result of increased temperatures. The authors did not detect differences in habitat selection among land management treatments. Habitat management for Texas horned lizards should focus on creating a mosaic of bare ground, herbaceous vegetation, and woody vegetation in close proximity.

659. **Modeled effects of sagebrush-steppe restoration on greater sage-grouse in the interior Columbia Basin, U.S.A.**
Wisdom, Michael J.; Rowland, Mary M.; Wales, Barbara C.; Hemstrom, Miles A.; Hann, Wendel J.; Raphael, Martin G.; Holthausen, Richard S.; Gravenmier, Rebecca A.; and Rich, Terrell D.
Conservation Biology 16(5): 1223-1231. (2002)
NAL Call #: QH75.A1C5; ISSN: 0888-8892
Descriptors: conservation measures/ nutrition/ diet/ ecology/ terrestrial habitat/ land and freshwater zones/ Centrocercus urophasianus (Phasianidae): habitat management/ sagebrush steppe restoration/ modeled effects and evaluation/ food plants/ Artemisia/ feeding behavior/ population dynamics/ grassland/ sagebrush steppe/ United States/ Interior Columbia Basin/ Phasianidae/ Galliformes, Aves/ birds/ chordates/ vertebrates

660. **Models for guiding management of prairie bird habitat in northwestern North Dakota.**
Madden, E. M.; Murphy, R. K.; Hansen, A. J.; and Murray, L.
American Midland Naturalist 144(2): 377-392. (2000)
NAL Call #: 410 M58; ISSN: 00030031
Descriptors: avifauna/ habitat management/ habitat mosaic/ habitat use/ prairie/ wildlife management/ United States/ Ammodramus bairdii/ Ammodramus savannarum/ Anthus spragueii/ Dolichonyx oryzivorus/ Passerculus sandwichensis/ Spizella pallida
Abstract: With grassland bird populations in the Great Plains exhibiting steep declines, grassland managers require information on bird habitat needs to optimally manage lands dedicated to wildlife. During 1993-1994, we measured bird occurrence and corresponding vegetation attributes on mixed-grass prairie in northwestern North Dakota. Three hundred and ten point-count locations over a wide range of successional stages were sampled. Ten grassland passerine species occurred commonly (i.e., at >10% of point count locations), including two species endemic to the northern Great Plains [Baird's sparrow (Ammodramus bairdii) and Sprague's pipit (Anthus spragueii)], and several species of management concern [bobolink (Dolichonyx oryzivorus), grasshopper sparrow

(Ammodramus savannarum), clay-colored sparrow (Spizella pallida)]. Some species were ubiquitous and had generalized habitat associations [e.g., savannah sparrow (Passerculus sandwichensis)]. Others exhibited more finely tuned, closely overlapping use of relatively short, sparse to moderately dense, grassand forb-dominated habitat. We used logistic regression models to predict bird species' occurrence based on nine vegetation variables. Previously undefined limits of vegetation height and density were identified for Baird's sparrow and Sprague's pipit, and of shrub cover for Baird's sparrow. Our findings underscore the need for a mosaic of successional types to maximize diversity of prairie bird species. Managers may reduce confusion created by generic treatment prescriptions for grasslands by focusing on absolute rather than relative measures of vegetation, and by integrating standard data from multiple bird habitat studies across regions.

661. **Mowing versus fire on expansion of black-tailed prairie dogs reintroduced into Chihuahuan Desert grasslands.**
Fredrickson, Ed L.; Andersen, Mark C.; Ford, Paulette L.; Truett, Joe C.; and Roemer, Gary.
In: 87th Annual Meeting of the Ecological Society of America and the 14th Annual International Conference of the Society for Ecological Restoration, Tucson, Arizona, USA; August 04-09, 2002.; Vol. 87.; pp. 352; 2002.
Descriptors: terrestrial ecology: ecology, environmental sciences/ wildlife management: conservation/ colony growth/ establishment/ grassland/ habitat/ keystone species distribution/ mowing versus fir/ range expansion/ reintroduction

662. **Mule deer fawn survival on cattle-grazed and ungrazed desert ranges.**
Horejsi, R. G., 1982. 47 p. Arizona Game and Fish Department Wildlife Bulletin.
Notes: ISSN: 0518-5467.
Descriptors: cattle/ coyote/ deer, mule/ deserts/ female/ food habits/ grazing/ interspecies relationships/ population density/ predation/ production/ rodents/ shrubs/ survival/ trees/ vegetation/ Arizona, central region/ Tonto Basin
Abstract: Study areas were the Three Bar Wildlife Area (closed to grazing in 1947) and the Tonto Basin Study Area (under National Forest cattle grazing permit). Data were collected on: rodent and rabbit populations; cover, density and frequency of trees, shrubs, and half shrubs; fruit, nut, berry, and spring mean forage production; nutritional quality of key forage species; deer population densities; buck(doe)fawn ration in mid-winter; predator populations; coyote, deer, and cattle food habits; and vegetation mapping of TBWA.

663. **Multi-resolution approach to wildlife habitat modeling using remotely sensed imagery.**
Smith, M. D. and Burger, L. W.
In: Proceedings of SPIE - The International Society for Optical Engineering. Gao W. and Shaw D.R. (eds.); Vol. 5153.
San Diego, CA; pp. 34-43 ; 2003.
Notes: 0277786X (ISSN).
Descriptors: habitat model/ habitat suitability/ IKONOS/ LANDSAT/ northern bobwhite/ wildlife/ conservation/ data reduction/ ecosystems/ environmental protection/ land use/ mathematical models/ modernization/ probability/ regression analysis/ remote sensing
Abstract: Remotely sensed imagery, coupled with wildlife habitat models provide a powerful tool for the implementation, assessment, and monitoring of wildlife conservation/restoration initiatives. Observed, empirical relationships between a species abundance metric and landscape structure/composition are used to structure models. Habitat suitability models always represent a trade off between breadth of applicability and specificity. Large-spatial extent, coarse spatial resolution data sets may be useful for characterizing potential animal distributions at regional or continental scales; however, habitat models developed at this spatial scale may have little applicability for predicting suitability at finer spatial resolutions. Whereas numerous issues related to multi-scale analysis have been acknowledged with respect to wildlife habitat models, only recently have sources of high-resolution imagery been readily available for site-specific analyses. We outline a multi-scale approach to habitat modeling and demonstrate this approach with northern bobwhite. We developed a coarse resolution model appropriate for identifying focal regions likely to support bobwhite using classified LandSat imagery and relative abundance measures from breeding season call counts. Then we developed a fine resolution model based on 4-m multispectral IKONOS imagery and animal space-use for planning and implementing conservation practices at the local scale. We discuss the application of this hierarchical approach to conservation planning.

664. **Multi-scale effects of habitat loss and fragmentation on lesser prairie-chicken populations of the U. S. southern Great Plains.**
Fuhlendorf, S. D.; Woodward, A. J. W.; Leslie, D. M.; and Shackford, J. S.
Landscape Ecology 17(7): 617-628. (2002)
NAL Call #: QH541.15.L35 L36; ISSN: 09212973.
Notes: doi: 10.1023/A:1021592817039.
Descriptors: agriculture/ conservation ecology/ fragmentation/ grasslands/ hierarchy/ landscape change/ landscape dynamics/ landscape structure/ lesser prairie-chicken/ rangeland/ southern Great Plains/ Scale/ species conservation/ habitat fragmentation/ habitat loss/ landscape change/ population decline/ scale effect/ species conservation/ land use/ Juniperus virginiana/ Tympanuchus pallidicinctus
Abstract: Large-scale patterns of land use and fragmentation have been associated with the decline of many imperiled wildlife populations. Lesser prairie-chickens (Tympanuchus pallidicinctus) are restricted to the southern Great Plains of North America, and their population and range have declined by > 90% over the past 100 years. Our objective was to examine scale-dependent relationships between landscape structure and change and long-term population trends for lesser prairie-chicken populations in the southern Great Plains. We used a geographic information system (GIS) to quantify landscape composition, pattern and change at multiple scales (extents) for fragmented agricultural landscapes surrounding 10 lesser prairie-chicken leks. Trend analysis of long-term population data was used to classify each

population and landscape (declined, sustained). We analyzed metrics of landscape structure and change using a repeated measures analysis of variance to determine significant effects (α = 0.10) between declining and sustained landscapes across multiple scales. Four metrics of landscape structure and change (landscape change index, percent cropland, increases in tree-dominated cover types, and changes in edge density) contained significant interactions between population status and scale, indicating different scaling effects on landscapes with declining and stable populations. Any single spatial scale that was evaluated would not have given complete results of the influences of landscape structure and change on lesser prairie-chicken populations. The smallest spatial scales (452,905, and 1,810 ha) predicted that changes in edge density and largest patch size were the only important variables, while large-scale analysis (7,238 ha) suggested that the amount of cropland, increase in trees (mostly Juniperus virginiana), and general landscape changes were most important. Changes in landscape structure over the past several decades had stronger relationships with dynamics of lesser prairie-chicken populations than current landscape structure. Observed changes suggest that these local populations may be appropriately viewed from a metapopulation perspective and future conservation efforts should evaluate effects of fragmentation on dispersal, colonization, and extinction patterns.

665. **A multi-scaled analysis of avian response to habitat amount and fragmentation in the Canadian dry mixed-grass prairie.**
Koper, N. and Schmiegelow, F. K. K.
Landscape Ecology 21(7): 1045-1059. (2006)
NAL Call #: QH541.15.L35 L36; ISSN: 09212973.
Notes: doi: 10.1007/s10980-006-0004-0.
Descriptors: Akaike's information criterion/ Canada/ habitat loss and fragmentation/ mixed-effects models/ mixed-grass prairie/ model selection/ nest success/ prairie birds/ spatial scale
Abstract: Previous research has suggested that ducks and songbirds may benefit from prairie landscapes that consist primarily of contiguous grasslands. However, the relative importance of landscape-level vs. local characteristics on mechanisms underlying observed patterns is unclear. We measured effects of grassland amount and fragmentation on upland and wetland songbird and duck density and nest success, and on some nest predators, across 16 landscapes in southern Alberta, Canada. We compared these landscape-level effects with local-scale responses, including distance to various edges and vegetation characteristics. We also evaluated several statistical approaches to comparing effects of habitat characteristics at multiple spatial scales. Few species were influenced by grassland amount or fragmentation. In contrast, distance to edge and local vegetation characteristics had significant effects on densities and nest success of many species. Previous studies that reported effects of landscape characteristics may have detected patterns driven by local mechanisms. As a corollary, results were very sensitive to statistical model structure; landscape level effects were much less apparent when local characteristics were included in the models. © 2006 Springer.

666. **The Nature Conservancy's Prairie Wings Project: A conservation strategy for the grassland birds of the western Great Plains.**
McCready, Bob; Mehlman, David; Kwan, Danny; and Abel, Becky
In: Bird Conservation Implementation and Integration in the Americas: Proceedings of the Third International Partners in Flight Conference, General Technical Report-PSW 191/ Ralph, C. J. and Rich, T. D.; Albany, CA: Pacific Southwest Research Station, Forest Service, U.S. Department of Agriculture, 2005. pp. 1158-1161.
Notes: Volume 2; Responsibility: Pacific Southwest Research Station; U.S. Forest Service General Technical Report series; ISSN: 0196-2094; Bird Conservation Implementation and Integration in the Americas: Third International Partners in Flight conference held 2002 March 20-24 in Asilomar, California.
Descriptors: conservation measures/ terrestrial habitat/ land zones/ habitat management/ grassland/ Conservation strategy/ North America/ western Great Plains/ grassland management strategy/ Aves/ birds/ chordates/ vertebrates

667. **Nest-site characteristics of burrowing owls (Athene cunicularia) in the Snake River birds of prey national conservation area, Idaho, and applications to artificial burrow installation.**
Belthoff, James R. and King, R. Andrew
Western North American Naturalist 62(1): 112-119. (2002)
NAL Call #: QH1.G7; ISSN: 1527-0904
Descriptors: conservation measures/ reproduction/ reproductive behavior/ ecology/ habitat utilization/ animal constructions/ land and freshwater zones/ Athene cunicularia (Strigidae): habitat management/ artificial burrow installation/ breeding site/ nesting site/ habitat preference/ burrows/ nests/ Idaho/ Snake River Birds of Prey National Conservation Area/ nest site characteristics/ Strigiformes, Aves/ birds/ chordates/ vertebrates
Abstract: Burrowing Owl (Athene cunicularia) populations are declining in many portions of their range, and research and management efforts into stemming declines are underway. One tool with promise is the artificial burrow, which can supplement nesting opportunities and play a role in research, mitigation, translocation, and reintroduction studies. However, few studies directly assess important burrow and surrounding topographic features upon which owls choose sites and then construct and install artificial burrows accordingly. In this study we (1) measure physical, vegetative, and topographic characteristics of Burrowing Owl nest sites in the Snake River Birds of Prey National Conservation Area (SRBPNCA); (2) compare used and unused burrows to determine features important in nest-site selection; and (3) use this information to help guide current and future construction and placement of artificial burrows in the SRBPNCA. Owls nested in abandoned American badger (Taxidea taxus) burrows in areas with more than one burrow, close to roads and irrigated agricultural fields, and characterized by sparse and low vegetation dominated by nonnative plant species. Only one feature studied, tunnel entrance angle, corresponded with choice by owls; odds of burrow use decreased 17% with each 1[degree] increase in slope of the tunnel entrance. Owls nesting near irrigated agricultural fields also had higher productivity. We

discuss applications of our results to construction and placement of artificial burrows in the SRBPNCA and similar shrub-steppe environs in western North America.

668. **Nest success of ducks on rotational and season-long grazing systems in Saskatchewan.**
Ignatiuk, Jordan B. and Duncan, David C.
Wildlife Society Bulletin 29(1): 211-217. (2001)
NAL Call #: SK357.A1W5; ISSN: 0091-7648
Descriptors: grazing system: rotational, season long/ nest success/ nest survival/ residual vegetation cover
Abstract: Rotational grazing systems have been implemented to increase duck production in the prairie pothole region, although evidence to support the contention of increased duck production is scant at best. We examined duck nest success on 12 once-over rotational grazing systems and 12 season-long pastures in southern Saskatchewan. Analysis of 617 nests from 23 pastures failed to reveal a difference in nest survival between rotational and season-long grazing systems (20.2% versus 25.1%), although there was a year X treatment effect interaction wherein nest success differed between years on rotational pastures but not on season-long pastures. Residual vegetation cover from randomly clipped plots did not differ between grazing treatments but did differ between years. Nest success on pastures within years was not related to vegetative carryover. Although we did not detect greater duck nest success on rotational grazing systems compared to season-long pastures, rotational systems could be beneficial if they preserve or improve grassland areas, attract more ducks from less productive habitats, or increase duckling survival. Our study provides strong additional evidence of the high nest success on pastures compared to most other habitat types, including small plots of planted cover. Converting cropland to pastures and retaining existing pastures are recommended to maintain and improve duck production in the prairie pothole region.

669. **Nest survival of clay-colored and vesper sparrows in relation to woodland edge in mixed-grass prairies.**
Grant, Todd A.; Madden, Elizabeth M.; Shaffer, Terry L.; Pietz, Pamela J.; Berkey, Gordon B.; and Kadrmas, Neil J.
Journal of Wildlife Management 70(3): 691-701. (2006)
NAL Call #: 410 J827; ISSN: 0022-541X
Descriptors: Rodentia/ Sciuridae/ Spermophilus tridecemlineatus/ Emberizidae/ Passeriformes/ Pooecetes gramineus/ Spizella pallida/ Fringillidae/ Bos bison/ clay-colored sparrow/ ground squirrels/ Poa pratensis/ Populus tremuloides/ Spermophilus tridecemlineatus/ thirteen-lined ground squirrel/ vesper sparrow/ vesper sparrows/ predation/ foods-feeding/ breeding grounds/ conservation/ wildlife management/ diets/ habitat use/ grasslands/ ecosystems/ habitat management/ land zones/ predators/ mammals/ McHenry County/ nest site/ nest survival/ nesting success/ North Dakota/ northern grassland/ nutrition/ Pooecetes gramineus/ Spizella pallida/ population ecology/ reproduction/ breeding/ productivity/ Spermophilus tridecemlineatus/ survival/ wildlife management/ woody vegetation/ aspen woodland/ clay-colored sparrow/ edge effects/ grassland birds/ mixed-grass prairie
Abstract: The quantity and quality of northern mixed-grass prairie continues to decline because of conversion to agriculture, invasion of woody and exotic plants, and disruption of important ecological processes that shape grasslands. Declines in grassland bird populations in North Dakota, USA, have coincided with these largely anthropogenic alterations to prairie habitat. In grasslands of north-central and northwestern North Dakota, woody plants have increased due primarily to fire suppression, extirpation of bison (Bos bison), and widescale planting of tree shelter belts. In northern grasslands, effects of woody vegetation on survival of grassland birds are poorly understood, and conclusions are based mainly on studies conducted outside the region. We examined nest survival of clay-colored sparrows (Spizella pallida) and vesper sparrows (Pooecetes gramineus) relative to the distance nests were located from aspen (Populus tremuloides) woodland edges and relative to other habitat features near the nest. Clay-colored and vesper sparrow nest survival was higher for nests located near woodland edges, nests with greater cover of Kentucky bluegrass (Poa pratensis), and nests more concealed by vegetation. Vesper sparrow nest survival increased as the percent cover of tall shrubs near the nest increased. Based on video-camera data, the 13-lined ground squirrel (Spermophilus tridecemlineatus) was the most common predator of sparrow eggs and young. Thirteen-lined ground squirrels were more common far from woodland edges than near and this pattern may, in part, explain clay-colored and vesper sparrow nest survival in relation to woodland edges. In contrast to our results, studies conducted in other grassland systems generally report lower nest survival for grassland birds nesting near trees and shrubs. This disparity in results demonstrates the need to identify specific nest predators and their distributions with respect to important habitat features because these data can be important in explaining-and perhaps predicting-patterns of nest predation.

670. **Nesting birds and grazing cattle: Accommodating both on Midwestern pastures.**
Temple, Stanley A.; Fevold, Brick M.; Paine, Laura K.; Undersander, Daniel J.; and Sample, David W.
Studies in Avian Biology 19: 196-202. (1999)
NAL Call #: QL671.S8.
Notes: 0197-9922 (ISSN); Ecology and conservation of grassland birds of the Western Hemisphere.
Descriptors: commercial activities/ conservation measures/ reproduction/ ecology/ community structure/ population dynamics/ terrestrial habitat/ land and freshwater zones/ farming and agriculture/ habitat management/ pasture management/ ecology/ reproduction/ reproductive productivity/ species diversity/ population density/ pasture management/ grasslands/ Wisconsin/ Iowa and Lafayette Counties/ Aves/ birds/ chordates/ vertebrates

671. **Nesting ecology of mixed-grass prairie songbirds in southern Saskatchewan.**
Davis, S. K.
Wilson Bulletin 115(2): 119-130. (2003)
NAL Call #: 413.8 W692; ISSN: 00435643
Descriptors: brood parasitism/ nest predation/ nesting behavior/ reproductive success/ songbird/ Canada/ North America/ Saskatchewan/ Ammodramus bairdii/ Anthus spragueii/ Calcarius ornatus/ Microtus pennsylvanicus/ Molothrus ater/ Passerculus sandwichensis/ Spizella pallida/ Sturnella neglecta

Abstract: During 1996-2000, I studied the nesting ecology of Sprague's Pipits (Anthus spragueii), Clay-colored Sparrows (Spizella pallida), Savannah Sparrows (Passerculus sandwichensis), Baird's Sparrows (Ammodramus bairdii), Chestnut-collared Longspurs (Calcarius ornatus), and Western Meadowlarks (Sturnella neglecta) on 47 native mixed-grass prairie pastures in southern Saskatchewan. Predation was the primary cause of nest failure and occurred at a similar frequency among the six species. Nest success and productivity varied among years and was lowest during 1997, the year of a substantial increase in meadow vole (Microtus pennsylvanicus) populations in southern Saskatchewan. Nest predation was most severe during the nestling stage with daily survival rates typically lower than those of the incubation period. Brown-headed Cowbirds (Molothrus ater) parasitized nests of all six species, with 5-29% of host nests containing cowbird eggs. Savannah Sparrows, Clay-colored Sparrows, and Western Meadowlarks incurred the highest frequency of brood parasitism. Parasitized hosts experienced lower productivity due to a combination of reductions in clutch size, hatching success, and fledging success. Overall, brood parasitism by cowbirds cost these birds between 1.3 and 2.2 young per successful nest. These results support the general contention that nest predation is the primary factor influencing grassland songbird reproductive success.

672. **Nesting-season responses of three grassland sparrow species to previous-year mowing on reclaimed surface mines in Clarion County, Pennsylvania.**
Brauning, Daniel; Grishaver, Mary; and Grainer, Chris
Journal of the Pennsylvania Academy of Science 75(1): 23-26. (2001)
NAL Call #: Q11.J682; ISSN: 1044-6753
Descriptors: commercial activities/ reproduction/ reproductive behavior/ ecology/ terrestrial habitat/ land and freshwater zones/ Ammodramus henslowii/ Ammodramus savannarum/ Passerculus sandwichensis (Emberizidae): farming and agriculture/ mowing/ breeding season/ nesting season/ reclaimed surface mines/ previous year mowing/ distribution within habitat/ nesting season occupancy/ grassland/ prairie/ Pennsylvania/ Clarion County/ Emberizidae/ Passeriformes, Aves/ birds/ chordates/ vertebrates
Abstract: Declines in populations of grassland birds have been attributed to the intensive nature of modern agricultural practices, the loss of native prairie grasses across the continent, and loss of agricultural acreage in the Northeast. Using belt transects, we assessed numbers of three sparrow species during the nesting season in relation to hay-cutting during the previous year on three reclaimed surface mines in Clarion County, Pennsylvania. Grasshopper sparrow (Ammodramus savannarum) detection rates varied between 0.3 to 1.2 birds per 100 ms, and showed no consistent response to previous-year mowing. Savannah sparrows (Passerculus sandwichensis) occurred at twice the rate on mowed (0.58 birds/100 m) than on unmowed fields (0.22 birds/100 m). Henslow's sparrows (Ammodramus henslowii) were from six to 28 times more abundant on unmowed transects (0.6 to 1.2 birds per 100 m) than on mowed transects (0.04 to 0.09 birds per 100 m). Leaf litter depth, number of dead forbs, and the height of tallest green forbs differed significantly between mowed and unmowed areas. Leaf litter depth was the best predictor of the number of Henslow's sparrows ($r^2 = 0.63$, $p < 0.001$) in all areas combined. The presence of dead forbs was the best indicator of unmowed areas; no dead forbs were observed on transects mowed the previous year. Habitat features associated with mowing the previous year, i.e., elimination of dead forbs and reduction of leaf litter depth, have direct functional affects on Henslow's sparrows in the form of eliminating song perches and reducing cover for nests, respectively. Our results corroborate recommendations to manage only a portion of an area for Henslow's sparrow annually and to cut individual parcels at intervals of no more than bi- or tri-ennially.

673. **Nesting success of upland nesting waterfowl and sharp-tailed grouse in specialized grazing systems in south-central North Dakota.**
Sedivec, K. K.; Messmer, T. A.; Barker, W. T.; Higgins, K. F.; and Hertel, D. R.
In: Can livestock be used as a tool to enhance wildlife habitat? General Technical Report-RM 194/ Severson, Kieth E., ed.; Fort Collins, Colo.: Rocky Mountain Forest and Range Experiment Station, Forest Service, U.S. Department of Agriculture, 1990. pp. 71-92.
Notes: 43rd Annual Meeting of the Society for Range Management, Reno, Nev., February 13, 1990.
NAL Call #: aSD11.A42 no. 194
Descriptors: commercial activities/ conservation measures/ reproduction/ ecology/ population dynamics/ land and freshwater zones/ Anas/ Aythya (Anatidae)/ Tympanuchus phasianellus (Phasianidae): farming and agriculture/ habitat management/ reproductive productivity/ population density/ nesting density/ North Dakota/ nesting success/ livestock grazing systems/ Anatidae/ Anseriformes/ Aves/ birds/ chordates/ vertebrates

674. **Nongame wildlife communities in grazed and ungrazed montane riparian sites.**
Schulz, T. T. and Leininger, W. C.
Great Basin Naturalist 51(3): 286-292. (1991)
NAL Call #: 410 G79; ISSN: 0017-3614
Descriptors: Zapus princeps/ birds/ small mammal/ Wilson's warbler/ western jumping mouse/ cattle grazing/ wildlife management/ Rocky Mountains/ Colorado

675. **The northern bobwhite decline: Scaling our management for the twenty-first century.**
Williams, C. K.; Guthery, F. S.; Applegate, R. D.; and Peterson, M. J.
Wildlife Society Bulletin 32(3): 861-869. (2004)
NAL Call #: SK357.A1W5; ISSN: 00917648.
Notes: doi: 10.2193/0091-7648(2004)032<0861:TNBDSO>2.0.CO;2.
Descriptors: broad-scale/ Colinus virginianus/ fine-scale/ habitat/ harvest/ management/ northern bobwhite/ usable space/ gamebird/ habitat management/ harvesting/ population decline/ wildlife management/ North America
Abstract: Northern bobwhites (Colinus virginianus) are one of the most broadly researched and intensively managed species in North America. However, we argue that a disadvantage of this status is that traditional management

principles currently are incompatible with the spatial scale necessary to address the nationwide decline in bobwhite abundance. We maintain that halting or reversing this decline will entail 2 principal changes in the scale of management. Primarily we suggest that habitat oversight must switch from historical fine-scale management (promotion of edge habitat, weedy fencelines, disked strips, living hedges, and food plots) to regional management of usable space. Secondly, within these regional management areas, we should apply harvest management that employs risk-sensitive strategies that conservatively avoid undermining the primary goal. This entails narrowing the scale of harvest management from statewide to regional levels. If these ideological changes cannot be made and historical policies remain in force, we risk failing to stabilize, let alone increase, bobwhite populations.

676. **Northern bobwhites and postfire succession.**
Ransom, Dean and Schulz, Gerral G.
Journal of Wildlife Management 71(2): 565-570. (2007)
NAL Call #: 410 J827; ISSN: 0022-541X
Descriptors: Galliformes/ Phasianidae/ Colinus virginianus/ fires-burns/ habitat management/ density/ prescribed fire/ rangeland/ rolling plains/ ecosystems/ Texas/ environmental factors/ conservation/ wildlife management/ habitat use/ land zones/ population ecology/ wildlife management/ postfire succession
Abstract: Our study evaluated the effects of prescribed fire on northern bobwhites (Colinus virginianus) occupying native rangelands in Rolling Plains of Texas, USA, during 2002 and 2003. Prescribed fires were conducted during February of 1996, 1998, and 2000; pastures with no recent treatment history served as controls. We quantified bobwhite densities from line transects using distance sampling. We used a repeated-measures analysis of variance to test for treatment-year differences in bobwhite densities. We measured postfire herbaceous and woody vegetation attributes and evaluated vegetation relationships to bobwhite density using simple linear regression. We found significant between-year differences in fall bobwhite densities ($F = 13.05$, $df = 3$, $P = 0.036$) but no differences among treatments or controls. Fall bobwhite densities were inversely related to visual obstruction ($r^2 = 0.179$, $df = 15$, $P = 0.058$) and positively associated with increasing heterogeneity of grass cover ($r^2 = 0.416$, $df = 15$, $P = 0.004$). Our results suggest prescribed fire at large spatial scales may be a neutral practice for managing bobwhite habitat on semiarid rangelands.

677. **Observations of pronghorn distribution in relation to sheep grazing on the Desert Experimental Range.**
Clary, W. P. and Holmgren, R. C.
In: Proceedings of the Wildlife-Livestock Relationships Symposium. Coeur D'alene, Idaho. Peek, James M. and Dalke, P. D. (eds.)
Moscow, Idaho: Forest, Wildlife and Range Experiment Station, University of Idaho; pp. 581-592; 1982.
NAL Call #: SF84.84.W5 1981
Descriptors: Utah/ sheep/ pronghorn/ Antilocapra americana/ grazing
This citation is from AGRICOLA.

678. **Observations of white-tailed deer and cattle diets in Mexico.**
Martinez, Alfonso; Molina, Victor; Gonzalez, Fernando; Marroquin, Jorge S.; and Navar, Jesus
Journal of Range Management 50(3): 253-257. (1997)
NAL Call #: 60.18 J82; ISSN: 0022-409X.
http://jrm.library.arizona.edu/data/1997/503/253-257_martinez.pdf
Descriptors: nutrition/ diet/ feeding behavior/ ecology/ competition/ terrestrial habitat/ man-made habitat/ land and freshwater zones/ Odocoileus virginianus texanus (Cervidae): food plants/ food preferences/ interspecific competition/ Bos indicus/ Bos taurus/ grazing resources/ dietary structure/ selectivity/ rangelands/ grasslands/ cultivated land habitat/ pasture/ Mexico/ Nuevo Leon/ anahuac/ dietary composition/ sympatric species overlap/ faecal analysis/ Cervidae/ Artiodactyla/ Mammalia/ chordates/ mammals/ vertebrates

679. **Observations on white-tailed deer and habitat response to livestock grazing in south Texas.**
Cohen, W. E.; Drawe, D. L.; Bryant, F. C.; and Bradley, L. C.
Journal of Range Management 42(5): 361-365. (1989)
NAL Call #: 60.18 J82; ISSN: 0022-409X.
http://jrm.library.arizona.edu/Volume42/Number5/azu_jrm_v42_n5_361_365_m.pdf
Descriptors: Odocoileus virginianus/ rotational grazing/ Texas/ white-tailed deer
Abstract: Since short duration grazing (SDG) was introduced to Texas, concern for white-tailed deer (Odocoileus virginianus) has magnified because they are a species of major economic importance to ranchers. The objective of this study was to observe the effects of SDG and continuous yearlong grazing (CG) on home ranges and movement indices of female deer, and on forage availability. The study was conducted on the Rob and Bessie Welder Wildlife Refuge, near Sinton, Texas. The study area included a 10-pasture SDG cell and a CG pasture, each stocked at 2.8 ha/auy. Cattle grazed each SDG paddock 2 to 8 days; paddocks were rested 32 to 47 days. A total of 3,961 radio-fixes from 11 does was collected over an 11-month study period in 1983. Monthly and annual home ranges of does were similar ($P > 0.05$) between SDG (207 ha) and CG (229 ha). However, white-tailed deer traveled 35% more ($P < 0.05$) between fixes in SDG (449 m) than in CG (332 m) from May to August, a time of greatest physiological and nutritional stress for female deer in south Texas. Also, does avoided ($P < 0.05$) cattle during 2 cycles of the SDG rotation. The primary trend observed was for the deer under SDG to avoid cattle concentrations by alternating between preferred habitats rather than a predictable paddock-to-paddock movement. In general, there were few differences in total grass and forb cover between SDG and CG. However, several forage species important to deer were less frequent ($P < 0.05$) under SDG than CG.
This citation is from AGRICOLA.

680. **Occupied and unoccupied sage grouse habitat in Strawberry Valley, Utah.**
Bunnell, K. D.; Flinders, J. T.; Mitchell, D. L.; and Warder, J. H.
Journal of Range Management 57(5): 524-531. (2004)
NAL Call #: 60.18 J82 ; ISSN: 0022409X
Descriptors: Centrocercus urophasianus/ logistic regression/ sage grouse/ sagebrush/ gamebird/ habitat use/ nest site/ regression/ vegetation/ North America/ Strawberry Valley/ United States/ Utah/ Bromus inermis/ Centrocercus urophasianus
Abstract: This study evaluated multiple aspects of spring/summer sage grouse (Centrocercus urophasianus) habitat in Strawberry Valley, Utah by measuring vegetation associated with nest, brood and adult use sites. In addition, 3 types of random habitats were measured including available habitat within core use areas, random sagebrush (Artemisia spp.)/grass habitat outside core use areas, and random sagebrush/grass habitat sites that had been converted to an understory of smooth brome (Bromus inermis Leyss) by past range management practices. Logistic regression was used to identify those habitat variables that discriminated between site types. Variables that discriminated adult habitat from brood rearing habitat included: 1) sagebrush height (P ≤ 0.01) and 2) forb diversity (P = 0.12) with sagebrush height being greater at adult sites and forb diversity greater at brood sites Variables that significantly discriminated occupied adult habitat from random habitat outside of core use areas included: 1) percent grass cover (P < 0.01) and 2) area of sagebrush canopy (P = 0.03) with both variables having grater values in adult habitat. Variables that significantly discriminated occupied adult habitat from random habitat with a smooth brome understory included: 1) percent forb cover (P ≤ 0.01), 2) shrub canopy cover (P = 0.02), and 3) area of sagebrush canopy (P = 0.08) with all variables being greater in adult habitat. In addition, this study identified sagebrush age, sagebrush canopy area, and forb diversity as potentially important aspects of sage grouse habitat that have not been previously reported.

681. **Pastures for upland birds: Landowner incentive program restores native species in bermudagrass pastures (Texas).**
Wagner, M.; Smeins, F.; and Hays, B.
Ecological Restoration 23(3): 209-210. (2005); ISSN: 15434079
Descriptors: Aves/ Cynodon/ pastures/ birds/ uplands/ native habitat/ grasses/ Texas

682. **Patch and landscape factors shape community assemblage of bumble bees, Bombus spp. (Hymenoptera: Apidae), in montane meadows.**
Hatfield, R. G. and LeBuhn, G.
Biological Conservation 139(1-2): 150-158. (2007)
NAL Call #: S900.B5; ISSN: 00063207.
Notes: doi: 10.1016/j.biocon.2007.06.019.
Descriptors: grazing/ landscape/ patch/ pollinator/ Scale/ Sierra Nevada
Abstract: Understanding the scale at which habitat influences species richness in terrestrial ecosystems is central to both ecology and conservation biology [Wettstein, W., Schmid, B., 1999. Conservation of arthropod diversity in montane wetlands: effect of altitude, habitat quality and habitat fragmentation on butterflies and grasshoppers. Journal of Applied Ecology, 36, 363-373]. Community composition may be influenced by habitat variation at patch and/or landscape-scales depending on the body size, home range area, and dispersal distances of the focal taxa [Calder III, W.A., 1984. Size, function, and life history. Harvard University Press, Cambridge, MA; Haskell, J.P., Ritchie, M.E., Olff, H., 2002. Fractal geometry predicts varying body size scaling relationships for mammal and bird home ranges. Nature 418, 527-530; Thomas, C.D., 2000. Dispersal and extinction in fragmented landscapes. Proceedings of the Royal Society Biological Sciences Series B 267, 139-145], not merely their phylogenetic affinity. We investigated the importance of habitat variables at different scales on the richness and abundance of bumble bees both annually and seasonally in Sierran montane meadows over two years. We found that both patch and landscape factors influence the species richness and abundance of bumble bees and these factors have a seasonal component to their importance. The proportion of meadow in the surrounding habitat was the most consistent positive influence on both species richness and abundance across years. In the second year, 2003, patch factors, plant species richness and current livestock grazing also influenced bumblebee species richness; plant species richness was positively correlated and current livestock grazing was negatively correlated with bumble bee species richness. Bumble bee abundance was positively influenced by meadow wetness and proportion of meadow in the surrounding habitat in both years. These data suggest conservation of pollinators depends on conservation planning with attention to the quality and context of the landscape.

683. **Patch size and landscape effects on density and nesting success of grassland birds.**
Winter, M.; Johnson, D. H.; Shaffer, J. A.; Donovan, T. M.; and Svedarsky, W. D.
Journal of Wildlife Management 70(1): 158-172. (2006)
NAL Call #: 410 J827; ISSN: 0022541X
Descriptors: bird density/ bobolink/ clay-colored sparrow/ Dolichonyx oryzivorus/ landscape composition/ nest success/ Passerculus sandwichensis/ patch size/ replication/ Savannah sparrow/ Spizella pallida/ variability
Abstract: Current management recommendations for grassland birds in North America emphasize providing large patches of grassland habitat within landscapes that have few forest or shrubland areas. These Bird Conservation Areas are being proposed under the assumption that large patches of habitat in treeless landscapes will maintain viable populations of grassland birds. This assumption requires that patch size and landscape features affect density and nesting success of grassland birds, and that these effects are consistent among years and regions and across focal species. However, these assumptions have not yet been validated for grassland birds, and the relative importance of local vegetation structure, patch size, and landscape composition on grassland bird populations Is not well known. In addition, factors influencing grassland bird nesting success have been investigated mostly in small-scale and short-duration studies. To develop management guidelines for grassland birds, we tested the spatial and temporal repeatability of the influence of patch size and

landscape composition on density and nesting success of 3 grassland passerines, after controlling for local-scale vegetation structure, climate, and-when analyzing nest success-bird density. We conducted our study during 4 years (1998-2001) in 44 study plots that were set up in 3 regions of the northern tallgrass prairie in Minnesota and North Dakota, USA. In these study plots we measured density and nesting success of clay-colored sparrows (Spizella pallida), Savannah sparrows (Passerculus sandwichensis), and bobolinks (Dolichonyx oryzivorusj. Statistical models indicated that density was influenced by patch size, landscape, region, and local vegetation structure more so than by local vegetation structure alone. Both magnitude and direction of the response of density to patch size varied among regions, years, and species. In contrast, the direction of landscape effects was consistent among regions, years, and between Savannah sparrows and bobolinks. In each species, this landscape effect was independent of patch size. Nesting success was not clearly influenced by patch size or landscape composition, and none of the factors that influenced avian density also influenced nesting success in any of the 3 species. General statements on "optimal habitat" for grassland birds should therefore be viewed cautiously. Instead, long-term studies in different regions as well as a deeper understanding of the local system are needed to determine which factors are most important for grassland birds in a particular area.

684. **Patterns of avian nest predators and a brood parasite among restored riparian habitats in agricultural watersheds.**
Maul, Jonathan D.; Smiley, Peter C.; and Cooper, Charles M.
Environmental Monitoring and Assessment 108(1-3): 133-150. (2005)
NAL Call #: TD194.E5; ISSN: 0167-6369
Descriptors: nutrition/ diet/ prey/ parasites diseases and disorders/ ecology/ population dynamics/ predators/ terrestrial habitat/ land zones/ Aves: avian prey/ monitoring predators among restored riparian habitats/ community structure/ monitoring avian nest predators and brood parasite among restored riparian habitats/ population size/ avian predators/ monitoring nest predators among restored riparian habitats/ mammalian predators/ reptilian predators/ riparian habitat/ restored habitats/ monitoring avian nest predators and brood parasite/ monitoring avian/ mammalian and reptilian predators/ Mississippi/ Panola County/ Long and Hotophia Creeks/ Reptilia/ birds/ chordates/ mammals/ reptiles/ vertebrates
Abstract: In fragmented edge-dominated landscapes, nest predation and brood parasitism may reduce avian reproductive success and, ultimately, populations of some passerine species. In the fragmented agroecosystem of northwest Mississippi, placement of drop-pipe structures has been used as a restoration technique for abating gully erosion along stream banks. These actions have formed small herbaceous and woody habitat extensions into former agricultural lands. We quantified species relative abundances, species richness, and evenness of avian nest predators and a brood parasite within four categories of constructed habitat resulting from drop-pipe installation. Differences in the abundance of two nest predators, cotton mouse (Peromyscus gossypinus) and blue jay (Cyanocitta cristata), were observed among constructed habitats. However, relative abundances of other predators such as common grackle (Quiscalus quiscula), American crow (Corvus brachyrhynchos), and hispid cotton rat (Sigmodon hispidus), and the obligate brood parasite brown-headed cowbird (Molothrus ater) did not differ among four habitat categories. Although species richness, abundance, and evenness of potential nest predators were generally similar among the constructed habitats, predator species composition varied, suggesting that these habitats supported different predator communities. This difference is important because as each predator species is added to or deleted from the community, variation may occur in the framework of prey search methods, predator strategies, and potentially overall predation pressure. We suggest that land managers using drop-pipes as part of stream restoration projects allow for the development of the constructed habitat with the largest area and greatest vegetative structure.

685. **Performance of greater sage-grouse models for conservation assessment in the Interior Columbia Basin, U.S.A.**
Wisdom, Michael J.; Wales, Barbara C.; Rowland, Mary M.; Raphael, Martin G.; Holthausen, Richard S.; Rich, Terrell D.; and Saab, Victoria A.
Conservation Biology 16(5): 1232-1242. (2002)
NAL Call #: QH75.A1C5; ISSN: 0888-8892.
http://dx.doi.org/10.1046/j.1523-1739.2002.01074.x
Descriptors: nutrition/ diet/ ecology/ terrestrial habitat/ land and freshwater zones/ Centrocercus urophasianus (Phasianidae): habitat management/ sagebrush steppe restoration/ modeled effects and evaluation/ food plants/ Artemisia/ feeding behavior/ population dynamics/ grassland/ sagebrush steppe/ United States/ Interior Columbia Basin/ Phasianidae/ Galliformes, Aves/ birds/ chordates/ vertebrates
Abstract: Valid modeling of habitats and populations of Greater Sage-Grouse (Centrocercus urophasianus) is a critical management need because of increasing concern about population viability. Consequently, we evaluated the performance of two models designed to assess landscape conditions for Greater Sage-Grouse across 13.6 million ha of sagebrush steppe in the interior Columbia Basin and adjacent portions of the Great Basin of the western United States (referred to as the basin). The first model, the environmental index model, predicted conditions at the scale of the subwatershed (mean size of approximately 7800 ha) based on inputs of habitat density, habitat quality, and effects of human disturbance. Predictions ranged on a continuous scale from 0 for lowest environmental index to 2 for optimal environmental index. The second model, the population outcome model, predicted the composite, range-wide conditions for sage grouse based on the contribution of environmental index values from all subwatersheds and measures of range extent and connectivity. Population outcomes were expressed as five classes (A through E) that represented a gradient from continuous, well-distributed populations (outcome A) to sparse, highly isolated populations with a high likelihood of extirpation (outcome E). To evaluate performance, we predicted environmental index values and population outcome classes in areas currently occupied by sage grouse versus areas where extirpation has occurred. Our a priori expectations were that models should predict substantially

worse environmental conditions (lower environmental index) and a substantially higher probability of extirpation (lower population outcome class) in extirpated areas. Results for both models met these expectations. For example, a population outcome of class E was predicted for extirpated areas, as opposed to class C for occupied areas. These results suggest that our models provided reliable landscape predictions for the conditions tested. This finding is important for conservation planning in the basin, where the models were used to evaluate management of federal lands for sage grouse. [Ingenta]

686. **Planting trees in prairie landscapes: Do the ecological costs outweigh the benefits?**
Kelsey, K. W.; Naugle, D. E.; Higgins, K. F.; and Bakker, K. K.
Natural Areas Journal 26(3): 254-260. (2006)
NAL Call #: QH76.N37; ISSN: 08858608
Descriptors: avian diversity/ grassland birds/ native prairie/ riparian woodlands/ tree plantings
Abstract: Tree plantings are striking landscape features that symbolize settlement of the West. Although grassland birds require large tracts of treeless grasslands, planting trees in prairie landscapes is still regarded by many as a positive management practice. We compared bird use of tree plantings (n=182) and natural riparian woodlands (n=37) to evaluate whether ecological costs of tree plantings to grassland birds is compensated for by the benefit they provide to forest birds of management concern. Findings indicate that ecological costs of tree plantings outweigh their benefits because they fail to provide habitat for forest birds of management concern. Thus, loss of native grassland bird communities is the currency in which we pay the ecological costs of plantings trees in prairie landscapes. We recommend that managers refrain from planting trees in or adjacent to grassland habitats. We further recommend that managers refocus their tree plantings efforts to restoration of riparian woodlands that maximize avian diversity in prairie landscapes.

687. **A population decline recorded by operation burrowing owl in Saskatchewan.**
Skeel, M. A.; Keith, J.; and Palaschuk, C. S.
Journal of Raptor Research 35(4): 371-377. (2001)
NAL Call #: QL696.F3J682; ISSN: 08921016
Descriptors: Athene cunicularia/ burrowing owl/ endangered species/ habitat conservation/ population decline/ Saskatchewan/ stewardship
Abstract: Operation Burrowing Owl (OBO) is a prairie stewardship program launched in Saskatchewan in 1987 to preserve Burrowing Owl (Athene cunicularia) habitat from cultivation. As of 2000, 459 OBO members were protecting 61 259 ha of grassland habitat. Of the sites protected, 97% (466) involved privately-owned land (21 376 ha) and the remaining sites were publicly owned (39883 ha). Participants signed a voluntary agreement to report annually the number of owls on their land and to conserve the owls' nesting areas, even if sites became unoccupied. In recent years, the program has promoted conservation easements and assisted landowners with owl habitat enhancement. In recognition of participation, members received a gate sign, an annual newsletter, and educational material. In addition to conserving habitat, OBO has increased public awareness of the owl, participated in research, and monitored owl population changes. In 2000, 459 OBO members reported a total of 54 pairs, considerably fewer than the 681 pairs reported by 352 members in 1988. After correcting for non-responding members each year, the annual census indicated a 95% decline in estimated number of pairs over 13 yr from 1988 (1032 pairs) to 2000 (56 pairs); this represents an average decline of 21.5% per year. Between 1987-93, the mean number of sites with ≥5 pairs of owls was 26 (range = 10-42; 5-11% of sites). In contrast, by 2000, 94% of all formerly-occupied sites had zero owls, two sites had five pairs (<1% of sites), and no site had ≥5 pairs of owls.

688. **Population dynamics of hispid cotton rats (Sigmodon hispidus) across a nitrogen-amended landscape.**
Clark, J. E.; Hellgren, E. C.; Jorgensen, E. E.; Tunnell, S. J.; Engle, D. M.; and Leslie, D. M.
Canadian Journal of Zoology 81(6): 994-1003. (2003)
NAL Call #: 470 C16D; ISSN: 00084301.
Notes: doi: 10.1139/z03-084.
Descriptors: biodiversity/ biomass/ nitrogen/ exclosure fencing/ population statistics/ exclusion experiment/ grassland/ nitrogen/ nutrient enrichment/ population dynamics/ rodent/ Sigmodon hispidus
Abstract: We conducted a mark-recapture experiment to examine the population dynamics of hispid cotton rats (Sigmodon hispidus) in response to low-level nitrogen amendments (16.4 kg nitrogen/ha per year) and exclosure fencing in an old-field grassland. The experimental design consisted of sixteen 0.16-ha plots with 4 replicates of each treatment combination. We predicted that densities, reproductive success, movement probabilities, and survival rates of cotton rats would be greater on nitrogen-amended plots because of greater aboveground biomass and canopy cover. Population densities of cotton rats tended to be highest on fenced nitrogen plots, but densities on unfenced nitrogen plots were similar to those on control and fenced plots. We observed no distinct patterns in survival rates, reproductive success, or movement probabilities with regard to nitrogen treatments. However, survival rates and reproductive success tended to be higher for cotton rats on fenced plots than for those on unfenced plots and this was likely attributable to decreased predation on fenced plots. As low-level nitrogen amendments continue to be applied, we predict that survival, reproduction, and population-growth rates of cotton rats on control plots, especially fenced plots with no nitrogen amendment, will eventually exceed those on nitrogen-amended plots as a result of higher plant-species diversity, greater food availability, and better quality cover.

689. **Population responses of Microtus pennsylvanicus across a chronological sequence of habitat alteration.**
Dooley, James L. and Murray, Amanda L.
Ohio Journal of Science 106(3): 93-97. (2006)
NAL Call #: 410 Oh3; ISSN: 0030-0950
Descriptors: conservation measures/ ecology/ land zones/ Microtus pennsylvanicus: habitat management/ population dynamics/ man-made habitat/ reclaimed surface mined habitats/ Ohio/ international Center for the Preservation of

Wild animals/ Mammalia, Rodentia, Muridae/ chordates/ mammals/ rodents/ vertebrates
Abstract: Understanding the effects of habitat alteration on population demography and persistence is emerging as one of the most important and challenging areas facing ecologists and conservation biologists today. Here we compare the population demography of a common but important consumer species in eastern and mid-western grassland communities (Microtus pennsylvanicus) across three habitats that differ in the amount of time since reclamation following strip-mining (30, 25, and 15 years). We established two 40 x 40 m plots at each of the three sites and used traditional capture-recapture techniques to monitor population size, survival, and recruitment through a nine-month period during 1999-2000. We predicted that populations of M. pennsylvanicus would exhibit higher population numbers, better survival rates, and higher rates of recruitment in habitat patches that had been recovering for longer periods of time. In contrast to our predictions, results indicated higher peak population numbers at the most recently disturbed site (Z = 81.18 ± 9.59 individuals) and higher numbers of reproductive females ($\bar{x}$ = 3.38 ± 0.85) relative to sites recovering for 25 and 30 years ($\bar{x}$ peak population size = 28.08 ± 23.09 and 31.16 ± 1.75 individuals, respectively; ($\bar{x}$ number of reproductive females = 0.57 ± 0.32 and 1.13 ± 0.13, respectively). Thus it would appear that time since disturbance was not an important predictor of population performance for this species in this altered system. Alternative hypotheses such as the influence of local habitat attributes and population fluctuations are discussed.

690. **Population status and management of lesser prairie-chicken in Colorado.**
Giesen, Kenneth M.
Prairie Naturalist 32(3): 137-148(2000)
NAL Call #: QH540.P7; ISSN: 0091-0376
Descriptors: population studies/ wildlife management: conservation/ translocation/ management method/ conservation status/ grassland restoration/ grazing management/ habitat degradation/ habitat suitability/ population changes/ population size/
United States Forest Service
Abstract: Populations of lesser prairie-chicken (Tympanuchus pallidicinctus), apparently abundant in southeastern Colorado prior to EuroAmerican settlement, reached a low during the "Dust Bowl" years in the 1930's. Restoration of native sand sagebrush (Artemisia filifolia) grasslands and management of grazing on the Comanche National Grasslands by the United States Forest Service have resulted in modest population increases of lesser prairie-chicken since the 1960's. Past translocation efforts to expand distribution in Colorado and increase population size were not successful because too few birds were released and habitats may not have been suitable. Continued restoration and management of degraded habitats, as well as successful transplants into suitable habitats, could result in substantial increases in both distribution and population size. Precipitation appears to be a major factor affecting population changes as reflected in annual counts of active leks and males. Present populations in Colorado are estimated at less than 1,500 breeding individuals.

691. **Potential effects of livestock water-trough modifications on bats in northern Arizona.**
Tuttle, S. R.; Chambers, C. L.; and Theimer, T. C.
Wildlife Society Bulletin 34(3): 602-608. (Oct. 2006)
NAL Call #: SK357.A1W5
Descriptors: livestock/ water troughs/ fences/ Myotis/ Chiroptera/ drinking/ animal behavior/ Arizona/ Antrozous pallidus/ natural resources, environment, general ecology, and wildlife conservation/ animal ecology and behavior/ animal production
This citation is from AGRICOLA.

692. **Potential effects of mowing prior to summer burning on the Eastern Massasauga (Sistrurus c. Catenatus) at Squaw Creek National Wildlife Refuge, Holt County, Missouri, USA.**
Durian, Francis E. and Lenhoff, Lisa
Transactions of the Kansas Academy of Science 38: 21-25. (2004)
NAL Call #: 500 K13T; ISSN: 0544-540X
Descriptors: conservation measures/ ecology/ population dynamics/ terrestrial habitat/ land zones/ Sistrurus catenatus catenatus: habitat management/ mowing prior to summer burning/ potential effects on mortality rate/ mortality/ mortality rate/ grassland/ prairie/ Missouri/ Holt County/ Squaw Creek National Wildlife Refuge/ Reptilia, Lepidosauria, Squamata, Serpentes, Viperidae/ chordates/ reptiles/ vertebrates
Abstract: We conducted a pilot study to begin evaluating the use of pre-burn mowing to reduce or eliminate Eastern Massasauga (Sistrurus c. catenatus) mortality during summer prescribed fires. Drift fencing was used to determine the presence of Eastern Massasaugas on a 8.1 ha portion of native wet prairie at Squaw Creek National Wildlife Refuge during the summer 2001. Twenty-two days of trapping with 10 randomly located drift fence traps (n=220 trap nights) resulted in the capture of 96 snakes representing 8 species, including 9 Eastern Massasaugas. After trapping was completed the site was mowed to a height of 20 cm and then burned 13 days after mowing was completed. Post-burn transect searches of the site revealed one yellow-bellied racer (Coluber constrictor) mortality due to the fire. The low mortality rate suggests that pre-burn mowing may potentially reduce fire related mortality of Eastern Massasaugas and other snake species by negatively modifying occupied habitat which in turn forces snakes to leave the area or seek refuge below ground.

693. **Potential uses of cattle grazing to manage waterfowl nesting cover on Turnbull National Wildlife Refuge.**
Rees, J. R.
In: Proceedings of the Wildlife-Livestock Relationships Symposium. Coeur D'alene, Idaho. Peek, James M. and Dalke, P. D. (eds.)
Moscow, Idaho: Forest, Wildlife and Range Experiment Station, University of Idaho; pp. 86-93; 1982.
NAL Call #: SF84.84.W5 1981
Descriptors: Washington/ grazing/ waterfowl/ nesting
This citation is from AGRICOLA.

694. **Predation and the management of prairie grouse.**
Schroeder, M. A. and Baydack, R. K.
Wildlife Society Bulletin 29(1): 24-32. (2001)
NAL Call #: SK357.A1W5; ISSN: 00917648
Descriptors: Centrocercus urophasianus/ greater prairie-chicken/ Grouse management/ lesser prairie-chicken/ population regulation/ predator-prey relationships/ sage grouse/ sharp-tailed grouse/ Tympanuchus cupido/ Tympanuchus pallidicinctus/ Tympanuchus phasianellus/ gamebird/ management/ predation/ Centrocercus urophasianus/ Tympanuchus cupido/ Tympanuchus pallidicinctus/ Tympanuchus phasianellus
Abstract: This paper examines the importance of predation in the life cycles of sage grouse (Centrocercus urophasianus), sharp-tailed grouse (Tympanuchus phasianellus), greater prairie-chicken (T. cupido), and lesser prairie-chicken (T. pallidicinctus). Most individual prairie grouse eventually succumb to predation, with substantial effects on nest success, juvenile survival, and adult survival. Predator control has occasionally been used as a management tool with the belief that reducing predator numbers can enhance viability of game populations in general and prairie grouse in particular. Although some experimental research has shown that direct reduction of predator numbers can increase grouse recruitment, most current management plans recommend indirect management of the grouse-predator relationship by manipulating habitats. However, as habitats become more fragmented and altered and populations of prairie grouse become more threatened and endangered, it is important to reconsider predator control as a management option and to evaluate its viability through experimentation.

695. **Predator activity related to landscape features in northern Iowa.**
Kuehl, A. K. and Clark, W. R.
Journal of Wildlife Management 66(4): 1224-1234. (2002)
NAL Call #: 410 J827; ISSN: 0022541X
Descriptors: Akaike weights/ corn belt/ habitat fragmentation/ Iowa/ isolation/ Mephitis mephitis/ predation/ Procyon lotor/ raccoon/ red fox/ striped skunk/ track stations/ Vulpes vulpes/ grassland/ predation risk/ predator/ predator-prey interaction/ United States/ Mephitis mephitis/ Phasianus colchicus/ Procyon lotor/ Vulpes vulpes
Abstract: We studied mammalian predator activity in relation to patches of grassland habitat in the agricultural landscape of northern Iowa to understand the potential interactions with ground-nesting birds, including waterfowl and ring-necked pheasant (Phasianus colchicus). We quantified presence and movement direction of striped skunk (Mephitis mephitis), raccoon (Procyon lotor), and red fox (Vulpes vulpes) using unbaited track stations placed along the edges of 100-ha blocks of grassland and at other locations throughout the surrounding landscape. We used logistic regression with repeated measures and Akaike weights to develop predictive models of predator presence as a function of landscape variables including distance from a grassland block, shape of grassland edges, and presence of woodlands, farmsteads, and wetlands. Predators were detected at track stations in the landscape near (≤500 m) grassland blocks 33.5% of the time, more frequently than at stations immediately adjacent to edges of blocks (22.6%), and much more frequently than at stations distant (>500 m) from blocks (13.6%). Striped skunk presence at a station decreased as distance from grassland patches increased and was positively related to the number of farmsteads; raccoon presence was positively related to presence of woody cover; and red fox presence increased with greater area of pastureland and greater isolation from farmsteads, and decreased with increasing amount of strip habitat in the landscape. Predicted predator presence at locations where duck nests were found ≤5500 m from blocks of grassland (23.1%) was within 1 SE of the Mayfield nest mortality rate, whereas predicted presence at isolated nest locations (12.0%) was greater than observed nest mortality. Track stations indicated that predators moved into and out of grassland patches at corners of blocks (80% of the time) much more frequently than when they traveled along the straight sides of blocks (7%). If presence of predators is directly related to predation rate, our models predict that risk to nesting birds would be greatest in patches near large grassland blocks where corridors, corners, and smaller patches focus predator activity. We envision that wildlife biologists could use models of predator activity to predict the potential influence of landscape configuration on predation risk to nesting birds.

696. **Predicting regional abundance of rare grassland birds with a hierarchical spatial count model.**
Thogmartin, W. E.; Knutson, M. G.; and Sauer, J. R.
Condor 108(1): 25-46. (2006)
NAL Call #: QL671.C6; ISSN: 00105422
Descriptors: abundance/ bobolink/ grasshopper sparrow/ Henslow's sparrow/ hierarchical model/ sedge wren/ upland sandpiper
Abstract: Grassland birds are among the most imperiled groups of birds in North America. Unfortunately, little is known about the location of regional concentrations of these birds, thus regional or statewide conservation efforts may be inappropriately applied, reducing their effectiveness. We identified environmental covariates associated with the abundance of five grassland birds in the upper midwestern United States (Bobolink [Dolichonyx oryzivorus), Grasshopper Sparrow [Ammodramus savannarum], Henslow's Sparrow [A. henslowii], Sedge Wren [Cistothorus platensis], and Upland Sandpiper [Bartramia longicauda]) with a hierarchical spatial count model fitted with Markov chain Monte Carlo methods. Markov chain Monte Carlo methods are well suited to this task because they are able to incorporate effects associated with autocorrelated counts and nuisance effects associated with years and observers, and the resulting models can be used to map predicted abundance at a landscape scale. Environmental covariates were derived from five suites of variables: landscape composition, landscape configuration, terrain heterogeneity and physiognomy, climate, and human influence. The final models largely conformed to our a priori expectations. Bobolinks and Henslow's Sparrows were strongly sensitive to grassland patch area. All of the species except Henslow's Sparrows exhibited substantial negative relations with forest composition, often at multiple spatial scales. Climate was found to be important for all species, and was the most important factor influencing abundance of Grasshopper Sparrows. After mapping predicted abundance, we found no obvious correspondence in the regional patterns of the five species. Thus, no clearly defined areas exist within the upper midwestern United

States where management plans can be developed for a whole suite of grassland birds. Instead, a larger, region-wide initiative setting different goals for different species is recommended. © The Cooper Ornithological Society 2006.

697. **Preliminary evaluation of elk habitat use within a three-pasture rest-rotation grazing system.**
Frisina, M. R.
Proceedings of the Montana Academy of Sciences 46: 27-36. (1986)
NAL Call #: 500 M762
Descriptors: Cervus elaphus canadensis/ grazing/ habitats/ livestock/ range management/ resource management/ rotational grazing/ wildlife management/ plant protection/ wildlife-livestock relations/ Montana
This citation is from AGRICOLA.

698. **A preliminary report on the effects of a deferred-rotation grazing system on wildlife at the Sheldon National Wildlife Refuge.**
Oldemeyer, J. L.; Martin, S. J.; and Woodis, S. G.
Cal-Neva Wildlife Transactions: 26-42. (1983)
NAL Call #: SK351.W523; ISSN: 0095-3601
Descriptors: cattle/ Nevada/ rangelands/ wildlife/ rotational grazing
This citation is from AGRICOLA.

699. **Prescribed fire and cattle grazing influences on the vegetation and elk use of a rough fescue community.**
Jourdonnais, C. S. Univ. of Montana, 1985.
Descriptors: Cervus canadensis/ habitat management/ livestock/ interspecific relations/ food supply/ Montana/ burning/ carbohydrates/ cattle/ chemical analysis/ communities/ elk/ fall/ fescue/ grasses/ grazing/ nutrients/ production/ soils/ spring/ standing crop/ utilization/ vegetation/ weather
Abstract: The influence of seasonal burning and fall cattle grazing were compared to the following: (1) production and composition of a rough fescue community; (2) elk use; (3) nutrient content of rough fescue, Idaho fescue (F. idahoensis) and bluebunch wheatgrass (Agropyron spicatum); (4) total nonstructural carbohydrate reserves of rough fescue and idaho fescue; and (5) soil organic carbon content.

700. **Prescribed fire and cattle grazing on an elk winter range in Montana.**
Jourdonnais, C. S. and Bedunah, D. J.
Wildlife Society Bulletin 18(3): 232-240. (1990)
NAL Call #: SK357.A1W5; ISSN: 0091-7648
Descriptors: prescribed burns/ fire management/ cattle/ grazing/ Cervus elaphus/ American elk/ Montana
Abstract: Burn and cattle-grazing treatments reduced rough fescue Festuca scabrella standing crop, the preferred winter elk Cervus elaphus forage, during the initial growing season. By the 2nd growing season, the rough fescue standing crop was similar to the control in all treatments. Cattle grazing maintained more down litter accumulations than the burn treatments, were similar for all treatment in the second and third growing seasons after treatment. Elk use of the study area was limited to lake fall, winter, and early spring and was greater in the burn and cattle-grazed treatments compared with the control. Elk use of rough fescue was concentrated on plants without heavy litter. Idaho fescue F. idahoensis received significant use by elk only after rough fescue was heavily utilized. Other native species received little or no use. -from Authors

701. **Prescribed fire effects on herpetofauna: Review and management implications.**
Russell, K. R.; Van Lear, D. H.; and Guynn, D. C.
Wildlife Society Bulletin 27(2): 374-384. (Summer 1999)
NAL Call #: SK357.A1W5; ISSN: 0091-7648 [WLSBA6]
Descriptors: prescribed burning/ amphibia/ reptiles/ wildlife management/ mortality
This citation is from AGRICOLA.

702. **Prescribed sheep grazing to enhance wildlife habitat on North American rangelands.**
Mosley, J. C.
Sheep Research Journal Special Issue: 79-91. (1994)
NAL Call #: SF371.R47; ISSN: 1057-1809
Descriptors: sheep/ grazing/ species diversity/ botanical composition/ habitats/ wildlife management/ Ovis canadensis/ plant litter
This citation is from AGRICOLA.

703. **Private-land habitat opportunities for prairie grouse through federal conservation programs.**
Riley, T. Z.
Wildlife Society Bulletin 32(1): 83-91. (2004)
NAL Call #: SK357.A1W5; ISSN: 00917648
Descriptors: Conservation Reserve Program/ Conservation Security Program/ CRP/ CSP/ Environmental Quality Incentives Program/ EQIP/ Farm and Ranch Lands Protection Program/ federal conservation programs/ grasslands/ Grassland Easement Program/ Grassland Reserve Program/ GRP/ gamebirds/ habitat restoration/ prairies/ private land/ United States/ Centrocercus minimus/ Centrocercus urophasianus/ Tympanuchus cupido/ Tympanuchus pallidicinctus/ Tympanuchus phasianellus
Abstract: Habitat alterations have resulted in significant declines in the populations of prairie grouse (Centrocercus minimus, C. urophasianus, Tympanuchus cupido, T. pallidicinctus, T. phasianellus) throughout the last century. Landscape-level habitat restoration through federal conservation programs may be the only option available to prevent several of these species from declining to dangerously low levels. I examined 7 federal conservation programs available through the United States Department of Agriculture (USDA) and 5 programs through the United States Fish and Wildlife Service (USFWS) to determine how they might be used to restore and protect habitat for prairie grouse on private land. The USDA's Conservation Reserve Program (CRP) has restored ≥15 million ha of grassland with cost-share agreements and 10-year contracts. The Environmental Quality Incentives Program (EQIP) has the potential to restore habitat for prairie grouse because it is well funded and primarily focused on improving livestock operations on grasslands, much of which occurs on native prairies. Other USDA conservation programs provide the necessary funding and incentives to landowners to protect and restore prairie grouse habitat, but competition among states for available funds and authorized practices may reduce their effectiveness at restoring habitat over large landscapes. The USFWS

Grassland Easement Program, Partners for Fish and Wildlife Program, and Private Stewardship Grants Program collectively have restored and protected ≥ 300,000 ha of grassland and native prairie with perpetual easements, cost-share agreements, technical assistance, and term contracts. Much of the vegetation provided by these programs should be of significant value for prairie grouse habitat. The USFWS State and Tribal Wildlife Grants Program and the Landowner Incentive Program should enable the states to develop their own programs to restore and protect prairie grouse habitat on private land.

704. **Pronghorn use of agricultural land in northwestern South Dakota.**
Griffin, S. L.
Brookings, SD: South Dakota State University, 1991.
Notes: M.S. Thesis
Descriptors: Conservation Reserve Program/ State conservation programs/ South Dakota
Abstract: Studied the seasonal use of CRP grasslands by pronghorns.

705. **Protecting the prairie.**
Ness, Eric
Frontiers in Ecology and the Environment 1(6): 287. (2003)
Descriptors: Grassland Reserve Program/ prairies/ haying/ grazing/ Natural Resources Conservation Service/ NRCS/
Abstract: The author discusses the Grassland Reserve Program of the Natural Resources Conservation Service. This program will get a disbursement of $49.9 million and will protect the prairies. Under conservation management the program will look into the haying and grazing of eligible lands. More than 525 million acres of grasslands dominate American private land. Between 1982 and 1997 almost 23 million acres of grassland and scrublands were converted to crops. According to the 1997 Natural Resources Inventory another six million acres were developed. Threats to short grass prairie in Colorado and in other areas have affected grassland birds. The populations of mountain plover, prairie chicken, Henslow's sparrow, sedge wrens, the Florida grasshopper sparrow, and Bachman's sparrow have been declining over the past quarter century. Mowing during the breeding season and invasion by non-native grasses or shrubs due to fire suppression and abandonment are the main threats to these prairie grassland birds. The reserve program would work by allowing haying and grazing of eligible lands under conservation management.

706. **Ranching and prairie dogs.**
Long, Dustin and Truett, Joe
In: Grasslands Ecosystems, Endangered Species, and Sustainable Ranching in the Mexico-U.S. Borderlands: Conference Proceedings, Proceedings-RMRS 40/ Basurto, Xavier and Hadley, Diana; Ogden, UT: Rocky Mountain Research Station, Forest Service, U.S. Department of Agriculture, 2006. pp. 87-91.
http://www.fs.fed.us/rm/pubs/rmrs_p040.html
Descriptors: commercial activities/ Cynomys ludovicianus: farming and agriculture/ ranching/ Compatibility of management practices with ranching/ Mammalia, Rodentia, Sciuridae/ chordates/ mammals/ rodents/ vertebrates

707. **Ranching for longhorns and wildlife.**
Ikenson, Ben
Endangered Species Bulletin 25(1-2): 10-11. (2000); ISSN: 1091-7314.
http://www.fws.gov/Endangered/bulletin/2000/01-04/10-11.pdf
Descriptors: Galliformes/ Phasianidae/ Tympanuchus cupido attwateri/ ranching/ cattle/ Coastal Prairie Conservation Initiative/ Texas
Abstract: The San Bernard River in southeastern Texas passes through a ranch where the Attwater's prairie chicken once thrived. This species has become North America's most endangered bird. John Elick, the owner of the Eagle Roost Ranch wanted to help restore this bird and maintain habitat for wildlife. With the help of other landowners, he started restoration of Texas coastal prairie habitat as part of the Coastal Prairie Conservation Initiative. By this program, the landowners receive cost-share incentives for voluntary prairie habitat conservation practices. This improves the health of the rangeland and enhances wildlife habitat. The landowners can also sign a 'safe harbor' agreement, which relieves landowners of liability under the Endangered Species Act if the management practices attract endangered species. The various endangered species covered under Safe Harbor provisions are included in the article. By this agreement, the rancher improves his habitat for cattle operation and the Attwater's prairie chicken benefits from the improved habitat. Due to high rates of private ownership in Texas, this program has mushroomed in popularity.

708. **Rangeland modeling - Forage, water, and nutrients: Species competition and tree effects.**
Zhai, T.; Mohtar, R. H.; and Chen, X.
In: ASAE Annual International Meeting 2004. Ottawa, ON; pp. 3865-3886; 2004.
Descriptors: agroforestry/ APEX/ forage growth modeling/ GRASIM/ grazing management/ pasture modeling/ silvopasture/ computer simulation/ decision support systems/ ecology/ watersheds/ ecology/ forestry/ mathematical models/ nutrients
Abstract: Diverse uses of pasture and rangeland - from grazing to watersheds, wildlife habitats, and recreations - require an improved understanding of basic ecological processes and the effect of these processes on productivity, environmental pollution, and management practices. On going research is being conducted to develop computer-based modeling and decision support systems that help address research as well as management issues in pasture and range/and based livestock production systems. This paper presents theoretical development and field evaluation for modeling grazing system productivity and environmental impact. This modeling tool includes multispecies naturalized pasture and tree effects in silvopastoral systems. Due to its complexity and large data and computing requirement, this tool is made available on the Internet where all the computation and data needed for simulation reside on a local server. A Web-based interface is developed to facilitate input data entry and output visualization.

709. **Recovery plan for bighorn sheep in the Peninsular Ranges, California.**
Rubin, E.
Portland, OR: U.S. Fish and Wildlife Service, 2000.
Notes: Unpublished Wildlife Report.
http://ecos.fws.gov/docs/recovery_plan/001025.pdf
Descriptors: mapping/ morphology/ taxonomy/ diseases/ predation genetics/ disturbance/ drought/ livestock/ grazing/ fire/ habitat management for wildlife/ plants, miscellaneous/ exotic species/ reproduction/ mortality/ interspecies relationships/ California/ peninsular ranges

710. **Relating geomorphic change and grazing to avian communities in riparian forests.**
Scott, M. L.; Skagen, S. K.; and Merigliano, M. F.
Conservation Biology 17(1): 284-296. (2003)
NAL Call #: QH75.A1C5 ; ISSN: 08888892
Descriptors: avifauna/ complexity/ fluvial geomorphology/ grazing/ riparian forest/ United States/ Vireo olivaceus
Abstract: Avian conservation in riparian or bottomland forests requires an understanding of the physical and biotic factors that sustain the structural complexity of riparian vegetation. Riparian forests of western North America are dependent upon flow-related geomorphic processes necessary for establishment of new cottonwood and willow patches. In June 1995, we examined how fluvial geomorphic processes and long-term grazing influence the structural complexity of riparian vegetation and the abundance and diversity of breeding birds along the upper Missouri River in central Montana, a large, flow-regulated, and geomorphically constrained reach. Use by breeding birds was linked to fluvial geomorphic processes that influence the structure of these patches. Species richness and bird diversity increased with increasing structural complexity of vegetation ($F_{1,32} = 75.49$, $p < 0.0001$; $F_{1, 32} = 79.76$, $p < 0.0001$, respectively). Bird species composition was significantly correlated with vegetation strata diversity ($r_{s,33} = 0.98$, $p < 0.0001$). Bird abundance in canopy and tall-shrub foraging guilds increased significantly with increasing tree cover and tall-shrub cover ($F_{1,22} = 34.68$, $p < 0.0001$; $F_{1,20} = 22.22$, $p < 0.0001$, respectively). Seventeen bird species, including five species of concern (e.g., Red-eyed Vireo [Vireo olivaceus]), were significantly associated ($p < 0.10$) with structurally complex forest patches, whereas only six bird species were significantly associated with structurally simple forest patches. We related the structural complexity of 34 riparian vegetation patches to geomorphic change, woody vegetation establishment, and grazing history over a 35-year post-dam period (1953-1988). The structural complexity of habitat patches was positively related to recent sediment accretion ($t_{33} = 3.31$, $p = 0.002$) and vegetation establishment ($t_{20.7} = -3.63$, $p = 0.002$) and negatively related to grazing activity ($t_{19.6} = 3.75$, $p = 0.001$). Avian conservation along rivers like the upper Missouri requires maintenance of the geomorphic processes responsible for tree establishment and management of land-use activities in riparian forests.

711. **Relative abundance of small mammals in native and restored tallgrass prairie.**
Kezar, Samuel J. and Jenks, Jonathan A.
Proceedings of the South Dakota Academy of Science 83: 33-37. (2004)
NAL Call #: 500 So82; ISSN: 0096-378X
Descriptors: conservation measures/ ecology/ terrestrial habitat/ land zones/ Mammalia: habitat management/ habitat restoration/ small taxa/ restored tallgrass prairie/ comparison with native prairie/ community structure/ native and restored tallgrass prairie/ grassland/ native and restored tallgrass prairie habitat/ South Dakota/ Brookings County/ Mammalia/ chordates/ mammals/ vertebrates
Abstract: Relative abundance was assessed for small mammals captured on native and restored tallgrass prairie habitats. Prairie voles (Microtus ochrogaster) (n = 30), meadow voles (Microtus pennsylvanicus) (n = 4), deer mice (Peromyscus spp.) (n = 5), northern short-tailed shrews (Blarina brevicauda) (n = 3), pygmy shrews (Sorex hoyi) (n = 2), and thirteen-lined ground squirrels (Citellus tridecemlineatus) (n = 3) were captured using snap traps. Relative abundance of voles (Microtus spp.) was higher in native prairie (163.3) than in restored prairie (10.2). Relative abundance of deer mice (20.4), thirteen-lined ground squirrels (13.3), and shrews (20.4) was higher in restored than native prairie (< 5.1) habitat. Results indicated that restored prairie habitats provide adequate components (forage, cover) to support viable small mammal communities.

712. **Relative effects of litter and management on grassland bird abundance in Missouri, USA.**
Swengel, S. R. and Swengel, A. B.
Bird Conservation International 11(2): 113-128. (2001); ISSN: 09592709.
Notes: doi: 10.1017/S095927090100020X.
Descriptors: grassland/ litter/ management practices/ prairie/ relative abundance/ songbird/ United States
Abstract: Transect bird surveys were conducted at 43 tallgrass prairies in southwestern Missouri, U.S.A. in mid-June each year from 1992 to 1999. Litter volume on and near the ground was estimated on a nine-point scale during 1994 to 1999. The relative importance of management type (rotational burning, rotational haying, or a combination of both) and litter volume on relative abundance was analysed for three declining grassland songbirds: Henslow's Sparrow Ammodramus henslowii, Grasshopper Sparrow A. savannarum, and Dickcissel Spiza americana. Haying resulted in significantly higher abundance than burning for all species except Dickcissel, for which few significant management effects were detected. Henslow's Sparrow increased in abundance from light to heavy litter, Grasshopper Sparrow peaked in low to intermediate litter, and Dickcissel showed little pattern relative to litter. Litter scores recorded in each management type increased with number of years since last treatment. Although litter profoundly affected bird abundance, independent and equally important was whether that litter was obtained via haying or burning. Greater consistency among years in hayed vegetation structure may help explain these birds' preference for haying over burning or haying + burning.

Rotational haying should be employed more than burning in the management of these declining birds, especially for the sharply declining, fire-sensitive Henslow's and Grasshopper Sparrows.

713. **Reproduction by northern bobwhites in western Oklahoma.**
Cox, S. A.; Guthery, F. S.; Lusk, J. J.; Peoples, A. D.; Demaso, S. J.; and Sams, M.
Journal of Wildlife Management 69(1): 133-139. (2005)
NAL Call #: 410 J827; ISSN: 0022541X
Descriptors: Clutch size/ Colinus virginianus/ nest phenology/ nest success/ northern bobwhite/ Oklahoma/ reproduction/ clutch size/ gamebird/ latitudinal gradient/ nest predation/ nesting success/ phenology
Abstract: We studied northern bobwhites (Colinus virginianus) in western Oklahoma, USA, during the nesting seasons of 1992-2001. We obtained latitude-specific information on nesting biology and tested hypotheses on the cause of declines in clutch size with progression of the nesting season and on the phenological relation of first, second, and third nesting attempts. For pooled data on bobwhites alive during 15 April-15 September, 64 ± 6.5% of juvenile females (n = 56), 90 ± 10.0% of adult females (n=9), 13 ± 4.1% of juveniles males (n = 68), and 41 ± 10.7% of adult males (n = 22) incubated ≥ 1 nest. Bobwhites that entered the reproduction period starting on 15 April (n = 229) accumulated 203 nesting attempts (male and female incubations), which translated to 1.7 attempts/hen for all hens that entered (n = 117) and 3.1 attempts/hen for hens that survived to 15 September (n = 65). Overall success for incubated nests (48 ± 2.8%, n = 331) was independent of sex-age class and nesting attempt (1, 2, 3), but it declined at a rate of 2.37%/year (95% CL = 1.10-3.64%/year) during the study. Clutch size declined by 1 egg for every 14-20 elapsed days in the nesting season and the rate of decline was independent of incubation attempt (1 or 2); this result suggests that lower clutch sizes later in the nest season were not necessarily a function of re-nesting. Ending of nest-incubation attempts (1, 2, 3) occurred within an 8-day period from 26 August-2 September. Our results implied that early-season nesting cover is a management concern and that high nest success is possible in the absence of nest predator suppression where abundant nest sites occur across the landscape.

714. **Reproductive success and brood survival of bobwhite quail as affected by grazing practices.**
Cantu, R. and Everett, D. D.
In: Proceedings, Second National Bobwhite Quail Symposium. Schitoskey, F.; Schitoskey, E. C.; and Talent, L. G. (eds.)
Stillwater, Okla.: Oklahoma State University; pp. 79-83; 1982 .
NAL Call #: QL696.G27N3 1982
Descriptors: Texas/ Colinus virginianus/ bobwhite quail/ grazing practices/ livestock
This citation is from AGRICOLA.

715. **Reproductive success of chestnut-collared longspurs in native and exotic grassland.**
Lloyd, John D. and Martin, Thomas E.
Condor 107(2): 363-374. (2005)
NAL Call #: QL671.C6; ISSN: 0010-5422
Descriptors: Passeriformes/ Emberizidae/ Calcarius ornatus/ Fringillidae/ Agropyron cristatum/ chestnut-collared longspur/ terrestrial ecology/ breeding habitat/ native grassland/ exotic grassland/ nest survival rate/ grasslands/ ecosystems/ habitat management/ Medicine Lake National Wildlife Refuge/ Montana/ native prairie/ crested wheatgrass/ productivity/ reproductive success/ conservation/ wildlife management/ land zones/ reproduction/ Conservation Reserve Program/ exotic plant/ grassland birds/ nest success
Abstract: Habitat loss and fragmentation have been identified as important factors in the decline of grassland bird populations. However, population declines are apparent even in prairie ecosystems that remain relatively intact suggesting that additional factors are involved. The degradation of breeding habitat may be one such factor, but few studies have examined habitat-specific demography of grassland birds, and thus little is known of how changes in breeding habitat may be related to population declines. We addressed this question by comparing reproductive success of Chestnut-collared Longspurs (Calcarius ornatus) in patches of native prairie and in monocultures of crested wheatgrass (Agropyron cristatum), a grass introduced from Asia. Using recently developed methods for estimating nest survival rate, we found that, independent of habitat type, daily nest survival generally declined from egg laying to fledging. We also found a positive effect of clutch size on nest survival rate, which we interpreted as evidence for individual heterogeneity in nest survival. Finally, we found that the odds of a nest surviving a given day were 17% lower in the exotic habitat, and that nestlings grew more slowly, and had a smaller final mass in the exotic habitat. Despite having lower reproductive success in the exotic habitat, we found no evidence that Chestnut-collared Longspurs preferred to nest in the native habitat. Our results show that the introduction and spread of a commonly planted exotic grass has adverse fitness consequences for a grassland bird, and highlight the importance of maintaining native prairie.

716. **Reproductive success, territory size and predation pressures of the Florida scrub-jay (Aphelocoma coerulescens) at Savannas Preserve State Park.**
Cowan, Ernest M.
Endangered Species Update 22(1): 29-39. (2005); ISSN: 1081-3705
Descriptors: Corvidae/ Passeriformes/ Aphelocoma coerulescens/ scrub jay/ fires-burns/ Florida/ habitat management/ predators/ productivity/ reproductive success/ Savannas Preserve State Park/ shrub grasslands/ ecosystems/ territorial defense/ home range-territory/ territory size/ environmental factors/ behavior/ conservation/ wildlife management/ habitat use/ land zones/ reproduction/ Quercus spp./ Saint Lucie County
Abstract: The Florida Scrub-jay is found only in the fire-dependent xeric oak communities of Florida. The number of scrub-jays statewide has been in steady decline over the past century due to the habitat loss resulting from urban development and the aging of xeric oak scrub caused by

fire suppression policies. This study looks at the effect that aging of the scrub has on a population of scrub-jays at the Savannas Preserve State Park in Port St. Lucie, Florida. The population of scrub-jays at Savannas has been in decline over the past eight years. This study revealed that they are occupying territories that are much smaller than the normal optimal size and are having minimal reproductive success. In addition, the birds are subjected to predation pressures from natural predators present at higher than normal densities and by other predators brought into their habitat by encroaching urban development. The implementation of an aggressive prescribed fire program to restore their habitat is crucial to the long-term survival of this population of Florida Scrub-jays.

717. **Research observation: Effects of rangeland ecological condition on scaled quail sightings.**
Joseph, J.; Holechek, J. L.; Valdez, R.; Collins, M.; and Thomas, M.
Journal of Range Management 56: 314-318. (July 2003)
NAL Call #: 60.18 J82
Descriptors: Callipepla/ game birds/ drought/ pastures/ arid lands/ wildlife habitats/ ecological succession/ grazing intensity/ plant litter/ biomass/ vegetation cover/ population size/ New Mexico/ Callipepla squamata/ seral stages/ animal ecology and behavior
Abstract: Scaled quail (Callipepla squamata) numbers were evaluated during and after a 2-year drought period using strip census techniques on 2 pastures in late seral rangeland ecological condition and 2 pastures in mid-seral rangeland ecological condtion. This study was conducted on the Chihuahuan Desert Rangeland Research Center (CDRRC) in south-central New Mexico on 4 adjoining pastures that were similar in size and terrain. During part of the study (August 1994 to April 1997) all 4 pastures were destocked due to depletion of perennial grass cover and biomass from a combination of drought and heavy cattle grazing. Scaled quail sightings pooled across sampling periods (9) were different (P = 0.08) on high and low rangeland ecological condition treatments. They averaged 10.72 birds per pasture on late-seral and 4.22 birds per pasture on mid-seral rangeland ecological condition treatments. Autumn perennial grass cover and standing biomass levels was higher (P < 0.10) on late seral than on mid-seral rangeland ecological condition pastures during both years of study. Availability of scaled quail foods such as leatherweed croton and broom snakeweed did not differ (P > 0.10) between treatments. Our study indicates that during extended dry periods livestock grazing at moderate intensities may adversely affect scaled quail populations in the Chihuahuan Desert by depleting perennial grass cover. However, in years of above average precipitation there is evidence scaled quail prefer mid-seral pastures over late-seral pastures. Maintaining a mosaic of conservatively (late-seral) and moderately (mid-seral) grazed pastures should best meet the habitat needs of scaled quail in the Chihuahuan Desert.
This citation is from AGRICOLA.

718. **Response of a sage grouse breeding population to fire in southeastern Idaho.**
Connelly, J. W.; Reese, K. P.; Fischer, R. A.; and Wakkinen, W. L.
Wildlife Society Bulletin 28(1): 90-96. (2000)
NAL Call #: SK357.A1W5; ISSN: 00917648
Descriptors: Artemisia/ Centrocercus urophasianus/ fire/ habitat/ lek/ sage grouse/ sagebrush/ burning/ gamebird/ habitat management/ methodology/ species conservation/ wildlife management/ United States
Abstract: Prescribed burning is a common method to eliminate sagebrush (Artemisia spp.) and has been suggested as a tool to enhance the habitat of sage grouse (Centrocercus urophasianus). Effects of this practice on sage grouse have not been evaluated rigorously. We studied effects of prescribed fire on lek (traditional breeding display areas) attendance by male sage grouse occupying low-precipitation (<26 cm) sagebrush habitats in southeastern Idaho from 1986 through 1994. During the preburn period (1986-89), average declines for male attendance were 48% and 46% for treatment and control leks, respectively. Lek counts were similar for treatment and control leks during the preburn years (G-test, 0.25 > P > 0.10). During the postburn period (1990-94), male attendance at treatment leks declined 90% and control leks declined 63%. Although declines were similar between treatment and control leks during the preburn period, postburn declines were greater for treatment than control leks (0.05 < P < 0.10). We rejected the null hypothesis that for the 2 largest leks in both the treatment and control areas, counts were independent of years for preburn (0.05 < P < 0.10) and postburn (P ≤ 0.05) periods and concluded that breeding population declines became more severe in years following fire. Prescribed burning negatively affected sage grouse in southeastern Idaho and should not be used in low-precipitation sagebrush habitats occupied by breeding sage grouse.

719. **Response of birds to grazing of riparian zones.**
Popotnik, Gary J. and Giuliano, William M.
Journal of Wildlife Management 64(4): 976-982. (2000)
NAL Call #: 410 J827; ISSN: 0022-541X
Descriptors: avian abundance/ avian communities: bird counts, nest density, nest monitoring, reproductive success, riparian area livestock grazing impacts, species richness/ livestock grazing/ pasture/ pasture streams/ riparian areas/ vegetative cover/ vegetative structure/ wetlands
Abstract: Livestock grazing of streams and associated riparian areas may negatively impact avian communities through direct disturbance and alteration of vegetation structure. We determined the effects of grazing on vegetation, avian abundance, species richness, and reproductive success on pasture streams and associated riparian habitats in southwest Pennsylvania. Bird counts, nest monitoring, and vegetation sampling were conducted on 12 pairs (grazed and control) of streams in 1996 and 10 pairs in 1997. Compared with control streams, grazed areas had lower avian species richness and abundance. Several wetland-and riparian-dependent species (e.g., common snipe (Gallinago gallinago), great blue heron (Ardea herodias), green-backed heron (Butorides striatus), belted kingfisher (Ceryle alcyon), and solitary sandpiper (Tringa solitatia)) were found more often or only on control areas. Although nest density was higher and nest

destruction rates by livestock were lower on control streams, nest success (all species combined) was not affected by grazing. Avian communities in control areas appear to benefit primarily from improved vegetative cover and structure. Thus, management should focus on excluding livestock from such areas.

720. **Response of bobwhites to cover changes within three grazing systems.**
Hammerquist-Wilson, M. M. and Crawford, J. A.
Journal of Range Management 34(3): 213-215. (1981)
NAL Call #: 60.18 J82 ; ISSN: 0022-409X.
http://jrm.library.arizona.edu/Volume34/Number3/azu_jrm_v34_n3_213_215_m.pdf
Descriptors: Texas/ Colinus virginianus/ bobwhite quail/ grazing/ livestock
This citation is from AGRICOLA.

721. **Response of breeding Florida grasshopper and Bachman's sparrows to winter prescribed burning.**
Shriver, W. G. and Vickery, P. D.
Journal of Wildlife Management 65(3): 470-475. (2001)
NAL Call #: 410 J827; ISSN: 0022541X
Descriptors: Aimophila aestivalis/ Ammodramus savannarum floridanus/ Bachman's sparrow/ breeding density/ dry prairie/ endangered species/ Florida grasshopper sparrow/ grassland/ prescribed fire/ reproduction/ density/ fire management/ grasshopper/ passerines/ population decline/ reproductive success/ United States/ Aimophila aestivalis/ Ammodramus savannarum
Abstract: Populations of Florida grasshopper (Ammodramus savannarum floridanus) and Bachman's sparrows (Aimophila aestivalis) are small and declining. Prescribed burning is the primary management tool used to maintain their grassland habitats, but the effects of this management practice on the breeding density and reproductive success of these populations are poorly understood. We conducted a 3-year spot-mapping study of 3 winter burn classes (0.5-yr, 1.5-yr, and 2.5-yr postfire) in native dry prairie on 2 sites in central Florida to determine the effects of fire management on breeding density and reproductive success of these 2 sparrows. Florida grasshopper sparrow densities were greater on recently burned plots (0.5 yr postburn: $\bar{x}$ = 4.0 ± 1 territories/10 ha ($\bar{x}$ ± SE); 1.5 yr postburn $\bar{x}$ = 3.4 ± 0.8 territories/10 ha) than on plots that had not been burned in 2.5 years ($\bar{x}$ = 1.8 ± 0.8 territories/10 ha). Grasshopper sparrow reproductive success was also higher in recently burned plots (0.5 yr post-burn; $\bar{x}$ = 1.6 successful territories/plot) than in 2.5-year burn plots ($\bar{x}$ = 0.6 successful territories/plot). In contrast, Bachman sparrow breeding densities and reproductive success were not affected by fire management rotation. Our results indicate that a fire rotation of ≤3 years is necessary to maintain suitable breeding habitat for Florida grasshopper sparrows but does not appear to negatively affect breeding Bachman's sparrows.

722. **Response of elk to changes in plant production and nutrition following prescribed burning.**
Van Dyke, F. and Darragh, J. A.
Journal of Wildlife Management 71(1): 23-29. (Feb. 2007)
NAL Call #: 410 J827
Descriptors: animal ecology/ animal nutrition/ prescribed burning/ wildlife habitats/ wildlife food habits/ elks/ Cervus elaphus/ Artemisia/ grazing/ plant communities/ seasonal variation/ nutritive value/ botanical composition/ species diversity/ forage production/ forage quality/ habitat preferences/ forbs/ biomass/ grasses/ animal preferences/ Montana
Abstract: Researchers have ascribed use of areas by grazers after burning to changes in plant community structure, community composition, nutritional quality, and seasonal availability. Researchers can better evaluate these alternatives if they monitor changes in plant communities following burning concurrently with changes in animal use. We examined responses of elk (Cervus elaphus) to prescribed burning of areas dominated by sagebrush (Artemisia spp.) in south-central Montana, USA, within which we monitored changes in plant production, nutritional quality, and community composition and diversity from 1989 to 1999. Elk increased use of burned sites 1-2 years after burning, then reduced use to levels associated with preburn conditions over the next 3-10 years. Burning transformed low-diversity, sagebrush-dominated communities into relatively high-diversity, grass- and forb-dominated communities that persisted for 10 years, but forage biomass and protein content declined on burned sites after initial short-term increases. Changes in elk use closely tracked changes in production and nutritional quality of plants. Therefore, we concluded that increases in quantity and quality of forage were the primary cause for increased use of burned sites by elk. Managers may observe only short-term responses from elk following burning but can expect longer-term increases in plant diversity and persistence of grass-forb communities on burned sites for >10 years that may be important to elk or other grazing ungulates.
This citation is from AGRICOLA.

723. **Response of northern bobwhite to intensive habitat development on a prairie site in Mississippi (Colinus virginianus).**
Smith, Mark Dean. Mississippi State University, 2002.
Notes: Degree: MS; Advisor: Burger, Loren W.
Descriptors: bobwhite quail/ prairies/ Colinus virginianus/ nesting/ habitat management/ landscape structure/ brood survival/ habitat use/ Mississippi
Abstract: I documented annual changes in bobwhite population size during the initial phases of habitat management implementation on Black Prairie Wildlife Management Area (BPWMA), Mississippi, during 1997-1998. Additionally, I estimated survival, reproductive success, and habitat use of 197 radio-marked northern bobwhite during the 1997-1998 breeding seasons to identify mechanisms of population growth. The northern bobwhite population exhibited positive growth (r = 0.4215), primarily because of high breeding season survival, nest success, renesting effort, renest success, and brood survival. Demographic parameters did not differ between

years. Measurements of vegetation at nest sites and surrounding landscape structure were associated with probability of hatching. In establishment of home ranges and allocation of time among habitats, bobwhite exhibited selection for specific managed habitats. Habitat models using macro-habitat characteristics within home ranges were useful predictors of bobwhite habitat occupancy.

724. **Response of small mammal populations to fescue hayfield conversion to native warm season grasses in Bath County, Virginia.**
Mengak, Michael T.
Virginia Journal of Science 55(4): 169-176. (2004); ISSN: 0042-658X
Descriptors: commercial activities/ ecology/ population dynamics/ terrestrial habitat/ man-made habitat/ land zones/ Mammalia: farming and agriculture/ grassland management influence on populations of small taxa/ population size/ Influence of grassland management on small taxa/ habitat utilization/ grassland types/ grassland/ existing fescue hayfield conversion to switchgrass/ impact on populations of small taxa/ cultivated land habitat/ Virginia/ George Washington National Forest/ Hidden Valley/ small taxa population responses to grassland management/ Mammalia/ chordates/ mammals/ vertebrates
Abstract: I investigated the effect on small mammal populations of converting an existing fescue (Festuca arundinacea) hayfield to switchgrass (Panicium virgatum) on the George Washington National Forest at Hidden Valley in Bath County, Virginia. Native warm season grasses are thought to provide better habitat than fescue pastures for Northern Bobwhite (Colinus virginianus) and several species of grassland birds as well as herbivorous small mammals. I established one live-trapping grid and conducted trapping (pretreatment) in both the switcligrass (treatment) and the fescue (control) field in March and May 1997. The treatment field was sprayed with glyphosate herbicide (Roundup[registered trademark]) in June 1997, burned and seeded to switchgrass. Live trapping was conducted at approximately 60-day intervals during the growing season from March 1997 until October 1999. I caught significantly more individuals in the treatment field (n=349 individuals of 5 species) than in the control field (n=59 individuals of 4 species; X^2 = 196.7, d.f. = 1, P0.05). The overall capture index was 14.432 and 2.273 animals per 100 trap nights in the treatment and control fields, respectively. The treatment field had a significantly higher mean 2 plant biomass weight ($\bar{x}$ =58.24 g/m^2) than the control field ($\bar{x}$ =38.41 g/m^2; t =4.323; P0.00008, D.F. = 44).

725. **Response of small mammals to livestock grazing in south-central Idaho.**
Johnson, M. K.
Journal of Range Management 35(1): 51-53. (1982)
NAL Call #: 60.18 J82 ; ISSN: 0022-409X.
http://jrm.library.arizona.edu/Volume35/Number1/azu_jrm_v35_n1_51_53_m.pdf
Descriptors: Idaho/ small mammals/ livestock/ grazing
This citation is from AGRICOLA.

726. **Response of vegetation and breeding birds to the removal of cattle on the San Pedro River, Arizona (U.S.A.).**
Krueper, D.; Bart, J.; and Rich, T. D.
Conservation Biology 17(2): 607-615. (2003)
NAL Call #: QH75.A1C5; ISSN: 0888-8892
Descriptors: riparian environments/ arid environments/ riparian vegetation/ breeding success/ environment management/ nature conservation/ population density/ conservation/ Aves/ Arizona/San Pedro R./ birds/ cattle removal/ passeriformes/ landbirds/ songbirds
Abstract: In late 1987 cattle were removed from the San Pedro Riparian National Conservation Area (NCA) in southeastern Arizona (U.S.A.). We monitored vegetation density and abundance of birds during the breeding season during 1986-1990 in riparian, mesquite grassland, and Chihuahuan desert-scrub communities in the NCA. The density of herbaceous vegetation increased four- to six-fold in riparian and mesquite grassland communities. Little change occurred in herbaceous vegetation in desert scrub, or in the density of shrubs or trees in any of the communities. Of 61 bird species for which sufficient data were collected, mean detections per kilometer increased for 42 species, 26 significantly, and decreased for 19 species, 8 significantly. The number of individuals of all avian species detected on surveys increased each year from 103/kilometer in 1986 to 221/kilometer in 1991, an average annual increase of 23% ($p < 0.001$). The largest increases occurred in riparian species, open-cup nesters, Neotropical migrants, and insectivores. Species of the Chihuahuan desert-scrub, in which vegetation changed the least, showed the smallest increases. Only a few of the species showed increasing regional trends for the same period, as demonstrated by the North American Breeding Bird Survey; thus, increases on the San Pedro Riparian NCA were likely caused by the change in local conditions, not by regional effects. Our results suggest that removing cattle from riparian areas in the southwestern United States can have profound benefits for breeding birds.

727. **Response of winter birds to drought and short-duration grazing in southeastern Arizona.**
Bock, Carl E. and Bock, Jane H.
Conservation Biology 13(5): 1117-1123. (1999)
NAL Call #: QH75.A1C5 ; ISSN: 0888-8892
Descriptors: canopy cover/ cattle ranch/ drought/ grassland oak savanna/ grazing/ livestock exclosure/ short duration grazing/ species abundance/ vegetative ground cover
Abstract: In a grassland-oak savanna in southeastern Arizona, we compared vegetative ground cover and bird populations between a 29-year livestock exclosure and an adjacent cattle ranch that was managed according to the principles of holistic resource management, including short-duration rotational grazing. The study took place in the winter after a 2-year drought and 1 year after the drought ended and stocking densities were reduced. During the first winter, grasses on the livestock exclosure were taller (4.4 times) and had higher basal area ground cover (2.5 times), canopy cover (2.2 times), and reproductive canopy cover (10 times) than in the grazed area. These differences persisted into the second winter but at lower levels. As a group, 19 species of ground-foraging, seed-eating birds (e.g., doves, quail, sparrows, towhees) were 2.7 times more abundant on the exclosure than on adjacent grazed

grasslands during the first winter. These same species were 1.7 times more abundant on the exclosureduring the second winter and were 2.9 times more abundant on both sites combined after the drought had ended. A second group of 24 avian species with different foraging ecologies (e.g., predators, frugivores, arboreal insectivores) did not differ between treatments or years. High-density, short-duration rotational grazing, coupled with a drought, left the land in a substantially denuded condition through two winters and negatively affected a variety of resident and migratory birds dependent on ground cover and seed production for over-winter survival.

728. **Responses of birds, rodents, and vegetation to livestock exclosure in a semi desert grassland site.**
Bock, C. E.; Bock, J. H.; Kenney, W. R.; and Hawthorne, V. M.
Journal of Range Management 37(3): 239-242. (1984)
NAL Call #: 60.18 J82; ISSN: 0022-409X.
http://jrm.library.arizona.edu/Volume37/Number3/azu_jrm_v37_n3_239_242_m.pdf
Descriptors: Bouteloua spp./ Eragrostis intermedia/ Trichachne californicum/ shrub/ seasonality/ xeric habitat/ feeding/ grazing/ Arizona
Abstract: Livestock were excluded from a 3160-ha range in southeastern Arizona [USA] since 1968. Compared to an adjacent continuously grazed area, in 1981-1982 a protected upland site supported 45% more grass cover, a comparatively heterogeneous grass community and 4 times as many shrubs. Grama grasses (Bouteloua spp.) were equally common in and outside the exclosure, while a variety of other species, especially plains lovegrass (Eragrostis intermedia) and Arizona cottontop (Trichachne californicum) were much more abundant on the protected site. The grazed area supported significantly higher numbers of birds in summer, while densities did not differ in winter. Rodents were significantly more abundant inside the protected area. Species of birds and rodents more common in the grazed area included those typical of more xeric lowland habitats and those preferring open ground for feeding. Species more common on the protected site were those which characterize semidesert or plains grasslands, and which prefer substantial grass or shrub cover. Grazing appeared to favor birds as a class over rodents.

729. **Responses of bobwhite to short duration and continuous grazing in south Texas.**
Bareiss, Laura J. Texas Tech University, 1985.
Descriptors: Colinus virginianus/ food supply/ habitat disturbance/ interspecific relations/ land use/ livestock/ mortality/ Texas/ bobwhite quail

730. **Responses of plant and bird communities to prescribed burning in tallgrass prairies.**
Van Dyke, F.; Schmeling, J. D.; Starkenburg, S.; Yoo, S. H.; and Stewart, P. W.
Biodiversity and Conservation 16(4): 827-839. (2007)
NAL Call #: QH75.A1B562; ISSN: 09603115.
Notes: doi: 10.1007/s10531-006-9107-9.
Descriptors: DeSoto National Wildlife Refuge/ grassland birds/ Grassland plants/ prairie restoration/ prescribed burning/ tallgrass prairie
Abstract: Historic losses and fragmentation of tallgrass prairie habitat to agriculture and urban development have led to declines in diversity and abundance of plants and birds associated with such habitat. Prescribed burning is a management strategy that has potential for restoring and rejuvenating prairies in fragmented landscapes, and through such restoration, might create habitat for birds dependent upon prairies. To provide improved data for management decision-making regarding the use of prescribed fire in tallgrass prairies, we compared responses of plant and bird communities on five burned and five unburned tallgrass prairie fragments at the DeSoto National Wildlife Refuge, Iowa, USA, from 1995 to 1997. Overall species richness and diversity were unaffected by burning, but individual species of plants and birds were affected by year-treatment interactions, including northern bobwhite (Colinus virginianus) and ring-necked pheasant (Phasianus colchicus), which showed time-delayed increases in density on burned sites. Analyses of species/area relationships indicated that, collectively, many small sites did make significant contributions to plant biodiversity at landscape levels, supporting the overall conservation value of prairie fragments. In contrast, most birds species were present on larger sites. Thus, higher biodiversity in bird communities which contain area-sensitive species might require larger sites able to support larger, more stable populations, greater habitat heterogeneity, and greater opportunity for niche separation. © 2006 Springer Science+Business Media B.V.

731. **Responses of plants and arthropods to burning and disking of riparian habitats.**
Benson, T. J.; Dinsmore, J. J.; and Hohman, W. L.
Journal of Wildlife Management 71(6): 1949-1957.(Aug. 2007)
NAL Call #: 410 J827
Descriptors: riparian areas/ wildlife habitats/ wetland conservation/ grasslands/ arthropods/ discing/ conservation buffers/ ecosystem management/ land restoration/ Lepidoptera/ Hemiptera/ plant litter/ plant response/ vegetation/ species diversity/ plant communities/ population size/ forbs/ biomass/ botanical composition/ wild birds/ prescribed burning/ Wetlands Reserve Program/ woody plants/ Iowa/ plant ecology/ animal ecology and behavior/ entomology related/ natural resources, environment, general ecology, and wildlife conservation
Abstract: Alteration of Iowa, USA, landscapes for agricultural production has resulted in a loss of 99% of the original prairie and 95% of native wetlands. This conversion has included riparian areas, which, as interfaces between terrestrial and aquatic ecosystems, are important to many wildlife species. Farm Bill programs have resulted in the reestablishment of millions of hectares of grasslands and wetlands nationwide, including. 100,000 ha in riparian areas of the Midwest. We assessed plant and arthropod responses to burning and disking of riparian grasslands in east-central Iowa in 2001 and 2002. Burning altered the plant community by removing litter and standing dead vegetation and had negative effects on several arthropod taxa, including Hemiptera and Lepidoptera. However, we observed no differences in vegetation or arthropods between burned and unburned fields during the second year postburning ($P > 0.05$). Disking decreased the cover of grasses, litter, and standing dead vegetation and increased

plant species richness and the cover of forbs and bare ground ($P < 0.05$). Arthropod abundance and dry biomass were greater on disked than undisked portions of fields ($P < 0.05$). Increases in the abundance and biomass of arthropods associated with changes in vegetation structure and composition likely improved habitat quality for a number of breeding bird species. Both burning and disking appear to be effective management options for maintaining or enhancing riparian grasslands for wildlife.
This citation is from AGRICOLA.

732. **Responses of raptors to livestock grazing in the western USA.**
Kochert, M. N.
In: Proceedings of the Western Raptor Management Symposium and Workshop. Boise, Idaho, USA
Pendleton, B. G. (eds.)
Washington, D.C., USA: Institute for Wildlife Research and National Wildlife Federation; pp. 194-203; 317 p.; 1989.
Notes: Literature review; ISSN: 1044-4971.
NAL Call #: QL696.F3W47 1989; ISBN: 0945051026
Descriptors: mammal/ grazing system/ plant population change/ habitat destruction/ nesting/ prey availability/ diversity/ population/ conservation

733. **Restoring forbs for sage grouse habitat: Fire, microsites, and establishment methods.**
Wirth, Troy A. and Pyke, David A.
Restoration Ecology 11(3): 370-377. (2003)
NAL Call #: QH541.15.R45R515; ISSN: 1061-2971.
Descriptors: Galliformes/ Phasianidae/ Centrocercus urophasianus/ terrestrial ecology/ establishment method/ fires-burns/ restoration ecology/ revegetation/ sage grouse habitat restoration/ sagebrush steppe/ grasslands/ ecosystems/ grassland revegetation/ habitat management/ habitat revegetation/ Hart mountain National Antelope Refuge/ Oregon/ conservation/ wildlife management/ land zones/ Artemisia spp.
Abstract: The decline and range reduction of sage grouse populations are primarily due to permanent loss and degradation of sagebrush-grassland habitat. Several studies have shown that sage grouse productivity may be limited by the availability of certain preferred highly nutritious forb species that have also declined within sagebrush ecosystems of the Intermountain West, U.S.A. The purpose of this study was to determine the suitability of three species of forbs for revegetation projects where improving sage grouse habitat is a goal. Species suitability was determined by evaluating the emergence, survival, and reproduction of Crepis modocensis, C. occidentalis, and Astragalus purshii in response to method of establishment (seeding or transplanting), site preparation treatment (burned or unburned), and microsite (mound or interspace) in an Artemisia tridentata ssp. wyomingensis vegetation association in south central Oregon. For seeded plants A. purshii had the lowest emergence (8%) of all three species. Both seeded Crepis species had similar overall emergence (38%). Significantly more Crepis seedlings emerged from shrub mounds in unburned areas (50%) than in any other fire-by-microsite treatment (33 to 36%). Approximately 10% more Crepis seedlings survived in mounds compared with interspaces. Nearly twice as many emerging Crepis seedlings survived in the burned areas as opposed to unburned areas ($p<0.01$). This resulted in more plant establishment in burned mounds despite higher emergence in unburned mounds. Astragalus purshii seedlings also survived better in burned areas (p=0.06) but had no differential response to microsite. Fire enhanced survival of both Crepis and A. purshii transplants (p=0.08 and p=0.001). We believe additional research is needed to improve A. purshii emergence before it will become an effective plant for restoring sage grouse habitat. Conversely, we conclude that these Crepis species provide a viable revegetation option for improving sage grouse habitat in south central Oregon.

734. **Restoring grassland savannas from degraded pinyon-juniper woodlands: Effects of mechanical overstory reduction and slash treatment alternatives.**
Brockway, D. G.; Gatewood, R. G.; and Paris, R. B.
Journal of Environmental Management 64(2): 179-197. (2002)
NAL Call #: HC75.E5J6 ; ISSN: 03014797.
Notes: doi: 10.1006/jema.2001.0522.
Descriptors: Bouteloua gracilis (Willd. ex Kunth) Lag. ex Griffiths/ herbaceous biomass/ Juniperus monosperma (Engelm.) Sarg./ logging slash/ plant cover/ soil erosion/ species diversity/ grassland/ habitat restoration/ overstory/ savanna/ species diversity/ biodiversity/ biomass/ climate change/ controlled study/ domestic animal/ environmental management/ environmental protection/ fire ecology/ forest/ grass/ grassland/ grazing/ Juniperus/ livestock/ nutrient/ nutritional status/ plant litter/ prescribed burning/ savanna/ scrub/ soil chemistry/ soil erosion/ tree/ United States/ biomass/ climate/ Conservation of natural Resources/ environmental monitoring/ forestry/ plant Leaves/ Poaceae/ population dynamics/ rain/ soil/ trees/ United States/ Bouteloua/ Bouteloua gracilis/ Juniperus/ Juniperus monosperma/ Pinus edulis/ Poaceae
Abstract: Although the distribution and structure of pinyon-juniper woodlands in the southwestern United States are thought to be the result of historic fluctuations in regional climatic conditions, more recent increases in the areal extent, tree density, soil erosion rates and loss of understory plant diversity are attributed to heavy grazing by domestic livestock and interruption of the natural fire regime. Prior to 1850, many areas currently occupied by high-density pinyon-juniper woodlands, with their degraded soils and depauperate understories, were very likely savannas dominated by native grasses and forbs and containing sparse tree cover scattered across the landscape. The purpose of this study was to evaluate the effectiveness of mechanical overstory reduction and three slash treatment alternatives (removal, clustering and scattering) followed by prescribed fire as techniques for restoring grassland savannas from degraded woodlands. Plant cover, diversity, biomass and nutrient status, litter cover and soil chemistry and erosion rates were measured prior to and for two years following experimental treatment in a degraded pinyon-juniper woodland in central New Mexico. Treatment resulted in a significant increase in the cover of native grasses and, to a lesser degree, forbs and shrubs. Plant species richness and diversity increased most on sites where slash was either completely removed or scattered to serve as a mulch. Although no changes in soil chemistry or plant nutrient status were observed,

understory biomass increased over 200% for all harvest treatments and was significantly greater than controls. While treatment increased litter cover and decreased soil exposure, this improvement did not significantly affect soil loss rates. Even though all slash treatment alternatives increased the cover and biomass of native grasses, scattering slash across the site to serve as a mulch appears most beneficial to improving plant species diversity and conserving site resources.

735. **Restoring heterogeneity on rangelands: Ecosystem management based on evolutionary grazing patterns.**
Fuhlendorf, Samuel D. and Engle, David M.
Bioscience 51(8): 625-632. (2001)
NAL Call #: 500 Am322A; ISSN: 0006-3568.
http://teamquail.tamu.edu/fuhlendorf-engle2001.pdf
Descriptors: commercial activities/ conservation measures/ land and freshwater zones/ Aves: farming and agriculture/ grazing management/ habitat management/ rangeland grazing/ ecosystem conservation applications/ terrestrial habitat/ role of grazing management/ North America/ Great Plains/ rangeland ecosystem conservation/ grazing management applications/ Aves/ birds/ chordates/ vertebrates

736. **Restoring resources for an endangered butterfly.**
Schultz, Cheryl B.
Journal of Applied Ecology 38(5): 1007-1019. (2001)
NAL Call #: 410 J828; ISSN: 0021-8901
Descriptors: conservation measures/ nutrition/ diet/ life cycle and development/ terrestrial habitat/ land and freshwater zones/ Icaricia icarioides fenderi (Lycaenidae): habitat management/ prairie grasslands/ habitat restoration/ food plants/ Lupinus sulphureus kincaidii/ life cycle/ life history/ grassland/ prairie/ Oregon/ Eugene area/ Prairie Grassland Habitat Restoration Project/ Lycaenidae/ Papilionoidea, Heteroneura, Glossata, Lepidoptera, Insecta/ arthropods/ insects/ invertebrates/ Lepidopterans
Abstract: 1. Recent changes in land use have resulted in dramatic habitat loss for numerous species. More than 99% of the habitat for Fender's blue butterfly Icaricia icarioides fenderi, an endangered butterfly in Oregon, USA, has been lost. 2. Fender's blue butterflies require larval host-plants (Kincaid's lupine Lupinus sulphureus kincaidii) and nectar from native wildflowers. 3. An experiment was conducted at two degraded sites near Eugene, Oregon, to investigate methods for restoration of Fender's blue habitat. The experimental design included four soil treatments (tilling, reverse fertilization, solarization and a control) combined with two planting treatments (50% forb seed: 50% grass seed and 10% forb seed: 90% grass seed) and two weeding treatments (weeding or not weeding). Treatments were replicated in eight experimental blocks (9 [x] 28 m) at each site. Seeds from 12 native plant species were field collected and sown in September 1995. 4. Plant establishment was monitored in May 1996, 1997, 1998 and 1999. In 1999, flowers of all nectar species and leaves of Kincaid's lupine were counted. 5. Based on estimates of resource needs from previous work, resources were evaluated as insufficient, sufficient or ample. 6. Solarization combined with 50% forb: 50% grass planting promoted sufficient nectar to sustain butterflies at both sites. Control treatments provided insufficient nectar at both sites. None of the treatments produced sufficient larval resources. 7. This experiment demonstrates a method to quantitatively link habitat restoration to the resource needs of focal species. The results emphasize the importance of connecting restoration efforts to the life-history features of focal species. In addition, they highlight the importance of using experiments conducted across a range of sites to test restoration methods before large-scale efforts are implemented.

737. **Results from the use of a system of "rest rotational grazing" for livestock to improve wildlife habitat in Montana.**
Mccarthy, J. J.
IBEX Journal of Mountain Studies 7(Supplement): 13-16. (2003); ISSN: 1590-3907
Descriptors: commercial activities/ conservation measures/ land zones/ North America/ Cervus canadensis (Cervidae): farming and agriculture/ rest rotation grazing system/ rangeland management/ habitat quality/ habitat management/ terrestrial habitat/ rangelands/ Montana/ grazing management/ Cervidae/ Artiodactyla/ Mammalia/ chordates/ mammals/ ungulates/ vertebrates
Abstract: Rest rotation grazing is a forage management system that utilizes livestock grazing to improve forage vigor, reduce erosion and improve range conditions. Cyclic movement of livestock through pastures allow plants to carry out photosynthetic processes and assist in seed dissemination and seedling establishment. Elements of such a grazing system are discussed, as are the benefits to plants and soils. An example of a system that has been in operation since 1980 is also described, as are the benefits to livestock producers and the area's wildlife.

738. **Richness and abundance of Carabidae and Staphylinidae (Coleoptera), in northeastern dairy pastures under intensive grazing.**
Byers, R. A.; Barker, G. M.; Davidson, R. L.; Hoebeke, E. R.; and Sanderson, M. A.
Great Lakes Entomologist 33(2): 81-105. (2000)
NAL Call #: QL461.M5; ISSN: 0090-0222
Descriptors: ecology/ terrestrial habitat/ land and freshwater zones/ Carabidae: community structure/ intensively grazed pastures/ Pennsylvania and Vermont/ grassland/ intensively grazed dairy pastures/ New York/ Pennsylvania/ Vermont/ new records/ community structure in intensively grazed pasture/ Carabidae/ Caraboidea/ Adephaga/ Coleoptera/ Insecta/ arthropods/ coleopterans beetles/ insects/ invertebrates
Abstract: Dairy cattle grazing has become popular to dairy farmers in the Northeast looking for management schemes to cut production costs. Carabidae (ground beetles) and Staphylinidae (rove beetles) are indicators of habitat disturbances, such as drainage of wetlands, or grassland for grazing animals, and their monitoring could provide one measure of ecosystem sustainability if intensive grazing management systems expand or intensify in the future. Our objective was to assess the abundance and species richness of these two beetle families under intensive grazing throughout Pennsylvania, southern New York and Vermont. We collected 4365 ground beetles (83 species) and 4,027 rove beetles (79 species) by pitfall traps in three

years in Pennsylvania. Nine ground beetle species, Amara aenea, Poecilus chalcites, Pterostichus melanarius, Bembidion quadrimaculatum oppositum, Amara familiaris, Poecilus lucublandus, Agonum muelleri, Bembidion obtusum and Bembidion mimus represented 80% of the Carabidae collected. Five other species were new to Pennsylvania. Four rove beetle species, Philonthus cognatus, Meronera venustula, Amischa analis, and Philonthus various=(carbonarius), comprised 74% of the total Staphylinidae collected. Yearly distributions of the dominant species did not change significantly in the three years with A. aenea and P. cognatus being most abundant every year. A parasitic rove beetle, Aleochara tristis, was recovered for the first time in Pennsylvania and Vermont since its release in the 1960's to control face fly, Musca autumnalis. Similar results were found in New York and Vermont. We collected 1,984 ground beetles (68 species). Pterostichus melanarius was most abundant. Pterostichus vernalis was detected for the first time in the United States (Vermont). It was previously reported from Montreal, Canada. We collected 843 rove beetles (45 species). Philonthus cognatus was the most abundant rove beetle. In addition, Tachinus corticinus, previously known only from Canada, was discovered for the first time in the United States in Vermont. Pastures in Pennsylvania were diverse, containing 14 species of forage plants and 17 weed species. Botanical composition was similar in New York and Vermont. Sixteen species of grasses and legumes made up 90% of the plant composition and 36 species of weeds made up the remainder. This diverse plant ecosystem may explain the richness of ground and rove beetles in northeastern U.S. pastures because the heterogeneity in the plant population provided additional resources which can support a rich assemblage of beetles. Monitoring richness and abundance of Carabidae and Staphylinidae over three years in Pennsylvania suggests intensive grazing systems are ecologically sustainable.

739. **Ring-necked pheasant and passerine abundance in Conservation Reserve Program grasslands of differing age-classes and cover types in eastern South Dakota, 1998-2000.**
Eggebo, S. L. South Dakota State University, 2001.
Notes: Degree: M.S.; SD W-075-R/Study No. 7588; Wildlife Coop. Unit Report - Thesis
Descriptors: Phasianus colchicus/ phasianidae/ phasianus/ Phasianus colchicus/ abundance/ age/ birds, passerines/ broods and brooding/ conservation programs/ cover/ cultivated farmland/ grassland/ habitat management for wildlife/ pheasant, ring-necked/ productivity/ surveys/ vegetation/ South Dakota: eastern region/ Big Sioux River Basin/ Prairie Coteau/ Brookings County/ Kingsbury County/ Lake County/ Moody County/ Aurora County/ Davison County/ Hanson County/ Hutchinson County
Abstract: Objectives were to: (1) determine ring-necked pheasant and passerine abundance in relation to two differing age-classes of cool- and warm- season grasslands and row-crop fields within low and high pheasant density areas in eastern South Dakota; and (2) evaluate cover quality characteristics (e.g., height-density index, litter depth) in relation to differing age class stands and cover types of Conservation Reserve Program.

740. **Riparian area responses to changes in management.**
Borman, M. M.; Massingill, C. R.; and Elmore, E. W.
Rangelands 21(3): 3-7. (1999)
NAL Call #: SF85.A1R32; ISSN: 0190-0528
Descriptors: grasslands/ riparian grasslands/ grassland management/ grazing/ overgrazing/ surveys/ long term experiments/ cattle/ United States/ Oregon/ condition/ Bos/ Bovidae/ ruminants/ Artiodactyla/ mammals/ vertebrates/ Chordata/ animals/ ungulates/ Pacific Northwest
Abstract: The management of riparian areas in the USA is reviewed. In particular, claims that the exclusion of livestock are the only appropriate management for riparian areas are considered to be based on flawed comparisons of ungrazed riparian areas with adjacent overgrazed non-riparian areas. Surveys of 8 riparian areas in Oregon in the late 1970s and early 1980s were reassessed in 1994, taking into account condition and cattle grazing treatments. Trends in the condition of the riparian communities were not specifically linked to grazing management: with or without grazing, most riparian habitats had improved since their original surveys. Those habitats which began in good condition and which were grazed appropriately remained in good condition. It is considered that climate, landscape setting, soil types and land use history all affected the development of an appropriate grazing management prescription, and that this prescription must be adhered to.

741. **Riparian ecosystems of semi-arid North America: Diversity and human impacts.**
Patten, D. T.
Wetlands 18(4): 498-512. (1998)
NAL Call #: QH75.A1W47; ISSN: 0277-5212
Descriptors: ecosystems/ semiarid zones/ vegetation types/ plant communities/ deciduous forests/ floods/ forests/ human activity/ hydrology/ latitude/ altitude/ natural resources/ poplars/ riparian vegetation/ sediment/ water quality/ water table/ watersheds/ wetlands/ plant ecology/ species diversity/ erosion/ mixed forests/ coniferous forests/ plant succession/ amenity and recreation areas/ riparian forests/ Prosopis/ Populus deltoides/ Salix/ North America/ Mimosoideae/ Fabaceae/ Fabales/ dicotyledons/ angiosperms/ Spermatophyta/ plants/ Salicaceae/ Salicales
Abstract: This overview paper for the symposium presents a general description of the diversity of riparian ecosystems in the arid-West of North America (extending west from the 100th meridian to the crest of the Cascades and Sierras and south from southern Canada to northern Mexico). Similarities and differences of function, structure and process are discussed. All riparian ecosystems in the region are dependent on supplemental water (usually from the shallow valley alluvial aquifer) and they stabilize stream banks, trap sediment, improve water quality and help control or modulate hydrological processes. They also function as habitat for many western animal species (serving as a small mesic island or strip within an arid landscape) and as recreational sites for humans. Along elevational gradients, riparian vegetation may change from simple deciduous forests to mixed deciduous to coniferous and possibly alpine wetlands. Temporal gradients occur within a location in the riparian zone as early pioneer communities such as cottonwood/willow give way to late successional communities such as mesquite or sagebrush, often a consequence of sediment accumulation. Many

similarities among western riparian ecosystems exist because several dominant genera (e.g. Populus) are common throughout the West, and many geomorphic and hydrological processes that influence riparian establishment are similar. Western riparian ecosystems have been greatly altered by human activity. Major factors include natural resource use, urbanization, alteration of stream flows through dam construction and groundwater withdrawal, modification of biotic conditions through grazing, agriculture, introduction of non-native species and alteration within watersheds.

742. **Riparian restoration on the Gila River, New Mexico, creates breeding habitat for southwestern willow flycatchers.**
Boucher, Paul F.; Stoleson, Scott H.; Shook, Roland S.; Pope, Ralph D.; and Monzingo, Jerry
Studies in Avian Biology 26: 135-142. (2003)
NAL Call #: QL671.S8; ISSN: 0197-9922
Descriptors: conservation measures/ reproduction/ reproductive behavior/ terrestrial habitat/ land zones/ Empidonax traillii extimus: disturbance by man/ habitat management/ riparian restoration role in breeding habitat creation/ breeding site/ riparian habitat/ New Mexico/ Gila National Forest/ Gila River Bird Area/ Aves, Passeriformes, Tyrannidae/ birds/ chordates/ vertebrates
Abstract: In 1995, the Gila National Forest in southwestern New Mexico was faced with a legal obligation to reduce severe erosion of riverbanks in the Gila River Bird Area. A combination of managed and natural processes stabilized banks and created riparian habitat. Retiring grazing, excavating the riverbank to the water table level, constructing a temporary berm, and planting poles set the stage for the naturally occurring flooding, sediment deposition, and revegetation that followed. Southwestern Willow Flycatchers (Empidonax traillii extimus) colonized and bred for the first time in this restored habitat and nearby natural regeneration in 1997. A similar project undertaken upstream on private property on the U Bar Ranch was colonized in 1999. The rapid colonization of these two restoration sites was due, in part, to their proximity to a large core population of flycatchers upstream in the Cliff-Gila Valley. This project demonstrates that landowners can simultaneously stabilize banks, reduce erosion, and create or improve Willow Flycatcher habitat.

743. **Riparian wildlife habitat literature review.**
McComb, William. and Hagar, Joan.
Corvallis, OR: Oregon State University, Department of Forest Science; 63 p. (1994).
Notes: Cover title. Includes bibliographical references (p. 25-35).
NAL Call #: QH541.5.R52M36 1994
Descriptors: Riparian areas---United States/ Riparian animals---United States
This citation is from AGRICOLA.

744. **Rodent communities in a grazed and ungrazed Arizona grassland, and a model of habitat relationships among rodents in southwestern grass/shrublands.**
Jones, Zach F.; Bock, Carl E.; and Bock, Jane H.
American Midland Naturalist 149(2): 384-394. (2003)
NAL Call #: 410 M58; ISSN: 0003-0031
Descriptors: rodents/ small mammals/ grazing/ grasslands/ habitat relationships/ shrublands/ Arizona/ Baiomys taylori/ Reithrodontomys fulvescens/ Reithrodontomys megalotis/ Sigmodon fluviventer/ Cricetidae/ Rodentia/ Chaetodipus hispidus/ Dipodomys merriami/ Perognathus flavus/ Heteromyidae/ Muridae
Abstract: We live-trapped rodents in 2000-2001 at eight sites on a 3160 ha grassland and mesquite-oak savanna in southeastern Arizona that had been ungrazed since 1968, and on eight paired sites on adjacent cattle ranches. There were 917 captures of 14 species during 5760 trap-nights. Four species of Muridae (Sigmodon fulviventer, Baiomys taylori, Reithrodontomys megalotis and R. fulvescens) were significantly more common on ungrazed plots, while no species was more abundant on grazed plots. However, Heteromyidae as a group (especially Chaetodipus hispidus and Perognathus flavus) comprised a significantly higher proportion of total captures on grazed plots, and heteromyids as a percentage of total captures was positively correlated across all plots with amount of bare ground. One of the eight cross-fence sites also had been trapped in 1981-1983. In the 17 y between trapping events at this site: (1) the grass canopy on both grazed and ungrazed plots had become dominated by taller species, (2) a kangaroo rat (Dipodomys merriami) that had been the second most common species in grazed areas disappeared from both plots, (3) pocket mice increased on the grazed plot and declined on the ungrazed plot and (4) Muridae (excluding Peromyscus) as a percent of all captures increased by greater than 1.5-fold on both plots. Based on these results, and those from other field studies, we propose a model for the composition of rodent communities in grass/shrublands of the Southwest and Intermountain West, based on ground cover. Kangaroo rats (Dipodomys spp.) are abundant in areas with the most bare soil, Muridae (specifically, Sigmodon, Baiomys and Reithrodontomys) dominate areas with the most and tallest ground cover, and pocket mice (Chaetodipus and Perognathus) are common in areas of intermediate cover. In relatively mesic grasslands, livestock grazing and fire drive the rodent community toward one dominated by heteromyids instead of murids. In more arid landscapes, grazing and fire favor kangaroo rats over pocket mice.

745. **The role of fire in structuring sagebrush habitats and bird communities.**
Knick, Steven T.; Holmes, Aaron L.; and Miller, Richard F.
Studies in Avian Biology (30): 63-75. (2005)
NAL Call #: QL671.S8; ISSN: 0197-9922.
http://www.sagestep.org/educational_resources/bibliographies/articles/Knicketal2005.pdf
Descriptors: birds/ wildlife habitat/ fire/ Fringillidae/ Galliformes/ Passeriformes/ Phasianidae/ Sturnidae/ Amphispiza belli/ Bromus tectorum/ Centrocercus urophasianus/ Oreoscoptes montanus/ Spizella breweri/ disturbance/ fire regimes/ sagebrush ecosystems/ Artemisia spp./ Juniperus spp.
Abstract: Fire is a dominant and highly visible disturbance in sagebrush (Artemisia spp.) ecosystems. In lower elevation, xeric sagebrush communities, the role of fire has changed in recent decades from an infrequent disturbance maintaining a landscape mosaic and facilitating community processes to frequent events that alter sagebrush communities to exotic vegetation, from which restoration is

unlikely. Because of cheatgrass invasion, fire-return intervals in these sagebrush ecosystems have decreased from an historical pattern (pre-European settlement) of 30 to >100 yr to 5-15 yr. In other sagebrush communities, primarily higher elevation ecosystems, the lack of fire has allowed transitions to greater dominance by sagebrush, loss of herbaceous understory, and expansion of juniper-pinyon woodlands. Response by birds living in sagebrush habitats to fire was related to the frequency, size, complexity (or patchiness), and severity of the bums. Small-scale fires that left patchy distributions of sagebrush did not influence bird populations. However, large-scale fires that resulted in large grassland expanses and isolated existing sagebrush patches reduced the probability of occupancy by sagebrush-obligate species. Populations of birds also declined in sagebrush ecosystems with increasing dominance by juniper (Juniperus spp.) and pinyon (Pinus spp.) woodlands. Our understanding of the effects of fire on sagebrush habitats and birds in these systems is limited. Almost all studies of fire effects on birds have been opportunistic, correlative, and lacking controls. We recommend using the large number of prescribed bums to develop strong inferences about cause-and-effect relationships. Prescribed burning is complicated and highly contentious, particularly in low-elevation, xeric sagebrush communities. Therefore, we need to use the unique opportunities provided by planned bums to understand the spatial and temporal influence of fire on sagebrush landscapes and birds. In particular, we need to develop larger-scale and longer-term research to identify the underlying mechanisms that produce the patterns of bird responses to fire in sagebrush ecosystems.

746. **Rough-legged hawk habitat selection in relation to livestock grazing on Malheur National Wildlife Refuge, Oregon.**
Littlefield, Carroll D.; Thompson, Steven P.; and Johnstone, Richard S.
Northwestern Naturalist 73(3): 80-84. (1992)
NAL Call #: QL671.M8; ISSN: 1051-1733
Descriptors: Accipitridae/ Ciconiiformes/ Buteo lagopus/ birds/ behavior/ grazing/ habitat use/ habitat alterations/ mowing/ overwintering/ wildlife-livestock relationships

747. **Sage-grouse nesting and brood habitat use in southern Canada.**
Aldridge, C. L. and Mark Brigham, R.
Journal of Wildlife Management 66(2): 433-444. (2002)
NAL Call #: 410 J827; ISSN: 0022541X
Descriptors: Alberta/ Artemisia/ broods/ Centrocercus urophasianus/ greater sage-grouse/ nesting/ sagebrush/ endangered species/ gamebird/ habitat management/ habitat use/ nesting/ patch size/ population decline/ Canada/ Artemisia cana/ Centrocercus urophasianus
Abstract: Greater sage-grouse (Centrocercus urophasianus) populations have declined from 66 to 92% during the last 30 years in Canada, where they are listed as endangered. We used radiotelemetry to examine greater sage-grouse nest and brood habitat use in Alberta and assess the relationship between habitat and the population decline. We also identified the patch size at which sage-grouse were selecting nest and brood-rearing sites. Nest areas were in silver sagebrush (Artemisia cana) stands that had greater amounts of tall cover ($P \leq 0.001$) at a patch size of 7.5 to 15 m in radius. Within those sagebrush stands, nests were located beneath the densest sagebrush present. Areas used for brood rearing had greater amounts of taller sagebrush cover in an area ≥ 15 m in radius than at random locations. Brood locations were not selected based on forb content; mesic areas containing forbs (20-40% cover) as a food resource for chicks were limiting (only 12% cover available). Overall cover of sagebrush is considerably lower in Canada (5-11%) compared with sagebrush (Artemisia spp.) cover in other areas throughout the range of greater sage-grouse (15-25%). If management goals are to provide suitable nesting and brood-rearing habitat, efforts should be directed toward protecting and enhancing sagebrush stands ≥ 30 m^2 and increasing overall sagebrush cover. Management strategies also should focus on increasing the availability of mesic sites and increasing the abundance of sites with >10% forb cover, to enhance brood rearing habitat.

748. **Sagebrush-steppe vegetation dynamics and restoration potential in the interior Columbia Basin, U.S.A.**
Hemstrom, M. A.; Wisdom, M. J.; Hann, W. J.; Rowland, M. M.; Wales, B. C.; and Gravenmier, R. A.
Conservation Biology 16(5): 1243-1255. (2002)
NAL Call #: QH75.A1C5; ISSN: 08888892.
Notes: doi: 10.1046/j.1523-1739.2002.01075.x.
Descriptors: gamebird/ habitat loss/ habitat quality/ restoration ecology/ steppe/ vegetation dynamics/ United States/ Artemisia/ Artemisia tridentata/ Centrocercus/ Centrocercus urophasianus/ Phasianidae/ Salvia
Abstract: We modeled the dynamics and restoration of sagebrush (Artemisia spp.) habitats for Greater Sage-Grouse (Centrocercus urophasianus) in the interior Columbia Basin and adjacent portions of the Great Basin (referred to as the basin). Greater Sage-Grouse have undergone widespread decline and are the focus of conservation on over 13 million ha of sagebrush steppe in the basin, much of which is managed by the U.S. Forest Service (FS) and U.S. Bureau of Land Management (BLM). Consequently, we evaluated changes in the amount and quality of sage-grouse habitat on 8.1 million ha of FS-BLM lands in the basin. Changes were estimated from historical to current conditions and from current conditions to those projected 100 years in the future under proposed management and under two restoration scenarios. These two scenarios were designed to improve long-term (100-year) projections of sage-grouse habitat on FS-BLM lands in relation to current conditions and proposed management Scenario 1 assumed a 50% reduction in detrimental grazing effects by livestock (through changes in stocking rates and grazing systems) and a six-fold increase in areas treated with active restoration relative to proposed management Scenario 2 assumed a 100% reduction in detrimental grazing effects and the same level of active restoration as scenario 1. Under the two scenarios, the amount of FS-BLM habitat for sage grouse within treated areas declined by 17-19% 100 years in the future compared with the current period, but was 10-14% higher than the 100-year projection under proposed management Habitat quality under both scenarios was substantially improved compared

with the current period and proposed management Our results suggest that aggressive restoration could slow the rate of sagebrush loss and improve the quality of remaining habitat.

749. **Season of burn influences fire behavior and fuel consumption in restored shortleaf pine-grassland communities.**
Sparks, Jeffrey C.; Masters, Ronald E.; Engle, David M.; and Bukenhofer, George A.
Restoration Ecology 10(4): 714-722. (2002)
NAL Call #: QH541.15.R45R515; ISSN: 1061-2971
Descriptors: Picoides borealis/ Piciformes/ forestry practices/ habitat alterations/ terrestrial ecology/ prescribed burning/ Keetch-Byram drought index/ red-cockaded woodpecker/ Pinus echinata/ Pinus spp.
Abstract: Pine forests of southeastern United States have been burned primarily in the dormant season to accomplish silvicultural objectives, but with increased emphasis on ecosystem restoration fires are now prescribed in other seasons. We observed fire behavior during both growing season and dormant season prescribed fires in shortleaf pine (Pinus echinata) stands managed as pine-grassland communities for the endangered Red-cockaded Woodpecker (Picoides borealis). Fuel beds for dormant season fires were characterized by lower amounts of live fuels, higher amounts of 1-hr time lag fuel and a greater total fuel load than growing season fires. Fuel consumption and percent of the total fuels consumed was greater in dormant season fires than in growing season fires. Fireline intensity, heat per unit area, reaction intensity, and rate of spread were greater in dormant season fires than in growing season fires. Lower fire intensity in growing season fires was possibly a function of lower amounts of 1-hr time lag fuels, higher amounts of live herbaceous fuels, and possibly a less porous fuel bed. Additionally, growing season fires had lower heat per unit area and reaction intensity and slower rates of spread. The Keetch-Byram drought index (KBDI) did not provide a good index for potential fire behavior on our drought-prone sandy loam soils. KBDI during growing season fires averaged over four times greater than during dormant season fires, but fire intensity was greater in dormant season fires. Low KBDI values may be misleading and give a false sense of security for dormant season fire prescriptions on sandy loam soils because the duff layer may dry more quickly as a result of inherent low water holding capacity. High KBDI values may result in prescribed burns being canceled because of conditions that are erroneously perceived to be outside the prescription window. We caution against over-reliance on KBDI as a determining factor for conducting prescribed burns on areas with sandy or sandy loam soils.

750. **Seasonal use of recently fenced agricultural riparian habitat by avifauna in Pennsylvania.**
Argent, David G. and Zwier, Roberta J.
Northeastern Naturalist 14(3): 361-374. (Sept. 2007)
NAL Call #: QH105.M2M36
Descriptors: streams/ fencing/ riparian areas/ wildlife habitat/ Aves/ birds/ Pennsylvania
Abstract: Streambank fencing is increasingly used to exclude livestock from riparian corridors and to enhance biological communities. Our study examined vegetative change and avian-community use of recently fenced agricultural habitat. We conducted strip-transect surveys to census bird communities, line-transect and plot surveys to assess vegetation, and intensive nest monitoring to gauge use and reproductive success across 12 fenced riparian sites in southwestern Pennsylvania. Selected sites varied in age from 3 to 8 years since fencing and averaged 21 m in width. We found avian use was significantly greater in spring than in fall across our fenced sites. We determined that canopy cover, shrub cover, and herbaceous ground cover could predict various attributes of the avian community present within the fenced riparian areas. Our results also suggest that the avian community has greater species richness within sites containing greater habitat complexity, and that these sites are important breeding and nesting areas. Among the 145 nests monitored, 38% successfully fledged young. We found no differences in distance to corridor edge between successful nests and nests that failed. Our study confirms that riparian renovation efforts do have conservation value for both migratory and resident birds.

751. **Section-based monitoring of breeding birds within the Shortgrass Prairie Bird Conservation Region (BCR 18).**
Sparks, Robert A. and Hanni, David J. (Feb. 2006).
http://www.rmbo.org/pubs/downloads/BCR_18_2006.zip
Descriptors: conservation measures/ ecology/ population dynamics/ habitat utilization/ terrestrial habitat/ land zones/ Aves: habitat management/ distribution/ population density/ habitat preference/ monitoring/ grasslands/ shortgrass prairie/ conservation/ United States/ Shortgrass Prairie Bird Conservation Region/ birds/ chordates/ vertebrates
Abstract: In this document, we report the findings of the 2005 section-based surveys and an initial population analysis using density estimates for an interval of three years (2003 to 2005). Results are presented for BCR 18 as well as management units participating with RMBO's grassland bird monitoring program including four states (Nebraska, Colorado, Kansas, and Oklahoma) and four National Grasslands (Cimarron, Comanche, Kiowa and Pawnee). This report provides natural resource managers with information on grassland bird populations on both local and regional scales. Such knowledge can assist managers in making effective land management decisions regarding conservation of grassland birds and their habitat. Participating agencies include Colorado Division of Wildlife, Kansas Department of Wildlife and Parks, Nebraska Game and Parks Commission, Oklahoma Department of Wildlife Conservation, Oklahoma City Zoo, and United States Forest Service (USFS).

752. **Section-based monitoring of breeding birds within the Shortgrass Prairie Bird Conservation Region (BCR 18).**
Sparks, Robert A.; Hanni, David J.; and McLachlan, Megan (2005).
Notes: 2004 survey findings.
http://www.rmbo.org/pubs/downloads/BCR_2005.pdf
Descriptors: conservation measures/ ecology/ population dynamics/ habitat utilization/ terrestrial habitat/ land zones/ habitat management/ distribution/ habitat preference/ population density/ monitoring/ habitat management/

shortgrass prairie/ conservation/ Shortgrass Prairie Bird Conservation Region/ United States, western/ Aves/ birds/ chordates/ vertebrates
Abstract: In 2004, Rocky Mountain Bird Observatory (RMBO) implemented the fourth year of grassland bird-monitoring program within the shortgrass prairie region. During this year, RMBO conducted surveys in four western states (Nebraska, Colorado, Kansas, and Oklahoma) and five National Grasslands (Cimarron, Comanche, Kiowa, Pawnee and Rita Blanca). The objective of this program is to monitor population trends and distributions of grassland birds within the Shortgrass Prairie Bird Conservation Region (BCR 18) using section-based surveys, a road-based point count technique. A one square mile section is the basic land management unit of the prairie. The section-based survey technique was determined to be the most efficient and effective method for surveying and monitoring grassland birds (Hanni 2002) in a landscape dominated by private ownership. RMBO surveyed 2,414 sections within BCR 18, 15 May / 3 July 2004. Sections were stratified by habitat then randomly selected for survey in proportion to habitat acreage on the landscape / 1,802 sections of native prairie habitat, 552 of dry-land agriculture habitat, and 60 of land in CRP. We observed 115 bird species. Included are 38 species of concern, as recognized by Partners In Flight (2004) and/or the participating state and federal agencies. We calculated density estimates for 49 species, analyzed by management unit, habitat type, percent shrub cover and percent grass cover >15 cm. Included among these density estimates are 22 species of concern, as recognized by Partners In Flight (PIF database 2004) and/or the participating state and federal agencies. We present distribution and index of abundance maps for 62 species. In 2004, we conducted exploratory habitat analyses to determine habitat preferences of eight grassland bird species; Burrowing Owl, Loggerhead Shrike, Cassin's Sparrow, Brewer's Sparrow, Lark Bunting, Grasshopper Sparrow, McCown's Longspur and Chestnut-collared Longspur. Two habitat conditions were used in the analysis, percent shrub cover and percent grass cover >15 cm. We used a chi-square goodness of fit test (alpha .05) to detect significant differences between expected use based on availability and observed use within habitat condition categories. Figures were generated to illustrate significant preferences of habitat conditions by selected shortgrass prairie bird species (Neu et. al 1974, and Byers et. al 1984). Long-term monitoring of Short Grass Prairie BCR region will provide valuable information on trends and distribution within a framework that allows land managers to make cooperative management decisions. Equipped with this information and habitat preferences of prairie birds, units to assess habitat suitability for species of concern. In addition, monitoring birds will provide data that can by applied to monitoring ecosystems, since bird species utilize an inclusive habitat spectrum within ecosystems. As a result bird monitoring provides a cost-effective means for monitoring ecosystems at a variety of scales.

753. **Selective control of rangeland grasshoppers with prescribed fire.**
Vermeire, L. T.; Mitchell, R. B.; Fuhlendorf, S. D.; and Wester, D. B.
Journal of Range Management 57: 29-33. (Jan. 2004)
NAL Call #: 60.18 J82
Descriptors: range management/ prescribed burning/ insect control/ Ageneotettix deorum/ Melanoplus/ Acrididae/ insect pests/ biomass/ fire ecology/ precipitation/ population density/ Oklahoma/ Melanoplus bowditchi/ Melanoplus flavidus/ Hesperotettix viridis/ species differences/ plant production range and pasture grasses/ pests of plants insects/ animal ecology and behavior/ entomology related
Abstract: Grasshoppers (Orthoptera: Acrididae) are considered among the most damaging rangeland pests yet desired for the development of many wildlife species. Most grasshoppers are innocuous, but control with insecticides is non-discriminatory among species. Our objectives were to evaluate the effects of prescribed burning on the abundance and biomass of grasshoppers and to determine if species could be selectively controlled with prescribed fire. Twenty-four 4-ha sites were selected in a sand sagebrush-mixed prairie near Woodward, Okla. and blocked by pasture. Plots were randomly assigned fall-, spring-, or non-burned treatments within block with 4 replications per treatment for each of 2 years. Grasshopper biomass and abundance were sampled in late July and early August by sweeping with canvas beating nets. Specimens were weighed to the nearest 0.1 mg and identified to species. Fire treatments had no effects on the abundance or biomass of grasshoppers across species, with about 10 grasshoppers weighing 4,090 mg per 150 sweeps. Fire effects on the 4 most common species were variable and could be explained by the biology of the animals. Melanoplus bowditchi and M. flavidus were unaffected by fire treatment. Hesperotettix viridis is sensitive to damage to its host plants and was reduced about 88% by fire in either season. Fall burns reduced Ageneotettix deorum abundance by 65% because the species' eggs are laid near the soil surface and exposed to the heat of passing fire. Fire prescriptions can be written to target species-specific vulnerabilities and control pest grasshoppers while maintaining the food base for grasshopper predators.
This citation is from AGRICOLA.

754. **Sentinel nematodes of land-use change and restoration in tallgrass prairie.**
Todd, T. C.; Powers, T. O.; and Mullin, P. G.
Journal of Nematology 38(1): 20-27. (2006);
ISSN: 0022-300X
Descriptors: commercial activities/ conservation measures/ ecology/ terrestrial habitat/ land zones/ Nematoda: farming and agriculture/ role as indicator of land use change/ Kansas and Nebraska/ habitat management/ habitat restoration/ role as indicator/ community structure/ role as indicator of land use change and restoration/ environmental indicators/ grassland/ tallgrass prairie/ Kansas/ Konza prairie/ Nebraska/ homestead National Monument/ Nematoda/ invertebrates/ nematodes
Abstract: Changes in land use and the associated changes in land cover are recognized as the most important component of human-induced global change. Much attention has been focused on deforestation, but grasslands are among the most endangered ecosystems

on Earth. The North American tallgrass prairie is a dramatic example, exhibiting a greater than 95% decline in historical area. Renewed interest in prairie conservation and restoration has highlighted the need for ecological indicators of disturbance and recovery in native systems, including the belowground component. The tallgrass prairie differs from the agricultural systems that have replaced it in having greater diversity and heterogeneity of resources, less physical soil disturbance (although other disturbances, such as fire and grazing, are prominent), and greater nitrogen limitation. Understanding the responses of nematode taxa to these characteristic differences is crucial to the development and improvement of community indices, but while knowledge of disturbance responses by individual taxa is accumulating, the level of necessary taxonomic resolution remains in question. Although nematode communities generally are better described for temperate grasslands than for other natural ecosystems, identification of sentinel taxa is further confounded by high levels of diversity, and both spatial and temporal heterogeneity.

755. **Sexual segregation in white-tailed deer: Responses to habitat manipulations.**
Steward, Kelley M.; Fulbright, Timothy E.; Drawe, D. Lynn; Bowyer, R. Terry; and Stewart, Kelley M.
Wildlife Society Bulletin 31(4): 1210-1217. (2003)
NAL Call #: SK357.A1W5; ISSN: 0091-7648
Descriptors: Artiodactyla/ Cervidae/ Odocoileus virginianus/ Odocoileus virginianus/ white-tailed deer/ social behavior/ behavioral responses/ age-sex relationships/ conservation/ wildlife management/ forage availability/ habitat availability/ habitat management/ habitat manipulations/ intraspecies relationships/ land management/ land zones/ mating season/ nutritional requirements/ parturition/ reproduction/ sexual aggregation/ sexual dimorphism/ sexual segregation/ shrubland matrix/ terrestrial ecology/ Texas/ habitat/ herbicides/ mechanical manipulation/ odocoileus virginianus/ white-tailed deer/ forage/ abundance/ dispersion/ forest/ social organization
Abstract: Sexually dimorphic cervids such as white-tailed deer (Odocoileus virginianus) often sexually segregate outside the mating season. Few studies reporting results of mechanical manipulation of habitat to benefit deer have considered that males and females may respond differently to alterations of their environment. We examined effects of habitat manipulation on sexual segregation in white-tailed deer in south Texas by creating clearings within a shrubland matrix that altered habitat and forage. We used mechanical chopping and herbicides to manipulate forbs and resprouts of shrubs. We hypothesized that adult males and adult females would respond differently to manipulations of available forage during periods of sexual segregation (spring, including parturition) but not sexual aggregation (autumn, including rut). Proportion of males was greater in the study area during sexual aggregation than during sexual segregation, but no differences occurred in proportion of males using vegetation treatments during sexual aggregation. During sexual segregation, however, proportion of males observed on the treatment that reduced availability of forbs and shrubs was greater than in other treatments. The treatment that reduced forbs and resprouts of shrubs received the greatest proportional use by males and had the greatest biomass of graminoids and low biomass of forbs and shrubs. The gastrocentric hypothesis for sexual segregation proposes that differing nutritional requirements between sexes result in males consuming a larger quantity, but lower quality, of forage than females. Thus, reducing forbs and shrubs likely created a plot that benefited males more than females. Wildlife and land managers should consider that mechanical manipulation of habitat and forage availability has the potential to benefit one sex to the possible detriment of the other.

756. **Sharp-tailed grouse and range management practices in western rangelands.**
Kessler, W. B. and Bosch, R. P.
In: Proceedings of the Wildlife-Livestock Relationships Symposium. Coeur D'alene, Idaho. Peek, James M. and Dalke, P. D. (eds.)
Moscow, Idaho: Forest, Wildlife and Range Experiment Station, University of Idaho; pp. 133-146; 1982.
NAL Call #: SF84.84.W5 1981
Descriptors: sharp-tailed grouse/ range management/ livestock

757. **Short- and long-term changes in elk use and forage production in sagebrush communities following prescribed burning.**
Van Dyke, Fred and Darragh, Jeffrey A.
Biodiversity and Conservation 15(14): 4375-4398. (2006)
NAL Call #: QH75.A1B562; ISSN: 0960-3115
Descriptors: Cervidae/ Artiodactyla/ Cervus canadensis/ terrestrial ecology/ forage production/ nutritional quality/ prescribed burning/ seasonal availability/ wapiti/ dispersion/ habitat/ forest/ fire/ productivity/ vegetation/ diversity/ nitrogen-protein/ food/ Montana
Abstract: Burning shrub and grassland communities often leads to increases in plant production and nutritional quality that benefit herbivores, resulting in increased herbivore use of burned areas. Increased use has been ascribed more specifically to changes in plant community structure, community composition and diversity, nutritional quality, and seasonal availability. These hypotheses can be evaluated more precisely if changes in plant communities following burning are monitored concurrently with changes in herbivore use, especially in longer-term studies. From 1988 to 1999, we examined responses of elk (Cervus elaphus) following prescribed burning of areas burned in 1984 and 1988 that had been formerly dominated by mountain big sagebrush (Artemisia tridentata ssp. vaseyana) in south-central Montana (USA), with concurrent monitoring of changes in plant production, nutritional quality, and community composition. Elk made increased use of burned sites up to 15 years after burning. Burning transformed big sagebrush-dominated communities into native herbaceous communities that persisted for 15 years without sagebrush reinvasion. Forage biomass and protein content remained higher on burned sites for 15 years, although differences were not significant in every year and declined as time elapsed after burning. Forage production, forage protein, and elk use were temporally correlated, suggesting the possibility that grazing by elk might have contributed to persistence of elevated plant production and protein levels on burned sites.

758. **Short- and longer-term effects of fire and herbivory on sagebrush communities in south-central Montana.**
Van Dyke, Fred and Darragh, Jeffrey A.
Environmental Management 38(3): 365-376. (2006)
NAL Call #: HC79.E5E5 ; ISSN: 0364-152X
Descriptors: Artiodactyla/ Cervidae/ Cervus elaphus/ environmental factors/ behavior/ conservation/ wildlife management/ diets/ foods-feeding/ habitat use/ environmental management/ fires-burns/ foraging site selection/ ecosystems/ habitat management/ herbivorous grazing/ land zones/ Line Creek Plateau/ Gold Creek/ methods and techniques/ Montana/ nutrition/ prescribed burning/ sagebrush habitat/ sagebrush habitat management/ sagebrush habitat use/ shrub grasslands/ terrestrial ecology/ Artemisia spp.
Abstract: To better understand the role of herbivory and fire as potential disturbance processes in sagebrush communities, we examined responses of a grazing ungulate, elk (Cervus elaphus), following prescribed burning of sagebrush (Artemisia tridentata ssp. vaseyana) in south-central Montana (USA.) with concurrent monitoring of changes in plant production, nutritional quality, and community diversity from 1989-1999. Burning transformed low-diversity, sage-brush-dominated communities into high-diversity, graminoid-forb communities that persisted for 10 years without significant reestablishment of sagebrush. Elk increased use of burned sites one year after burning, but elk use returned to pre-burn levels over the next two to nine years. Forage biomass and nutritional quality declined after initial increases that coincided with increased elk use. Increases in elk use appeared to be influenced by increases in combined graminoid and forb production and changes in structural vegetation characteristics that permitted greater foraging efficiency, Declines in use were associated with loss of nutritional enhancement and declines in combined graminoid and forb production. Managers may observe only short-term responses from grazing ungulates to prescribed fire in sagebrush communities, but can expect longer-term increases in plant diversity and establishment of graminoid-forb communities.

759. **Short-term grazing exclusion effects on riparian small mammal communities.**
Giuliano, W. M. and Homyack, J. D.
Journal of Range Management 57(4): 346-350. (2004)
NAL Call #: 60.18 J82 ; ISSN: 0022-409X
Descriptors: riparian areas/ grazing intensity/ small mammals/ species diversity/ plant litter/ ground vegetation/ height/ Pennsylvania
Abstract: Grazing of livestock in streams and associated riparian habitats (hereafter referred to as riparian zones) may affect small mammal communities by influencing vegetation, water quality, and other site characteristics. To better understand these effects, we compared vegetation structure, and abundance and richness of small mammals in grazed riparian zones and similar areas where livestock had recently (1-2 years) been excluded in southwest Pennsylvania, 1998 and 1999. Mammalian species richness and abundance (all species combined, meadow voles [Microtus pennsylvanicus Ord], and meadow jumping mice [Zapus hudsonius Zimmermann]) were greater on sites where livestock had been excluded than grazed areas. These findings are likely the result of greater litter cover and increased vertical vegetation obstruction observed on these sites. Because small mammal communities respond quickly to relaxation of grazing in riparian zones, subsidy programs exist to partially pay for fencing, and landowners may potentially benefit from fencing these areas through improved water quality, erosion control, and livestock health, fencing may be an effective wildlife and grazing management tool.
This citation is from AGRICOLA.

760. **Short-term temporal effects on community structure of lepidoptera in restored and remnant tallgrass prairies.**
Summerville, Keith S.; Bonte, Anson C.; and Fox, Lena C.
Restoration Ecology 15(2): 179-188. (2007)
NAL Call #: QH541.15.R45R515; ISSN: 1061-2971
Descriptors: conservation measures/ ecology/ terrestrial habitat/ land zones/ Heterocera: habitat management/ tallgrass prairie restoration/ community structure/ grassland/ tallgrass prairie habitat/ restored and remnant habitats/ Iowa/ short term variations/ restored and remnant tallgrass prairie/ Insecta, Lepidoptera/ arthropods/ insects/ invertebrates/ Lepidopterans
Abstract: Understanding the degree to which species assemblages naturally vary over time will be critically important when assessing whether direct management effects or contingency is responsible for species gain or loss. In this study, we tested three predictions related to short-term variation in prairie moth communities: (1) communities would only exhibit significant temporal variation in newly restored sites (1-3 years old); (2) prairie size and age would positively influence community reassembly, with larger, older restorations sampling a greater proportion of the regional species pool; and (3) older restorations (7-10 years old) would have yet to converge on the community composition of prairie remnants. Moths were sampled from 13 Tallgrass prairie restorations and remnants in central Iowa in 2004-2005. Repeated measures analysis of variance revealed significant effects of sampling year on moth species richness and abundance as well as on the richness of two functional groups, but difference among prairie types was only observed in 2005. Rarefaction analysis revealed that older restorations and prairie remnants supported higher species richness compared to recently planted sites, and nonmetric, multidimensional scaling ordination indicated that restorations older than 7 years were clearly converging on the species composition of remnants. These results suggest that moth communities in restorations and remnants are highly variable in time but that as restorations age, they appear to reaccumulate moth species found in prairie remnants. The long-term persistence of a particular species assemblage within a given site, however, might be a difficult endpoint to attain in central Iowa prairies because of significant annual variation in species occurrence.

761. **Should heterogeneity be the basis for conservation? Grassland bird response to fire and grazing.**
Fuhlendorf, S. D.; Harrell, W. C.; Engle, D. M.; Hamilton, R. G.; Davis, C. A.; and Leslie, D. M.
Ecological Applications 16(5): 1706-1716. (2006)
NAL Call #: QH540.E23; ISSN: 10510761
Descriptors: conservation biology/ disturbance/ diversity/

grassland birds/ Henslow's sparrow/ heterogeneity/ Oklahoma/ rangelands/ tallgrass prairie preserve/ upland sandpiper
Abstract: In tallgrass prairie, disturbances such as grazing and fire can generate patchiness across the landscape, contributing to a shifting mosaic that presumably enhances biodiversity. Grassland birds evolved within the context of this shifting mosaic, with some species restricted to one or two patch types created under spatially and temporally distinct disturbance regimes. Thus, management-driven reductions in heterogeneity may be partly responsible for declines in numbers of grassland birds. We experimentally altered spatial heterogeneity of vegetation structure within a tallgrass prairie by varying the spatial and temporal extent of fire and by allowing grazing animals to move freely among burned and unburned patches (patch treatment). We contrasted this disturbance regime with traditional agricultural management of the region that promotes homogeneity (traditional treatment). We monitored grassland bird abundance during the breeding seasons of 2001-2003 to determine the influence of altered spatial heterogeneity on the grassland bird community. Focal disturbances of patch burning and grazing that shifted through the landscape over several years resulted in a more heterogeneous pattern of vegetation than uniform application of fire and grazing. Greater spatial heterogeneity in vegetation provided greater variability in the grassland bird community. Some bird species occurred in greatest abundance within focally disturbed patches, while others occurred in relatively undisturbed patches in our patch treatment. Henslow's Sparrow, a declining species, occurred only within the patch treatment. Upland Sandpiper and some other species were more abundant on recently disturbed patches within the same treatment. The patch burn treatment created the entire gradient of vegetation structure required to maintain a suite of grassland bird species that differ in habitat preferences. Our study demonstrated that increasing spatial and temporal heterogeneity of disturbance in grasslands increases variability in vegetation structure that results in greater variability at higher trophic levels. Thus, management that creates a shifting mosaic using spatially and temporally discrete disturbances in grasslands can be a useful tool in conservation. In the case of North American tallgrass prairie, discrete fires that capitalize on preferential grazing behavior of large ungulates promote a shifting mosaic of habitat types that maintain biodiversity and agricultural productivity. © 2006 by the Ecological Society of America.

762. **Shrub-grassland small mammal and vegetation responses to rest from grazing.**
Rosenstock, S. S.
Journal of Range Management 49(3): 199-203. (1996)
NAL Call #: 60.18 J82 ; ISSN: 0022-409X.
http://jrm.library.arizona.edu/Volume49/Number3/azu_jrm_v49_n3_199_203_m.pdf
Descriptors: small mammals/ grazing/ microhabitats/ canopy/ species diversity/ habitats/ grasses/ shrubs/ plant communities/ Utah
Abstract: Between 1989-1991, I studied the effects of livestock grazing on vegetation and small mammals in semiarid shrub-grassland habitats of south-central Utah. Responses were measured at 2 spatial habitat scales; patches and macrohabitats. Patch-scale data were obtained from 4 small (<1 ha) livestock exclosures and nearby grazed areas. Macrohabitat-scale data were collected at 4 actively grazed sites and 4 comparable, excellent condition sites, ungrazed for 30+ years. Ungrazed patch and macrohabitat sites had more surface litter, greater perennial grass cover, and taller perennial grass plants, but treatment response varied among sites. Small mammal responses were apparent only at the macro-habitat scale, where ungrazed sites had 50% greater species richness and 80% higher abundance. Small mammal reproductive activity and biomass were not affected by rest from grazing at either scale. Small mammal community composition varied greatly among sites and within treatments. This variability has important implications for ecological monitoring efforts involving these species. This citation is from AGRICOLA.

763. **Shrubsteppe bird response to habitat and landscape variables in eastern Washington, USA.**
Vander Haegen, W. M.; Dobler, F. C.; and Pierce, D. J.
Conservation Biology 14(4): 1145-1160. (2000)
NAL Call #: QH75.A1C5; ISSN: 08888892.
Notes: doi: 10.1046/j.1523-1739.2000.99293.x.
http://wdfw.wa.gov/wlm/research/papers/shrub/shrubsteppe.pdf
Descriptors: avifauna/ habitat fragmentation/ landscape structure/ plant community/ soil type/ United States/ Amphispiza belli/ Lanius ludovicianus/ Spizella breweri
Abstract: The landscape of the intermountain west has changed dramatically in the last 150 years, particularly in the state of Washington, where over half the native shrubsteppe ecosystem has been converted to agricultural lands, resulting in a fragmented landscape with few extensive tracts of shrubsteppe. We examined the historical and current distribution of shrubsteppe on different soil types in eastern Washington, and we censused bird communities at 78 sites in shrubsteppe from 1991 to 1993. We compared abundance of species among soil types and range conditions and developed models of species occurrence using site-specific vegetation and landscape variables. The pattern of shrubsteppe conversion has resulted in a disproportionate loss of deep soil communities. Eight bird species showed strong relationships with soil type and three with range condition. These associations likely resulted from the influence of soil type and range history on the vegetation of these communities. Brewer's Sparrows (Spizella breweri) and Sage Sparrows (Amphispiza belli) reached their highest abundances in deep, loamy soils, whereas Loggerhead Shrikes (Lanius ludovicianus) were most abundant in deep, sandy soils. Sage Sparrows occurred more frequently in landscapes dominated by shrubsteppe, indicating a negative relationship with fragmentation. Our results suggest that fragmentation of shrubsteppe and the pattern of agricultural conversion among soil types have had detrimental effects on numerous shrubsteppe species. The landscape for species with an affinity for deep, loamy soil communities has changed considerably more than the overall loss of shrubsteppe would indicate. Conservation practices that emphasize retention of shrubsteppe communities on deep soils and that reduce further fragmentation will be critical to the maintenance of avian biological diversity in this system.

764. **Small mammal populations in a grazed and ungrazed riparian habitat in Nevada.**
Medin, D. E. and Clary, W. P.
Ogden, UT: Intermountain Research Station, Forest Service, U.S. Department of Agriculture; Research Paper-INT 413, 1989. 6p.
Notes: 0886-7380 (ISSN).
NAL Call #: A99.9 F764U
http://www.fs.fed.us/rm/pubs_int/int_rp413.pdf
Descriptors: mammals/ Populus tremuloides/ Salix/ population dynamics/ riparian buffers/ grazing/ Nevada
Abstract: Community composition and relative abundance of small mammal populations were compared between an aspen (Populus tremuloides)lwillow (Salix spp.) riparian habitat seasonally grazed by cattle and a comparable adjoining habitat protected from grazing for the previous 11 years by an exclosure. The exclosure, constructed in 1977, is on the West Fork of Deer Creek in northeastern Nevada. Small mammal populations were compared by removal trapping over a 5-day period in late summer 1988. Four species accounted for 82 percent of the total number of individual animals trapped. These were deer mouse (Peromyscus maniculatus), western jumping mouse (Zapus princeps), least chipmunk (Tamias minimus), and Great Basin pocket mouse (Perognathus parvus). Other small mammals trapped either irregularly or in smaller numbers on the study site included golden-mantled ground squirrel (Spermophilus lateralis), vagrant shrew (Sorex vagrans), long-tailed vole (Microtus longicaudus), montane vole (Microtus montanus), Townsend's ground squirrel (Spermophilus townsendi), northern pocket gopher (Thomomys talpoides), and bushy-tailed woodrat (Neotoma cinerea). Estimated density of small mammals was over a third higher in the ungrazed habitat as compared to the grazed area. Small mammal standing crop biomass, species richness, and species diversity were 3.24, 1.83, and 1.25 times higher, respectively, on the ungrazed site. Each of the 11 species recorded during the study was trapped inside the protected area. Only six species were trapped in the grazed habitat. The grazed study site did not appear to have received excessive use by cattle in recent years compared to nearby riparian habitats.
This citation is from AGRICOLA.

765. **Small mammal response to the introduction of cattle into a cottonwood floodplain.**
Samson, F. B.; Knopf, F. L.; and Hass, L. B.
In: Management of amphibians, reptiles, and small mammals in North America.Flagstaff, Ariz. Szaro, R. C.; Severson, K. E.; and Patton, D. R. (eds.); Vol. GTR-RM-166.
Fort Collins, Colo.: U.S. Department of Agriculture Forest Service, Rocky Mountain Forest and Range Experiment Station; pp. 432-438; 1988.
Notes: ISSN: 0094-4823.
NAL Call #: aSD11.A42 no. 166
Descriptors: ecology/ terrestrial habitat/ land and freshwater zones/ Mammalia: community structure/ comparisons of grazed and ungrazed grassland/ community comparisons/ habitat exploitation/ comparison/ grassland/ grazed and ungrazed grassland communities/ Colorado/ Logan County/ South Platte State Wildlife Area/ comparison of grazed and ungrazed grassland/ small taxa/ chordates/ mammals/ vertebrates

766. **Small mammal responses to tallgrass prairie restoration from fescue pastures (Kansas).**
Keller, Amber D. and Cully, Jack F.
Ecological Restoration 20(4): 279-280. (2002); ISSN: 1522-4740
Descriptors: conservation measures/ ecology/ terrestrial habitat/ land zones/ Mammalia: habitat management/ habitat restoration/ small taxa community responses/ community structure/ small taxa responses to habitat restoration/ grassland/ tallgrass prairie/ small taxa community responses to habitat restoration/ Kansas/ Labette County/ Kansas Army Ammunition Plant/ Mammalia/ chordates/ mammals/ vertebrates

767. **Small mammals in tall-grass prairie: Patterns associated with grazing and burning.**
Clark, Bryon K.; Kaufman, Donald W.; Finck, Elmer J.; and Kaufman. Glennis A.
Prairie Naturalist 21(4): 177-184. (1989)
NAL Call #: QH540.P7; ISSN: 0091-0376
Descriptors: Blarina hylophaga/ Microtus ochrogaster/ Peromyscus maniculatus/ Peromyscus leucopus/ ecosystems/ grasslands/ fires-burns/ grazing/ habitat alterations/ prairies/ wildlife-livestock relationships/ Kansas: Geary County/ Kansas: Riley County

768. **Society for Range Management issue paper: Ecology and management of sage-grouse and sage-grouse habitat - A reply.**
Schroeder, M. A.; Connelly, J. W.; Wambolt, C. L.; Braun, C. E.; Hagen, C. A.; and Frisina, M. R.
Rangelands 28(3): 3-7. (2006)
NAL Call #: SF85.A1R32; ISSN: 01900528
Descriptors: habitat management/ sage grouse/ commentary
Abstract: A critique to the 2005 issue paper of the Society for Range Management (SRM) entitled "Ecology and Management of Sage-Grouse and Sage-Grouse Habitat" and based on Crawford et al's compilation of the 2001 SRM symposium on sage-grouse is presented. Focus is on issues and concerns regarding sage-grouse distribution, habitat relationships, habitat management practices, factors other than habitat that affect sage-grouse populations and landscape issues. It is shown that by focusing only in one paper, the issue paper authors may provide an inaccurate and/or incomplete assessment of sage-grouse populations and habitat.

769. **Soil dwelling macro-invertebrates in intensively grazed dairy pastures in Pennsylvania, New York and Vermont.**
Byers, R. A. and Barker, G. M.
Grass and Forage Science 55(3): 253-270. (2000)
NAL Call #: 60.19 B773; ISSN: 0142-5242
Descriptors: macroinvertebrates/ dairy/ pasture/ grazing/ northeastern United States
Abstract: This study estimates the relative contributions of environment and farm management strategies in influencing soil faunal assemblages and attempts to identify the species with potential to affect sustainability of intensive grazing management systems in the north-eastern USA. It arises because of the change from confinement feeding of

dairy cattle, consequent upon concerns about negative environmental effects, the rising costs for machinery and housing, and reduced profit margins, together with the absence of data from which the consequences of such change on the soil fauna may be predicted. Macro-invertebrates were sampled in soil from seventy-eight grazed pastures on twenty-one dairy farms in Pennsylvania, USA, in the spring of 1994. On five of these farms, macro-invertebrates were sampled (four pastures per farm) in the spring, summer and autumn seasons of 1994, 1995 and 1996. In 1997, macro-invertebrates were sampled in soil during spring, summer and autumn from (four pastures per farm) on three farms in New York, and during spring and summer on three farms in Vermont. Species richness ranged from two to twelve species (mean 6.4) per pasture site in Pennsylvania and five to eighteen species (mean 10.7) in New York and Vermont. The communities were dominated at most sites by earthworms. Earthworms were correlated with soil basal and substrate-induced respiration/carbon ratio, and soil moisture, but were negatively correlated with cows per hectare and herbage biomass in Pennsylvania. Sitona larvae were recorded at nineteen of the twenty-one farms during the spring of 1994 across Pennsylvania and occurred at populations >5 m-2 in 68% of the sampled pastures. Sitona larvae were less abundant in New York and Vermont. Elaterid larvae comprised a complex of seven species of which Aeolus melillus (Say) and Melanotus communis (Gyllenhal) comprised 35% and 39%, respectively, of the elaterids collected in Pennsylvania. Agriotes mancus (Say) and Ctenicera destructor (Brown) comprised 41% and 26%, respectively, of four species collected in New York and Vermont. Scarabaeid larvae, comprising a complex of eight species, were detected at only 27% of the seventy-eight pastures sampled in spring 1994 in Pennsylvania. Five species were collected in ten of the twelve New York pastures and four species in nine of the twelve Vermont pastures. Populations of scarabaeid larvae averaged <25 m-2 in all three states, except in three Pennsylvania pastures in spring 1994. Detrended canonical correspondence analysis (DCCA) showed pasture standing biomass, legume diversity, pre-winter stubble height, white clover pasture content, and soil phosphorus levels influenced numbers of invertebrate species more than climatic factors, such as temperature, rainfall, altitude, latitude and seasonal water table. DCCA also showed most pastures to be dose to the average of environmental factors. The extremely low density of herbivorous macro-invertebrates in soil and the absence of pest outbreaks may indicate a stable soil ecosystem.

770. **Soil macrofauna under two grazing systems.**
Rodriguez, I.; Crespo, G.; Torres, V.; and Fraga, S.
Cuban Journal of Agricultural Science 33(4): 415-422. (1999)
NAL Call #: S1.R4; ISSN: 0864-0408
Descriptors: biomass/ ferrallitic soils/ grassland soils/ grazing intensity/ grazing systems/ rotational grazing/ soil fauna/ soil types/ species diversity
Abstract: The soil macrofauna of an 18 ha Cynodon nlemfuensis sward was studied for three years (September 1993-96) on a red ferrallitic soil in Cuba to compare an intensive rotational grazing system with 72 paddocks (Voisin's rational grazing) and 260 large cattle (LC) units (equivalent to liveweight of 500 kg), and a less intensive rotational grazing system with 12 paddocks and an intensity of 51 LC. Three paddocks were selected from each system in which three areas of 0.065 m^2 each were sampled at 0-20 depth once each trimester to determine the number of macrofauna individuals, the biomass and soil humidity. Data were statistically analysed through a linear model and also the principal component method was used to analyse the influence of climatic factors on the variables studied and their relationship. There were no significant differences between the two grazing systems in the number of individuals (mean 4.37/m^2) or in their biomass (19.9 g/m^2). Results showed differences ($P<0.01$) between trimesters with the highest values in September-October-November and March-April-May. Annual performance of the macrofauna showed that in the first year there was a greater number of individuals (8.86 vs 2.26 and 1.96) and higher biomass (39.3 vs 2.43 and 11.07 g/m^2) compared to the following years. Among the diversity of individuals there were earthworms, coleopterous larvae and other insects. The first two groups made up most of the total biomass. Results indicate that diversity and biomass of macrofauna will not increase in the short term under similar soil and climatic conditions in the grazing systems used in this study.

771. **Soil microarthropods as indicators of exposure to environmental stress in Chihuahuan Desert rangelands.**
Kay, F. R.; Sobhy, H. M.; and Whitford, W. G.
Biology and Fertility of Soils 28(2): 121-128. (1999)
NAL Call #: QH84.8.B46; ISSN: 0178-2762
Descriptors: bulldozing/ desert grassland/ desertification/ environmental stress indicators/ grazing/ habitat/ microclimate/ rainfall/ soil communities/ vegetation damage
Abstract: We studied soil microarthropod communities along livestock grazing disturbance gradients, inside and outside grazing exclosures, and on areas subjected to restoration efforts (herbicide and bulldozing) in order to test the suitability of mites as indicators of rangeland soil quality. We found that mite numbers generally increased with decreased grazing disturbance. Soil microarthropods appeared to respond to a complex of factors including soil compaction, depth to an impervious soil layer, below-ground vegetative biomass, and residual effects of herbicide. All of our study plots, except those that had been herbicide treated, were dominated by microbivorous mites of the family Nanorchestidae. The numerical responses of mites, especially nanorchestids, appeared to provide a sensitive indicator of ecosystem health in a Chihuahuan Desert grassland.

772. **Songbird abundance and parasitism differ between urban and rural shrublands.**
Burhans, D. E. and Thompson, F. R.
Ecological Applications 16(1): 394-405. (2006)
NAL Call #: QH540.E23; ISSN: 10510761
Descriptors: brood parasitism/ brown-headed cowbird/ landscape/ nest predation/ nesting success/ shrubland/ songbirds/ urban
Abstract: Many studies have examined differences in avian community composition between urban and rural habitats, but few, if any, have looked at nesting success of urban

shrubland birds in a replicated fashion while controlling for habitat. We tested factors affecting nest survival, parasitism by the Brown-headed Cowbird (Molothrus ater), and species abundance in shrubland habitat in rural and urban landscapes. We found no support for our hypothesis that nest survival was lower in urban landscapes, but strong support for the hypothesis that survival increased with nest height. We found strong support for our hypothesis that cowbird parasitism was greater in urban than rural landscapes; parasitism in urban sites was at least twice that of rural sites. We found strong support for an urban landscape effect on abundance for several species; Northern Cardinal (Cardinalis cardinalis) and Brown-headed Cowbirds were more abundant in urban landscapes, whereas Field Sparrow (Spizella pusilla) and Blue-winged Warbler (Vermivora pinus) were more abundant in rural sites. There was support for lower abundances of Blue-gray Gnatcatcher (Polioptila caerulea) and Indigo Bunting (Passerina cyanea) with increased housing density. For six other species, edge and trail density or vegetation parameters best explained abundance. Lower abundances and greater parasitism in habitat patches in urban landscapes are evidence that, for some species, these urban landscapes do not fulfill the same role as comparable habitats in rural landscapes. Regional bird conservation planning and local habitat management in urban landscapes may need to consider these effects in efforts to sustain bird populations at regional and local scales. © 2006 by the Ecological Society of America.

773. **Songbird community composition and nesting success in grazed and ungrazed pinyon-juniper woodlands.**
Goguen, Christopher B. and Mathews, Nancy E.
Journal of Wildlife Management 62(2): 474-484. (1998)
NAL Call #: 410 J827; ISSN: 0022-541X
Descriptors: Bos taurus/ Fringillidae/ Passeriformes/ Molothrus ater/ Aves/ behavior/ birds/ communities/ ecosystems/ habitat alterations/ habitat use/ interspecies relationships/ juniper/ nest parasitism/ nests-nesting/ pinyon pine/ productivity/ wildlife-livestock relationships/ wild birds/ reproduction/ woodlands/ land use/ neotropical migrant songbirds/ breeding success/ livestock grazing/ natural resources/ animal ecology and behavior/ plant production/ range and pasture grasses/ abundance/ birds, passerines/ blackbirds and cowbirds/ cattle/ grazing/ habitat/ livestock/ nests and nesting/ parasitic habits/ sampling/ surveys/ vegetation/ agriculture/ prairie/ forest/ nest/ brood-egg/ fertility-recruitment/ brown-headed cowbird/ songbird/ biotop/ vegetation/ New Mexico/ Colfax County/ Sangre de Cristo Mountains
Abstract: Liverstock grazing is a dominant land use of pinyon-juniper habitats in the western United States, yet the effects of grazing on breeding bird communities in this habitat have been poorly studied. The authors compared habitat structure, songbird abundance, and nesting productivity within pinyon-juniper woodlands on an actively grazed site and a site experiencing long-term relief from livestock grazing in northeastern New Mexicon. From 1992 to 1995, they performed vegetation sampling, conducted songbird point counts, and located and monitored nests on 8.35-ha study plots. Four of these plots experienced moderate cattle grazing and four were ungrazed since 1973. They found no differences in habitat or vegetation features between grazed and ungrazed plots. Bird communities were similar, with only one of the 11 species they tested more abundant on the ungrazed treatment (western scrub-jay; Aphelocoma californicus). They detected no differences in nesting success or cause-specific rates of nest failure for seven common bird species ($P<0.05$), and detected no differences in brown-headed cowbird (Molothrus ater) parasitism rates for the major hosts between grazed and ungrazed areas. Greater than 75% of the nests of the solitary vireo (Vireo solitarius), western tanager (Piranga ludoviciana), and blue-gray gnatcatcher (Polioptila caerulea) were parasitized on both treatments. These high parasitism rates may be the result of high densities of local cowbirds because of abundant feeding sites (i.e., livestock), the high mobility of cowbirds, and the close proximity of ungrazed plots to grazed areas (all < 4 km). The results suggest that 20 years of relief from grazing had little influence on the habitat structure or bird species composition of the pinyon-juniper woodlands on the study site. However, livestock grazing has indirectly affected the nesting success of some songbird species via the influence of grazing on cowbird abundance. The authors' findings highlight the need for studies that incorporate nest monitoring and landscape-scale approaches to better understand the relation between cowbirds, livestock, and songbirds and the time required for recovery from grazing effects.

774. **Spatial components of plant-herbivore interactions in pastoral, ranching, and native ungulate ecosystems.**
Coughenour, M. B.
Journal of Range Management 44(6): 530-542. (1991)
NAL Call #: 60.18 J82 ; ISSN: 0022-409X.
http://jrm.library.arizona.edu/Volume44/Number6/azu_jrm_v44_n6_530_542_m.pdf
Descriptors: ungulates/ spatial distribution/ spatial variation/ grazing
Abstract: The spatial component of herbivory remains enigmatic although it is a central aspect of domestic and native ungulate ecosystems. The effects of ungulate movement on plants have not been clearly established in either range or wildlife management. While livestock movement systems have been implemented to cope with increases in livestock density, restrictions on movement, and overgrazing, a large number of studies have disputed the effectiveness of different livestock movement patterns. Traditional pastoralism, particularly nomadism, has been perceived as irrational and even destructive, but many studies have documented features of traditional pastoral land use that would promote sustainability. Disruptions of wild ungulate movements have been blamed for wildlife overgrazing and population declines, but actual patterns and mechanisms of disrupted movement and population responses have been poorly documented. Models that integrate plant growth, ungulate movement, and foraging are suggested as a way to improve analyses of spatial plant-herbivore systems. Models must give due attention to nonforage constraints on herbivore distribution, such as topography. Models should assess the significance of movement as a means of coping with local climatic variation (patchy rainfall). Models that distribute an aggregate population over a landscape in relation to the distribution of habitat features deemphasize aspects of

ungulate movements and population responses that inevitably cause nonideal distributions, particularly in natural ecosystems. Individual based models describe movement and foraging processes more accurately, but these models are difficult to apply over large areas. Both top-down and bottom-up approaches to spatial herbivory are needed. To model plant responses to movement, it is important to account for small scale phenomena such as tiller defoliation patterns, patch grazing, and grazing lawns as well as large scale patterns such as rotation and migration. Herbivory patterns at these different scales are interrelated.
This citation is from AGRICOLA.

775. **Spatial distribution of upland beetles in relation to landform, vegetation and grazing management.**
Dennis, Peter; Aspinall, R. J.; and Gordon, Iain J.
Basic and Applied Ecology 3(2): 183-193. (2002)
NAL Call #: QH540.B37; ISSN: 1439-1791
Descriptors: principle component analysis: mathematical and computer techniques/ climate change/ distance statistics/ grazing intensity/ grazing management/ land use changes/ landform management/ soil management/ soil moisture/ spatial distribution/ structural heterogeneity/ vegetation management
Abstract: We applied a novel analysis based on distance statistics to investigate how patterns of habitat heterogeneity affected the distribution of representative ground and rove beetle species (Coleoptera: Carabidae, Staphylinidae), sampled at an upland site of varied landform, soil and vegetation structure. The structural heterogeneity of the Nardus stricta-dominated grassland was further modified by varying grazing intensity with sheep, or sheep and cattle. We collected pitfall trap data from 120 sample points across the study area. Ground and rove beetle species were selected to represent the major trends in the species-trap abundance data, determined by the extent of their correlation with the main components of a factor analysis (Principal Components Analysis). The novel statistical analytical method, calculation of the Getis and Ord distance statistic, G, was applied to the distribution data of each selected species of ground and rove beetle. The distance statistic was calculated for the smallest distance to ensure that each sample point had at least one neighbour (73 m) and this distance was used to detect local spatial association and to explore the location and spatial scale of aggregations of each beetle species over the hillside. Clusters of high and low G(z) values were mapped to indicate the species' functional heterogeneity compared with habitat heterogeneity determined by landform, soils or grazing management. The small number of large aggregations indicated the sensitivity of certain species to patterns of landform (Calathus melanocephalus and Pterostichus adstrictus). More aggregations of smaller size, coinciding with the pattern of particular grazing regimes indicated species sensitive to grazing intensity and species of mammalian herbivore (Carabus problematicus and Olophrum piceum). The aggregations of Othius angustus and Philonthus decorus related to landform, and suggested these species may have been directly responding to soil moisture and patterns of trampling by grazers. The method distinguished between those species that are sensitive to land use change and those that may be affected more by climate change.

776. **Spatial dynamics of source-sink habitats: Effects on rare grassland birds.**
Perkins, D. W.; Vickery, P. D.; and Shriver, W. G.
Journal of Wildlife Management 67(3): 588-599. (2003)
NAL Call #: 410 J827; ISSN: 0022541X
Descriptors: Bachman's sparrow/ core/ dry prairie/ edge/ Florida grasshopper sparrow/ grassland birds/ habitat fragmentation/ nest success/ reproductive success/ edge effect/ endangered species/ passerines/ source-sink dynamics/ United States/ Aimophila aestivalis/ Ammodramus savannarum/ Pinus palustris
Abstract: Fragmentation and edge effects adversely affect passerines in North America, primarily by reducing territory density, reproductive success, and survival. As natural landscapes become increasingly altered and fragmented by human development, understanding the demographic parameters of remaining subpopulations is important. We wanted to determine whether remaining dry prairie fragments in central Florida, USA, were acting as population sources or sinks for 2 rare and declining sparrows: the federally endangered Florida grasshopper sparrow (Ammodramus savannarum floridanus) and the regionally threatened Bachman's sparrow (Aimophila aestivalis). We obtained sparrow survival estimates from 2 sites in central Florida and combined these with productivity, estimates from 3 sites (1996-1998) to determine whether each site was acting as a source or sink. We also explored whether subunits within a site consistently functioned as sources. For Florida grasshopper sparrows, we found that core areas >400 m from edge were consistently sources. We think that the only way Florida grasshopper sparrows can persist at these sites is if the core source areas produce enough surplus young to compensate for the sink habitat along the wide borders of these prairie fragments. In contrast to grasshopper sparrows, we found no consistent source areas for Bachman's sparrows. Dry prairie seems to be sink habitat for Bachman's sparrows, and this species is likely to persist in this habitat only through continued recruitment from adjacent long-leaf pine (Pinus palustris) stands. We think that large prairie fragments, possibly >4,000 ha, are necessary for maintaining source habitat for Florida grasshopper sparrows and possibly other grassland bird species.

777. **Spatial heterogeneity of low-density populations of Melanoplus sanguinipes (Orthoptera: Acrididae) associated with grazing and vegetation treatments.**
Fielding, Dennis J.; Brusven, M. A.; Shafii, Bahman; and Price, William J.
Canadian Entomologist 133(6): 843-855. (2001)
NAL Call #: 421 C16; ISSN: 0008-347X
Descriptors: commercial activities/ ecology/ population dynamics/ terrestrial habitat/ abiotic factors/ physical factors/ land and freshwater zones/ Melanoplus sanguinipes (Saltatoria): farming and agriculture/ livestock grazing/ population density/ low density populations/ distribution within habitat/ spatial heterogeneity of low density populations/ grassland/ climate and weather/ Idaho/ spatial distribution of low density populations/ effects of grazing and vegetation/ rangelands/ Saltatoria/ Orthoptera/ Insecta/ arthropods/ insects/ invertebrates

Abstract: The objectives of this study were to determine whether the spatial distribution of Melanoplus sanguinipes F., the most abundant species of grasshopper on rangeland in southern Idaho, varied annually in response to changing patterns of grazing and to investigate how vegetation affects the spatial distribution of low-density populations of M. sanguinipes at scales relevant to most rangeland-management activities. A lattice of 72 sites was established across nine pastures, covering approximately 5000 ha. At each site, densities of M. sanguinipes, percent canopy coverage by plant species, and percent forage utilization by livestock were estimated twice per year, in June when M. sanguinipes was in the nymphal stage and in August during the adult stage, for 4 years, 1991-1994. Spatial analyses of variance were used to evaluate the influence of grazing and vegetation type on densities of M. sanguinipes. In August of each year, densities of M. sanguinipes were lower on heavily grazed sites than on lightly grazed sites, except in 1993, when the opposite trend was observed. Above-normal precipitation in 1993 resulted in abundant growth of annual forbs and regrowth of grazed plants. The distribution of nymphs in June of 1993 and 1994 reflected the grazing patterns of the previous summer. Densities of M. sanguinipes were lower on crested wheatgrass habitats than on annual grasslands for every sampling period from June 1991 to June 1993, after which no differences were observed. We interpret the results to suggest that grazing effects on low-density populations of M. sanguinipes were contingent on weather conditions; under dry conditions, grazed habitats were less favorable to M. sanguinipes but, during relatively cool wet summers, grazing created conditions that were more favorable to M. sanguinipes.

778. **Spatial models of northern bobwhite populations for conservation planning.**
Twedt, D. J.; Wilson, R. R.; and Keister, A. S.
Journal of Wildlife Management 71(6): 1808-1818. (Aug. 2007)
NAL Call #: 410 J827
Descriptors: simulation models/ conservation areas/ Colinus virginianus/ wild birds/ quails/ spatial data/ conservation programs/ wildlife management/ wildlife habitats/ population dynamics/ land use change/ habitat conservation/ spatial distribution/ surveys/ grasslands/ agricultural land/ prediction/ population ecology/ remote sensing/ Louisiana/ Arkansas/ Texas/ Oklahoma/ natural resources, environment, general ecology, and wildlife conservation/ animal ecology and behavior
This citation is from AGRICOLA.

779. **Spatial responses of bobolinks (Dolichonyx oryzivorus) near different types of edges in northern Iowa.**
Fletcher, R. J. and Koford, R. R.
Auk 120(3): 799-810. (2003)
NAL Call #: 413.8 AU4 ; ISSN: 00048038
Descriptors: edge effect/ habitat fragmentation/ hypothesis testing/ passerines/ spatial distribution/ United States/ Dolichonyx oryzivorus
Abstract: Habitat edges are well-studied components of fragmented landscapes, yet factors mediating edge effects remain unclear. We report how different types of edges surrounding patches may affect spatial distributions of Bobolink (Dolichonyx oryzivorus), a declining, area-sensitive songbird that breeds in grasslands. We expected Bobolinks to be less abundant near edges, and we investigated a set of alternative hypotheses for explaining that spatial pattern: (1) passive displacement, in which individuals do not avoid edges but use edges as boundaries for territories; (2) habitat gradients, in which individuals respond to habitat structure gradients near edges; (3) territory size, in which size of territories increases near edges; and (4) active avoidance, in which individuals actively avoid edges by positioning territory boundaries away from edges. To examine those hypotheses, we surveyed Bobolinks in grassland habitats near 34 edges of three different edge types (agriculture, road, and woodland) in northern Iowa, 1999-2000. Bobolink density was lower near woodland edges than near other edge types, and density increased as a function of distance from edge for all edge types. There was no evidence for a habitat gradient close to edges, but there was some evidence for habitat structure differing among edge types. Territory size increased near roads, decreased near woodlands, but did not change near agricultural edges. Territory positioning was consistent with active avoidance near woodland edges, and to a lesser extent road edges, but positioning was only consistent with passive displacement near agriculture edges. We conclude that land use surrounding patches can have variable effects on territorial dynamics and habitat use of this area-sensitive species. Linking edge avoidance with fitness is needed to understand the demographic consequences of those responses for species in fragmented landscapes.

780. **Species diversity and habitat of grassland passerines during grazing of a prescribe-burned, mixed-grass prairie.**
Danley, Robert F.; Murphy, Robert K.; and Madden, Elizabeth M.
Western North American Naturalist 64(1): 72-77. (2004)
NAL Call #: QH1.G7; ISSN: 1527-0904
Descriptors: prescribed burning: applied and field techniques/ rotation grazing: applied and field techniques/ grazing/ habitat management/ mixed grass prairie: prescribe burned/ species diversity/ stocking rates
Abstract: No published data exist on responses of grassland passerines and their habitat to combined grazing and burning treatments in northern mixed-grass prairie. At Lostwood National Wildlife Refuge (LNWR) in northwestern North Dakota, we monitored breeding bird occurrence, abundance, and habitat during successive annual grazing treatments (1998-2000) on 5 prescribe-burned, mixed-grass prairie management units (range=50-534 ha, each burned 3-6 times in the previous 10-20 years). All breeding passerine species characteristic of upland, northern mixed-grass prairie were common (>10% occurrence) during at least 1 of 3 years on burned and grazed units, except Chestnut-collared Longspur (Calcarius ornatus), which was uncommon. Vegetation was generally shorter and sparser than that found on 4 nearby units treated by fire only (1999; density, visual obstruction, and height, all P<0.01). Regardless, occurrences of individual bird species resembled those previously documented on prairie units at LNWR with similar fire histories but no grazing; however, Brown-headed Cowbird (Molothrus ater) occurred 2.4 times more frequently on burned and grazed units studied. Our data suggest that species diversity of breeding grassland

passerines changes little during initial years of rotation grazing at moderate stocking rates in fire-managed, northern mixed-grass prairie at LNWR.

781. **Species richness and California voles in an annual and a perennial grassland.**
Fehmi, Jeffrey S. and Bartolome, James W.
Western North American Naturalist 62(1): 73-81. (2002)
NAL Call #: QH1.G7; ISSN: 1527-0904
Descriptors: Microtus californicus/ Cricetidae/ Rodentia/ Muridae/ grazing/ California vole/ grasslands/ California
Abstract: Populations of a common burrowing rodent, Microtus californicus (the California vole), thrive in ungrazed or lightly grazed grasslands in coastal California. Two sites ungrazed by livestock, one dominated by native perennial grasses and another dominated by invasive annuals, were evaluated over 2 consecutive years for the relationship between plant species richness and location of M. californicus burrow entrances (burrows). Plant species and burrows were sampled as present or absent in contiguous 1-m^2 quadrats on a 100-m^2 grid. Quadrats with burrows averaged significantly more plant species than quadrats without them (11.3 vs. 9.9 species, $P < 0.001$). Burrows found in 1996 were not correlated with species richness in 1995, suggesting that voles affect richness rather than seek it out. Vole burrow locations showed significant clumping on the annual site and trended toward clumping on the perennial site in both 1995 and 1996. Because voles seem to create a clumped pattern with their burrow entrances, the associated increase in plant species richness may have a strong effect on the overall structure of the plant community. A quantitative comparison of the 2 sites showed that the plant matrix of the perennial site contained flora of the annual site. This similarity in plant species composition may allow for similar treatment of our 2 types of sites and potentially other California grass-lands. Undetected increases in vole populations with livestock grazing reduction may account for the erratic results from grasslands management research and the inconsistent success of derived management practices.

782. **Species traits as predictors of lepidopteran composition in restored and remnant tallgrass prairies.**
Summerville, Keith S.; Conoan, Christopher J.; and Steichen, Renae M.
Ecological Applications 16(3): 891-900. (2006)
NAL Call #: QH540.E23 ; ISSN: 1051-0761
Descriptors: conservation measures/ terrestrial habitat/ land zones/ Lepidoptera: habitat management/ habitat restoration/ tallgrass prairies/ species trait analysis use/ community structure/ restored and remnant tallgrass prairies/ species trait analysis and conservation significance/ grassland/ restored and remnant habitats/ Iowa/ Insecta/ arthropods/ insects/ invertebrates/ Lepidopterans
Abstract: Restoration ecologists are increasingly turning to the development of trait-filter models, which predict how evolved traits limit species membership within assemblages depending on existing abiotic or biotic constraints, as a tool to explain how species move from a regional species pool into a restored community. Two often untested assumptions of these models, however, are that species traits can reliably predict species' broadscale distribution and that the effects of traits on community membership do not vary between restored and remnant habitats. The goals of this study were to determine whether combinations of ecological traits predispose moth species toward recolonization of restored prairies and to assess the degree to which restored prairies contain moth assemblages comparable with prairie remnants. In 2004, we collected 259 moth species from 13 tallgrass prairie remnants and restorations in central Iowa. Principal components analysis (PCA) was used to identify significant combinations of ecological traits that were shared by groups of moth species. Logistic regression was then employed to test for significant effects of the trait combinations on the frequency of prairie sites occupied by moth species. PCA partitioned moth traits into four axes that explained a total of 81.6% of the variance. Logistic regression detected significant effects for all four PCA axes on the fraction of sites occupied by moths. Species frequently filtered from the regional species pool into prairies were those that had long flight periods and were multivoltine, displayed a feeding preference for legumes but not other forb families, and were regionally abundant but relatively small in body size. Ordination revealed significant differences in moth communities among prairies, suggesting that species traits and habitat characteristics likely interact to create observed patterns of species recolonization of restorations. Thus, the optimal approach to restoring the lepidopteran fauna of tallgrass prairies may involve locating prairie plantings adjacent to habitat remnants.

783. **Spring livestock grazing affects crested wheatgrass regrowth and winter use by mule deer.**
Austin, D. D.; Urness, P. J.; and Fierro, L. C.
Journal of Range Management 36(5): 589-593. (1983)
NAL Call #: 60.18 J82 ; ISSN: 0022-409X.
http://jrm.library.arizona.edu/Volume36/Number5/azu_jrm_v36_n5_589_593_m.pdf
Descriptors: Utah/ grazing/ mule deer/ forage/ livestock
This citation is from AGRICOLA.

784. **Status, ecology, and conservation of the southwestern willow flycatcher.**
Finch, Deborah M. and Stoleson, Scott H.; U.S. Forest Service Rocky Mountain Research Station General Technical Repor RMRS-GTR 60, 2000.
http://www.fs.fed.us/rm/pubs/rmrs_gtr60.pdf
Descriptors: southwestern willow flycatcher/ endangered species/ riparian/ Southwest/ exotic woody plants/ rivers/ recovery/ habitat restoration/ neotropical migratory birds/ brown-headed cowbird
Abstract: The goal of this document is to describe the current status, ecology, habitat, and threats of the southwestern willow flycatcher (Empidonax traillii extimus); to offer guidance for managing and protecting this Neotropical migrant and its habitats; and to identify gaps in our knowledge of the bird and its requirements.

785. **The status, habitat, and response to grazing of water vole populations in the Big Horn Mountains of Wyoming, U.S.A.**
Klaus, Marion
Arctic Antarctic and Alpine Research 35(1): 100-109. (2003)
NAL Call #: GB395.A73; ISSN: 1523-0430
Descriptors: USDA Forest Service/ altitude/ bank structure/ channel types/ conservation status/ creeks/ dry weight biomass/ grazing responses/ habitat profiles/ habitat requirements/ historical records/ percent plant cover/ precipitation/ riparian environments/ soils/ species abundance/ stream depth/ temperature
Abstract: Microtus richardsoni, the water vole, was listed as a sensitive species in Region 2 of the USDA Forest Service in 1994. Historical records indicate water voles were found in the Big Horn Mountains, but little was known about their current status. The purpose of this study was to locate water voles in the Big Horn Mountains of Wyoming, develop a habitat profile, and evaluate the extent to which livestock grazing affects them. Accessible creeks with habitat requirements for water voles were surveyed. Water voles were not captured below 2440 m. Grazed and ungrazed sites occupied by water voles were matched and analyzed for percent plant cover, dry weight biomass, riparian classification, mean stream depth, channel type, elevation, precipitation, and temperature. Capture success was significantly greater in ungrazed areas. Percent cover by ferns and thallophytes was significantly greater in areas where water voles were more abundant, and bare ground was significantly greater at grazed locations. Water voles were most abundant on Rosgen B or E streams with a willow/wet Carex riparian class that is found on relatively undisturbed sites with stable, well-developed soils and bank structure. In the Big Horn Mountains, water vole captures were low in comparison to the Beartooth Mountains and synergistic effects of grazing and drying might negatively impact this species.

786. **Status of the regal fritillary (Speyeria idalia) and effects of fire management on its abundance in northeastern Kansas, USA.**
Powell, Alexis F.; Busby, William H.; and Kindscher, Kelly
Journal of Insect Conservation 11(3): 299-308. (2007)
NAL Call #: QL362.J68; ISSN: 1366-638X
Descriptors: conservation measures/ ecology/ population dynamics/ terrestrial habitat/ abiotic factors/ physical factors/ land zones/ Speyeria idalia: habitat management/ fire management effect on distributional status/ endangered status/ Conservation status/ fire management relationships/ population density/ grassland/ prairie habitat/ distributional status in relation to fire management/ fire/ Kansas/ Insecta, Lepidoptera, Glossata, Heteroneura, Papilionoidea, Nymphalidae/ arthropods/ insects/ invertebrates/ Lepidopterans
Abstract: The Regal Fritillary (Speyeria idalia), which once occupied prairies and meadows in North America from the upper Great Plains to the Atlantic coast, has disappeared in recent decades from nearly the entirety of the eastern half of its range and has declined westward. In the Great Plains, where the species is limited to native prairie remnants, several large populations are thought to exist, but patterns of occurrence and abundance in the region have not been described in detail. We surveyed prairies within a three county area of northeastern Kansas using distance-sampling along line transects and found Regal Fritillaries present at 70 of 87 sites. Population density varied considerably among sites but was generally much higher at those that had not been burned in the past year. Despite the loss of >99% of its original prairie landcover and the small sizes of remnants ($\bar{x}$ = 7.1 ha) we estimate that our study area supports a globally significant population of ≃12,000 adult individuals. Given the rapidity of decline of Regal Fritillary populations elsewhere, this study establishes important population benchmarks and a practical protocol for future monitoring efforts.

787. **A stewardship approach to grassland bird habitat conservation in Saskatchewan, Canada.**
Davis, Stephen K; Springer, Bob; Lohmeyer, Jennifer; Hall, Lesley; and Harrison, Tom
In: Bird Conservation Implementation and Integration in the Americas: Proceedings of the Third International Partners in Flight Conference, General Technical Report-PSW 191/ Ralph, C. J. and Rich, T. D.; Albany, CA: Pacific Southwest Research Station, Forest Service, U.S. Department of Agriculture, 2005. pp. 1198-1200.
Notes: Volume 2; Responsibility: Pacific Southwest Research Station; U.S. Forest Service General Technical Report series; ISSN: 0196-2094; Conference held 2002 March 20-24 in Asilomar, California.
http://www.fs.fed.us/psw/publications/documents/psw_gtr191/Asilomar/pdfs/1198-1200.pdf
Descriptors: conservation measures/ terrestrial habitat/ land zones/ Canada/ Aves/ habitat management/ grassland conservation/ grassland/ stewardship/ habitat conservation/ Saskatchewan/ birds/ chordates/ vertebrates

788. **Study looks at small mammal populations in restored fields.**
Schottler, Shawn
Grasslands 12(2): 4-5. (2002); ISSN: 1540-6857
Descriptors: wildlife management: conservation/ restored field habitat: small mammal populations/ tallgrass prairie

789. **Suppression of grasshoppers in the Great Plains through grazing management.**
Onsager, J. A.
Journal of Range Management 53(6): 592-602. (2000)
NAL Call #: 60.18 J82 ; ISSN: 0022-409X.
http://jrm.library.arizona.edu/Volume53/Number6/azu_jrm_v53_n6_592_602_m.pdf
Descriptors: Melanoplus sanguinipes/ insect control/ rotational grazing/ canopy/ rain/ heat sums/ biomass/ prairies/ Agropyron cristatum/ population density/ Acrididae/ mortality/ life cycle/ range management/ North Dakota
This citation is from AGRICOLA.

790. **Survey of CRP and other grasslands in the northeastern USA.**
Adler, Paul R; Sanderson, Matt A.; and Goslee, Sarah C.
In: 88th Annual Meeting of the Ecological Society of America. Savannah, GA.; Vol. 88: 6.; 2003.
Notes: Conference held jointly with the International Society for Ecological Modeling - North American Chapter.

Descriptors: conservation/ terrestrial ecology: ecology, environmental sciences/ Whittaker plot technique/ applied and field techniques/ Conservation Reserve Program [CRP]/ Wildlife Habitat Incentives Program [WHIP]/ biomass yield/ crop production potential/ grassland ecosystems/ intersite variability/ mine reclamation/ resource management/ soil properties/ spatial scales/ species composition/ species richness/ switchgrass fields
Abstract: Grassland ecosystems are important wildlife habitat and have the potential to be a significant component of the new biobased economy. Most currently established grasslands in the Northeastern USA are on land with marginal crop production potential. Little is known about the plant composition or amount of biomass produced on these grasslands. To assemble a database for the resource assessment of warm season grasslands in the Northeastern USA we determined plant species composition at multiple scales using the modified Whittaker plot technique, measured various soil properties, and quantified biomass yield on CRP, WHIP, mine reclamation, and other grasslands. A total of 22 grasslands were sampled in New York, Pennsylvania, New Jersey, Maryland, and Virginia during September and October 2002. We identified over 180 different plant species across the study region. Species richness was about 35 and biomass was about 6000 kg/ha, but both were quite variable by site. Although biomass yields were substantially lower than have been reported for monotypic switchgrass fields, minimal inputs may substantially increase the yields.

791. **Surveys and investigations projects as required by federal aid in Wildlife Restoration Act, Missouri.**
Kurzejeski, E. W.
Columbia, MO: Missouri Dept. of Conservation; PB97170112XSP, 1996. 64 p.
Notes: Final Report; Includes Study No. 1, Job No. 1, and Job No. 2; Sponsored by Fish and Wildlife Service, Washington, DC.
http://www.monwtf.org/attitudesurvey.pdf
Descriptors: grasses/ population/ reproduction biology/ birds/ vegetation/ Missouri/ Conservation Reserve Program/ medicine/ biology/ ecology/ zoology/ natural resources and earth sciences/ natural resource management
Abstract: During 1993-1995, we monitored vegetative conditions and avain abundance, composition, and productivity on 8 blocked sites in northern Missouri containing CP1 (cool-season grass), CP2 (warm-season grass), and rowcrop fields. Total bird abundance (P less than 0.0001 in 1994), grassland bird abundance (P less 0.05 in 1994 and 1995), nest density (P less than 0.001 each year), and number of nesting species (P less than 0.05 each year) were all lower on crop fields than on CRP fields. The bird community using crop fields markedly differed from that of CRP fields, with short-grass and open-ground feeding birds predominant on crop fields. Grassland bird species richness (P equals 0.057 in 1993, P less than 0.0001 each year), Henslow's sparrows (Ammodramus henslowii) (P less than 0.001 in 1993 and 1995), meadowlarks (Sturnella spp.) P less than .01 in 1993 and 1995, and American goldfinches (Carduelis tristis) (P less than 0.01 in 1994 and 1995) were higher on the structurally diverse than on CP2 fields. CP2 fields were tall, dense warm-season grass monocultures having higher abundances of red-winged blackbirds (Agelaius phoeniceus) (P less than 0.05 in 1994) and common yellowthroats (Geothylpis trichas) P less than 0.001 each year than CP1 fields. Difference in nesting success and nest densities of species between CP1 and CP2 fields, although rarely significant, were similar to those of relative abundance. The conservation value of CRP fields for declining grassland bird species was higher for CP1 fields than for CP2 fields; species of concern were either more abundant in both CP types. Monotypic stands of both warm-season and cool-season grasses should be avoided to increase the potential wildlife benefits of CRP and other idle grassland habitats.

792. **Tallgrass prairie amphibian and reptile assemblage. Fire mortality.**
Frese, Paul W.
Herpetological Review 34(2): 159-160. (2003); ISSN: 0018-084X
Descriptors: Thamnophis sirtalis/ Terrapene ornata/ Terrapene carolina/ Ophisaurus attenuatus/ Opheodrys aestivus/ Lampropeltis calligaster/ Elaphe obsoleta/ Coluber constrictor/ Bufo americanus/ wildlife-habitat relationships/ prairies/ mortality/ habitat management/ habitat alterations/ grasslands/ fires-burns/ ecosystems/ amphibians and reptiles/ American toad/ box turtle/ ornate box turtle/ slender glass lizard/ racer/ rat snake/ prairie kingsnake/ rough green snake/ common garter snake/ Missouri: Dade County
Abstract: The tallgrass prairie in Dade County, Missouri was surveyed for evidence of vertebrate mortality resulting from a prescribed burn conducted on 28 October 1999. A total of 72 individual herps, consisting of eight species of reptiles and one species of amphibian were observed. Twenty-nine individuals were found alive and 43 dead. Several T. carolina and T. ornata were found in formerly brushy draws after the burn. Higher reptile mortality was caused due to stimulated reptile activity because of four days of warm weather preceding the burn date and temperatures >20 degrees on 28 October. It was observed that to avoid high reptile mortality the prescribed burns should be implemented during cool and overcast periods.

793. **Tallgrass prairie management and bird nest success along roadsides.**
Shochat, E.; Wolfe, D. H.; Patten, M. A.; Reinking, D. L.; and Sherrod, S. K.
Biological Conservation 121(3): 399-407. (2005)
NAL Call #: S900.B5; ISSN: 00063207.
Notes: doi: 10.1016/j.biocon.2004.05.012.
Descriptors: livestock grazing/ nest placement/ Oklahoma/ prescribed fire/ survival analysis/ habitat conservation/ nesting/ prairie/ roadside environment/ wildlife management/ Arthropoda/ Aves
Abstract: The attributes of roadside vegetation, an important bird habitat in grassland ecosystems, have been shown to affect bird abundance, distribution composition, and diversity, yet there are relatively few works on reproductive success of birds nesting along roadsides. Because roadsides are linear habitats, management at the landscape scale can affect nest success in roadsides through bottom-up and top-down effects. In northeastern Oklahoma tallgrass prairie is subjected annually to prescribed spring fires. In the short term fires can alter both arthropod abundance and predator access to nests. We

explored effects of burning on bird nest success with a five-year study along roads that traversed tallgrass prairie habitat. Using data from ~1400 nests of 23 species, we generated nest survival curves for groups of altricial species defined by nest substrate (ground, shrub, tree, or culvert). We then determined if these curves were affected by management practice (spring burning), food abundance (arthropod biomass), and habitat attributes (tree density and height). Nest substrate had a large effect on nest success: despite their shorter nest exposure period, ground nests were least successful and culvert nests were most successful. An increase in arthropod biomass following burning was possibly the cause for the increased nest success in burned plots, regardless of substrate, suggesting bottom-up control. Tree height and nest height were correlated positively with nest success, whereas tree density had no effect. Conversely, nest predation rates were correlated negatively with nest success, with ground nests experiencing the highest predation, culvert nests the lowest. Our results suggest that burning may increase nest success through bottom-up processes, but some species may not benefit from the increase in food abundance as a result of a concomitant increase in predation.

794. **Tallgrass Prairie Restoration in southeast Kansas.**
Cully, A. C.; Cully, J. F.; and Hynek, A.
Kansas Wildlife and Parks (2001); ISSN: 0898-6975
Descriptors: tall grass prairie/ habitat management/ fescue/ grassland grazing/ cattle/ fertilization, soil and water/ burning/ transect survey/ abundance/ exotic species/ plants, miscellaneous/ land, military/ vegetation/ sampling/ Kansas
Abstract: Cattle were removed from allotments as leases expired, and a program of spring burning was implemented. Vascular plant species composition of these experimental treatment pastures were compared to currently grazed pastures and ungrazed but mowed pastures. Objectives were to determine if a combinatioin of cessation of fertilizer application, grazing removal, and burning would result in the reestablishment of tallgrass prairie plant species over a relatively short period of time. Study was conducted at the Kansas Army Ammunition Plant in southeast Kansas.

795. **The technology of bobwhite management: The theory behind the practice.**
Guthery, F. S.
Ames, IA: Iowa State Press; 215 pp. (2002)
Descriptors: animal ecology/ animal husbandry/ animal physiology/ endangered species/ game birds/ habitats/ mathematical models/ population dynamics/ reference works/ wild animals/ wildlife conservation/ wildlife management/ Colinus virginianus
Abstract: This book elaborates on the management of northern bobwhites (Colinus virginianus), stressing theory-based management technologies. Population declines that started in the 1880s prevail over approximately three-fourths of the original range of C. virginianus in the United States, indicating the threat of extinction. The different chapters discuss the bioenergetic and biophysical properties of bobwhites as well as their water requirements, a mathematical model to determine energy-based carrying capacity for subsequent application in the theory of habitat management, population dynamics of the species from a continental perspective, and demographic aspects in relation to the theory and practice of harvest management and population viability. Theories of habitat and habitat management are addressed.

796. **Teetering on the edge or too late? Conservation and research issues for avifauna of sagebrush habitats.**
Knick, S. T.; Dobkin, D. S.; Rotenberry, J. T.; Schroeder, M. A.; Vander Haegen, W. M.; and Van Riper, C.
Condor 105: 611-634. (2003)
NAL Call #: QL671.C6.
http://sagemap.wr.usgs.gov/docs/Condor_105p611-634.pdf
Descriptors: birds/ sagebrush/ habitats/ land use/ agriculture/ environmental impact
Abstract: Degradation, fragmentation, and loss of native sagebrush (Artemisia spp.) landscapes have imperiled these habitats and their associated avifauna. Historically, this vast piece of the Western landscape has been undervalued: even though more than 70% of all remaining sagebrush habitat in the United States is publicly owned, <3% of it is protected as federal reserves or national parks. We review the threats facing birds in sagebrush habitats to emphasize the urgency for conservation and research actions, and synthesize existing information that forms the foundation for recommended research directions. Management and conservation of birds in sagebrush habitats will require more research into four major topics: (1) identification of primary land-use practices and their influence on sagebrush habitats and birds, (2) better understanding of bird responses to habitat components and disturbance processes of sagebrush ecosystems, (3) improved hierarchical designs for surveying and monitoring programs, and (4) linking bird movements and population changes during migration and wintering periods to dynamics on the sagebrush breeding grounds. This research is essential because we already have seen that sagebrush habitats can be altered by land use, spread of invasive plants, and disrupted disturbance regimes beyond a threshold at which natural recovery is unlikely. Research on these issues should be instituted on lands managed by state or federal agencies because most lands still dominated by sagebrush are owned publicly. In addition to the challenge of understanding shrubsteppe bird-habitat dynamics, conservation of sagebrush landscapes depends on our ability to recognize and communicate their intrinsic value and on our resolve to conserve them.

797. **Temporal-spatial distribution of American bison (Bison bison) in a tallgrass prairie fire mosaic.**
Schuler, Krysten L.; Shaw, James H.; Maichak, Eric J.; and Leslie, David M.
Journal of Mammalogy 87(3): 539-544. (2006)
NAL Call #: 410 J823; ISSN: 0022-2372
Descriptors: Artiodactyla/ Bovidae/ Bison bison/ age distribution/ behavior/ distribution/ habitat use/ floral richness/ grasslands/ ecosystems/ land zones/ Oklahoma/ Pawhuska/ population composition/ status/ prairie vegetation/ social behavior/ structural complexity/ tall grass prairie/ tallgrass prairie fire mosaic/ temporal spatial distribution/ terrestrial ecology/ fire/ patch-burn mosaic/ season/ dispersion/ habitat/ prairie/ group size

Abstract: Fire and bison (Bison bison) are thought to be historically responsible for shaping prairie vegetation in North America. Interactions between temporal-spatial distributions of bison and prescribed burning protocols are important in current restoration of tallgrass prairies. We examined dynamics of bison distribution in a patch-burned tallgrass prairie in the south-central United States relative to bison group size and composition, and burn age and temporal distribution. Bison formed larger mixed groups during summer and smaller sexually segregated Groups the rest of the year, and bison selected dormant-season bum patches in the 1st postfire growing season most often during spring and summer. Large bison herds selecting recently burned areas resulted in seasonally variable and concentrated grazing pressure that may substantially alter site-specific vegetation. These dynamics must be considered when reintroducing bison and fire into tallgrass prairie because variable outcomes of floral richness and structural complexity are likely depending on temporal-spatial distribution of bison.

798. **Texas landowner perceptions regarding ecosystem services and cost-sharing land management programs.**
Olenick, Keith L.; Kreuter, Urs P.; and Conner, J. Richard
Ecological Economics 53(2): 247-260. (2005)
NAL Call #: QH540.E26 ; ISSN: 0921-8009
Descriptors: terrestrial ecology: ecology, environmental sciences/ agriculture/ economics/ wildlife habitat/ carbon sequestration/ ecosystem service/ water yield/ landowner perception/ cost sharing land management program
Abstract: Publicly funded management programs can enhance important ecological services including watershed functions, wildlife habitat, and carbon sequestration. A mail survey was conducted in 2003 in the Western Edwards Aquifer area of Texas to assess landowner perceptions regarding the supply of ecological services from rangelands and their willingness to participate in various land management programs aimed at enhancing such services, which are receiving increasing public consideration. In general, landowners favorably viewed programs that would reduce woody plant (brush) cover in an effort to increase water yields or to improve wildlife habitat, but they disapproved of programs that would encourage the proliferation of woody plants in an attempt to increase atmospheric carbon sequestration. In addition, whether land management programs were voluntary or mandatory had a much greater influence on the level of landowner willingness to participate in programs than the availability of publicly funded cost-sharing. Three-fourths of respondents indicated they would be willing to enroll in cost-sharing brush management programs, and most viewed short-term (5-10 year) performance contracts as the most acceptable legal instrument for participating. To deal with ecosystem trade-offs resulting from woody plant management, we recommend that publicly funded programs aimed at enhancing ecosystem services through effective woody plant management should be flexible. In addition, we recommend the promotion of ecosystem level planning for such programs and cooperative management strategies for landowners participating in such program in order to maximize the effectiveness of associated public investments. © 2004 Elsevier B.V. All rights reserved.

799. **Total plasma protein and renesting by greater sage-grouse.**
Gregg, M. A.; Dunbar, M. R.; Crawford, J. A.; and Pope, M. D.
Journal of Wildlife Management 70(2): 472-478. (2006)
NAL Call #: 410 J827; ISSN: 0022541X
Descriptors: age/ blood chemistry/ Centrocercus urophasianus/ dietary protein/ greater sage-grouse/ maternal condition/ nest initiation date/ nest predation/ nutrition/ renesting/ total plasma protein
Abstract: Greater sage-grouse (Centrocercus urophasianus) population declines have been attributed to reduced productivity. Although renesting by sage-grouse may contribute significantly to annual productivity during some years, little information is available on this aspect of sage-grouse reproductive ecology. We investigated the relationship between total plasma protein, age of hen, time of first nest initiation, and time of first nest loss on occurrence of renesting. We captured, assigned age, extracted blood, and radiomarked prelaying, female sage-grouse on 4 study areas during 1999-2004. We monitored radiomarked females from mid-April through June to identify period of nest initiation (early, mid, or late), nest loss (early or late), and renesting activity. We only considered hens that were available to renest (n = 143) for analysis, and we censored those that nested successfully or died during their first nest attempt. Depredation and abandonment accounted for 85% (122/143) and 15% (21/143) of the unsuccessful first nests, respectively. The proportion of hens renesting was 34% (48/143) across all study areas and years. Akaike's Information Criterion model selection indicated that occurrence of renesting varied by age, nest initiation period, nest loss period, and total plasma protein. The best model had low predictive power for any given hen (r^2 = 0.296), but validation of the best model indicated that our predictor variables were important for distinguishing renesting status and likely explained substantial temporal and spatial variation in renesting rates. A greater proportion of adults than yearlings renested, and hens that nested early in the nesting season and lost nests early during incubation were the most likely to renest. Hens that renested had greater total plasma protein levels than non-renesting hens independent of age, nest initiation period, and nest loss period. Because sage-grouse depend on exogenous sources of protein for reproduction, land management practices that promote high-quality, prelaying hen habitat could increase dietary protein intake and sage-grouse renesting rates.

800. **Trap-revealed microhabitat use by small mammals in monoculture grasslands.**
Davis, S. S.; Mitchell, R. B.; and Demarais, S.
Texas Journal of Science 52(3): 195-200. (2000)
NAL Call #: 470 T31; ISSN: 00404403.
Notes: Address: Mitchell, R.B.; Department of Range; Wildlife and Fisheries Management; Texas Tech University Lubbock, TX 79409-2125, United States; email: rob.mitchell@ttu.edu.
Descriptors: Chaetodipus hispidus/ Eragrostis curvula/ Peromyscus maniculatus/ Reithrodontomys megalotis
Abstract: This study was conducted to determine if microhabitat differences in canopy cover of weeping lovegrass (Eragrostis curvula) monoculture grasslands influenced presence of small mammals. Canopy cover of

weeping lovegrass was measured at 12 trapping grids of 100 traps each. Traps were pooled and separated into four categories (0 to 25%, 26 to 50%, 51 to 75% and 76 to 100%) based on percentage of weeping lovegrass canopy cover at each trap location. First captures of small mammals were analyzed using the chi square test statistic. Four species, cotton rat (Sigmodon hispidus; n = 100), western harvest mouse (Reithrodontomys megalotis; n = 173), hispid pocket mouse (Chaetodipus hispidus; n = 28), and deer mouse (Peromyscus maniculatus; n = 41) were captured in sufficient numbers for statistical comparison. Captures for P. maniculatus and C. hispidus differed from the expected distribution of captures (X^2, 3 df, P ≤ 0.01) with more captures in open trap sites and fewer captures in sites with increased cover. In contrast, captures for and hispidus and R. megalotis differed from the expected distribution (X2, 3 df, P ≤ 0.001) with more captures in densely vegetated trap sites and fewer captures in open trap sites. Canopy cover appears to influence small mammal microhabitat selection during the spring in weeping lovegrass monocultures. Land management decisions which affect microhabitat characteristics may impact small mammal community structure.

801. **Tree and shrub invasion in northern mixed-grass prairie: Implications for breeding grassland birds.**
Grant, Todd A.; Madden, Elizabeth; and Berkey, Gordon B.
Wildlife Society Bulletin 32(3): 807-818. (2004)
NAL Call #: SK357.A1W5; ISSN: 0091-7648
Descriptors: Populus tremuloides/ Aves/ communities/ grasslands/ ecosystems/ habitat management/ J. Clark Salyer National Wildlife Refuge/ North Dakota/ conservation/ wildlife management/ habitat use/ land zones/ aspen woodland/ fragmentation/ grassland birds/ mixed-grass prairie/ woody vegetation/ birds/ prairie/ vegetation/ exotic species/ change in vegetation/ habitat change/ brood-egg/ forest
Abstract: North American grasslands continue to decline in quantity and quality. In the northern mixed-grass prairie, potential edge and fragmentation effects on grassland birds are poorly understood and conclusions are based largely on data from outside the region. Lands in and adjacent to J. Clark Salyer National Wildlife Refuge in north-central North Dakota comprise one of the largest contiguous patches of northern mixed-grass prairie remaining in North America. However, within the region, aspen (Populus tremuloides), willow (Salix spp.), and other woody species have increased, such that continued existence of grasslands is threatened. We examined how breeding grassland birds responded to habitat that has been variably fragmented by encroaching woody vegetation. The probability of occurrence decreased markedly for 11 of 15 bird species (including 3 endemic to the northern Great Plains) as percent woodland, tall shrub, or brush cover increased. Bird species were increasingly affected as the height of woody plants increased from brush to tall shrubs to trees. Grasslands became largely unsuitable for 9 species as woodland cover exceeded 25%. Derived models can be used by land managers to predict the outcome of management actions that alter plant community succession or that restore grasslands degraded by woody invasion.

802. **Tree invasion constrains the influence of herbaceous structure in grassland bird habitats.**
Chapman, R. N.; Engle, D. M.; Masters, R. E.; and Leslie, D. M.
Ecoscience 11(1): 55-63. (2004)
NAL Call #: QH540.E366; ISSN: 11956860
Descriptors: Eastern redcedar/ grassland birds/ Great Plains/ habitat structure/ hierarchy/ plant invasions/ woody plant encroachment/ avifauna/ biological invasion/ ecological impact/ grassland/ habitat structure/ vegetation structure/ woody plant/ Great Plains/ North America/ Juniperus virginiana
Abstract: Trees and other woody plants threaten grassland obligate birds, as well as the biological integrity of grasslands around the world. Bird species associated with grasslands of southern mixed-grass prairie of North America have declined in abundance, whereas species associated with shrub-stage and woodland habitats have increased. Recent increases in the extent of eastern redcedar (Juniperus virginiana) in the southern Great Plains of North America explain some of the change in bird assemblages in landscapes composed of patches of grassland fragmented by cropland and stands of eastern redcedar. In this study, we determined the influence of eastern redcedar, relative to the influence of structural attributes of the herbaceous layer, on bird assemblages within individual patches of grassland habitat. We indexed bird abundance within the breeding season with point counts on grassland patches with varying levels of invasion of eastern redcedar. Canopy cover of eastern redcedar explained a greater proportion of the composition of bird communities in these grasslands than structure of herbaceous vegetation. Species associated with grassland habitats generally declined in abundance, whereas species associated with shrub and woodland habitats increased as cover of eastern redcedar increased. Perhaps more important to conservation ecology, our data indicate that as canopy cover of eastern redcedar increased, variation in abundance of grassland birds decreased, indicating that canopy cover of eastern redcedar may constrain the local influence of herbaceous habitat structure on bird assemblages.

803. **Treelines between fields reduce the density of grassland birds.**
O'Leary, Charles H. and Nyberg, Dennis W.
Natural Areas Journal 20(3): 243-249. (2000)
NAL Call #: QH76.N37; ISSN: 0885-8608
Descriptors: conservation measures/ behavior/ ecology/ population dynamics/ terrestrial habitat/ man-made habitat/ land and freshwater zones/ Aves: disturbance by man/ habitat management/ field connection/ field enlargement/ treelines/ spatial patterns/ territoriality/ spatial patterns/ population decline/ treelines between fields/ population density/ nests/ distribution within habitat/ grassland/ spatial analysis/ cultivated land/ habitat fragmentation/ Illinois/ Cook County/ Poplar Creek Preserve/ grassland species/ birds/ chordates/ vertebrates

804. **Trends in abundance of grassland birds following a spring prescribed burn in southern Arizona.**
Kirkpatrick, Chris; DeStefano, Stephen; Mannan, R. William; and Lloyd, John
Southwestern Naturalist 47(2): 282-292. (2002)
NAL Call #: 409.6 So8 ; ISSN: 0038-4909
Descriptors: Zenaida macroura/ Columbiformes/ Aimophila botterii/ Aimophila cassinii/ Campylorhynchus brunneicapillus/ Pooecetes gramineus/ Passeriformes/ Picoides scalaris/ Piciformes/ Aves/ terrestrial ecology/ prescribed burning/ breeding ecology/ desert grasslands/ Arizona/ Buenos Aires National Wildlife Refuge/ communities/ fires-burns/ grasslands/ ecosystems/ habitat management/ environmental factors/ conservation/ wildlife management/ habitat use/ land zones/ birds/ habitat/ prairie/ fire/ abundance/ mourning dove/ Botteri's sparrow/ Cassin's sparrow/ cactus wren/ vesper sparrow/ ladder-backed woodpecker
Abstract: We examined short-term trends in relative abundance and species richness of breeding and wintering grassland birds before (1996) and after (1997, 1998) a prescribed burn in a mesquite-invaded, desert grassland at Buenos Aires National Wildlife Refuge, Arizona. We surveyed birds and sampled vegetation along 1-km line transects bisecting 14 (7 control, 7 burn) 25-ha plots located randomly within a burn and adjacent control unit. Following a spring burn that was moderate in intensity and patchy in areal extent, we observed that ground cover was affected more strongly by burning than mesquite (Prosopis) cover, smaller mesquite were affected more strongly by burning than larger mesquite, and mortality of mesquite was low. No change in total abundance of birds was detected on the burn unit following fire for either wintering or breeding birds; however, species richness of breeding birds decreased in the first year post-burn. During the breeding season, mourning doves (Zenaida macroura) increased, whereas Botteri's sparrows (Aimophila botterii), Cassin's sparrows (Aimophila cassinii), and cactus wrens (Campylorhynchus brunneicapillus) decreased in relative abundance following fire. During the wintering season, ladder-backed woodpeckers (Picoides scalaris) and vesper sparrows (Pooecetes gramineus) increased and cactus wrens decreased in relative abundance following fire. Beyond species-level trends, we found stronger evidence of trends and greater magnitudes of relative change for breeding species associated with open grasslands compared to those associated with shrubs. The use of spring burns on the Refuge will likely improve conditions for open-grassland species that were historically more abundant by killing smaller mesquite and reducing mesquite recruitment. However, more intense and extensive fires will be required to reduce the presence of larger mesquite. Such fires would likely have a greater impact on birds associated with shrubs, and consequently, a greater impact on the avian community as a whole.

805. **Trends in grassland bird abundance following prescribed burning in southern Arizona.**
Kirkpatrick, Christopher Kreitler. University of Arizona, 2000.
Notes: Degree: MS; Advisor: Destefano, Stephen and Mannan, R. William
Descriptors: algarrobo/ aves/ procreando/ Prosopis spp./ ecology/ agriculture/ range management
Abstract: I examined trends in relative abundance and species richness of breeding and wintering grassland birds before (1996) and after (1997, 1998) a spring prescribed burn in a mesquite-dominated desert grassland at Buenos Aires National Wildlife Refuge, Arizona. The burn was moderate in intensity, patchy in extent, and affected ground cover more strongly than shrub cover, smaller shrubs more strongly than larger shrubs, and killed 1% of velvet mesquite (Prosopis velutina). Species richness of breeding birds decreased in the first year post-burn. Of breeding species, black-throated sparrows (Amphispiza bilineata) and mourning doves (Zenaida macroura) increased; whereas Botteri's sparrows (Aimophila botterii), Cassin's sparrows (Aimophila cassinii), and pyrrhuloxias (Cardinalus sinuatus) decreased in relative abundance. Breeding species characterized as not shrub-dependent exhibited changes that were more pronounced than those for shrub-dependent species. Of wintering birds, ladder-backed woodpeckers (Picoides scalaris) and vesper sparrows (Pooecetes gramineus) increased, and cactus wrens (Campylorhynchus brunneicapillus) decreased in relative abundance.

806. **Understanding relationships between greater sage-grouse habitat and population dynamics in eastern Montana.**
Moynahan, Brendan J.; Lindberg, Mark; and Thomas, Jack Ward
Intermountain Journal of Sciences 8(4): 258-259. (2002); ISSN: 1081-3519
Descriptors: Centrocercus urophasianus/ birds/ population ecology/ status/ habitat use/ ecosystems/ sagebrush/ habitat management/ wildlife management/ habitat surveys/ study methods/ greater sage grouse/ Artemisia spp./ Aves/ Montana
Abstract: The long-term decline of greater sage grouse (Centrocercus urophasianus) over much of their historic range is of concern to managers of sagebrush (Artemisia spp.) habitats. A petition has been submitted to list the Washington population of sage grouse under the Endangered Species Act (ESA) and a range-wide listing petition is expected in the near future. That habitat quality is related to demographics of populations is a fundamental assumption of the practice of managing species via managing habitat. However, few studies explicitly acknowledge this relationship, and still fewer explicitly attempt to define this relationship on a species-specific basis. There currently is no way to reliably determine the nature of the interaction between sage grouse population status (as indicated by estimated vital rates) and habitat condition. This research will use a combination of well-establish population demography tools and state-of-the-art analysis methods to elucidate relationships between Sage-Grouse populations and habitat at six sites in eastern Montana. Mark-resight and radio telemetry methods will be employed to estimate vital rates of sage grouse populations. Sensitivity analysis will identify which rate(s) has the greatest influence on population growth rate (λ) under different habitat conditions. Habitat condition at each site will be assessed by several critical habitat characteristics. A regression approach will quantify the relationship between individual vital rates and each of the measured habitat characteristics. The research will provide

crucial information to federal and state wildlife professionals charged with managing for sage grouse and will be of particular use in the event of a petition to list sage grouse under the ESA.

807. **Upland bird research: Evaluation of livestock grazing and residual herbaceous cover on sage grouse nest success.**
Giesen, K. M. Colorado Division of Wildlife, 1995. 16 pp. Job Final Report.
Notes: Period Covered: 1 Jan. 1993 –31 Dec. 1994.
Descriptors: telemetry/ habitat/ female/ vegetation/ size/ sagebrush/ predation/ trapping/ marking/ Colorado/ Jackson County
Abstract: Six strutting grounds in North Park, Colorado (Boettcher Junction, Coalmont, Delaney Butte, Lost Creek, Raven, and Spring Creek) were selected for documentation of hen movements to nests. Nesting habitat adjacent to each study lek was identified, and nest success and causes of failures were ascertained. Vegetative structure at nest sites was measured to determine possible selection for specific nesting habitats. Grazing from a portion of the nesting habitat associated with each strutting ground studied was experimentally excluded, and subsequent nest success between nests in grazing exclosures and control areas was compared.

808. **The use of cattle as a management tool for wildlife in shrub-willow riparian systems.**
Krueger, H. O. and Anderson, S. H.
In: Riparian ecosystems and their management: Reconciling conflicting uses, General Technical Report-RM 120/ Johnson, R. Roy; Ziebell, Charles D.; Patton, David R.; Ffolliott, Peter F.; and Hamre, R. H.; Fort Collins, Colo.: Rocky Mountain Forest and Range Experiment Station, Forest Service, U.S. Department of Agriculture, 1985. pp. 300-304.
Notes: Conference held April 16-18, 1985 in Tuscon, Ariz.
NAL Call #: aSD11.A42
Descriptors: cattle/ grazing/ wildlife/ habitats/ resource management
This citation is from AGRICOLA.

809. **Use of riparian corridors and vineyards by mammalian predators in northern California.**
Hilty, J. A. and Merenlender, A. M.
Conservation Biology 18(1): 126-135. (2004)
NAL Call #: QH75.A1C5; ISSN: 08888892
Descriptors: habitat corridor/ habitat fragmentation/ predation/ riparian zone/ vineyard/ California/ Sonoma County
Abstract: To address increasing fragmentation, conservation biologists have focused on protecting core habitat areas and maintaining connectivity among protected areas. Wildlife corridors, strips of relatively intact habitat designed to connect habitat fragments, may enhance connectivity, but little empirical evidence supports the idea that large mammals prefer to use corridors rather than the surrounding developed landscape. In Sonoma County, a premium wine-grape-growing region in California, we examined mammalian predator use of 21 riparian corridors classified as denuded, narrow, or wide according to the width of the remaining natural vegetation adjacent to the creek. We used unbaited, remotely triggered cameras to determine occurrence of predator species. We also monitored predator use of six vineyards, three close to core habitat and three far from core habitat, with unbaited cameras. Mammalian predator detection rates were 11-fold higher in riparian study areas than in vineyards. More native mammalian predator species were found in wide corridors than in narrow or denuded creek corridors. The number and activity level of native predators was higher in vineyards adjacent to core habitat than in vineyards farther away, where the number and activity level of non-native predators was higher. Maintaining wide and well-vegetated riparian corridors may be important in maintaining the connectivity of native predator populations to ensure their long-term survival.

810. **Using short duration grazing to accomplish wildlife habitat objectives.**
Guthery, F. S.; DeYoung, C. A.; Bryant, F. C.; and Drawe, D. L.
In: Can livestock be used as a tool to enhance wildlife habitat?, General Technical Report-RM 194/ Severson, Kieth E., ed.; Fort Collins, Colo.: Rocky Mountain Forest and Range Experiment Station, Forest Service, U.S. Department of Agriculture, 1990. pp. 41-55.
Notes: Literature review; 43rd Annual Meeting of the Society for Range Management, Reno, Nev., February 13, 1990.
NAL Call #: aSD11.A42 no. 194
Descriptors: commercial activities/ conservation measures/ ecology/ terrestrial habitat/ abiotic factors/ physical factors/ Aves/ Mammalia: farming and agriculture/ short duration grazing use as habitat management tool/ habitat management/ short duration grazing use/ population dynamics/ short duration grazing effects/ habitat management aspects/ grassland/ habitat management by short duration grazing/ aridity/ desertification reversal due to livestock watering/ conservation aspects/ birds/ chordates/ mammals/ vertebrates

811. **Variation in grasshopper (Acrididae) densities in response to fire frequency and bison grazing in tallgrass prairie.**
Joern, A.
Environmental Entomology 33: 1617-1625. (Dec. 2004)
NAL Call #: QL461.E532
Descriptors: bison grazing/ prairies/ Orthoptera/ population dynamics/ prescribed burning
Abstract: While weather can contribute significantly to grasshopper population dynamics in North American grasslands, local environmental conditions resulting from land use practices may be equally important. In this study, significant differences in grasshopper density were detected among adjacent watersheds from Kansas Flint Hills tallgrass prairie that differed in fire frequency and especially bison grazing treatments. Grasshopper densities were approximately equal to 2.5 times greater in grazed watersheds compared with ungrazed ones. Grasshopper densities also varied somewhat in response to fire frequency, mostly in species-specific ways. No treatment interactions on overall grasshopper density were detected. The effects of fire frequency and bison grazing were

implemented in part through their combined effect on the structural heterogeneity of vegetation, and other habitat characteristics. Individual grasshopper species responded uniquely to combinations of fire frequency and bison grazing. Grazing resulted in significant increases in density for seven of the nine most abundant species; fire frequency affected two species; and one species did not respond to either fire or grazing. Understanding effects of habitat on grasshopper densities provides opportunities to manage these populations for economic or conservation needs. This citation is from AGRICOLA.

812. **Vegetation and deer response to mechanical shrub clearing and burning.**
Rogers, James O.; Fulbright, Timothy E.; Ruthven, Donald C.; and Ruthven D.C.
Journal of Range Management 57(1): 41-48. (2004)
NAL Call #: 60.18 J82 ; ISSN: 0022-409X
Descriptors: Artiodactyla/ Cervidae/ Odocoileus virginianus/ brushland habitat/ burning/ burning and mechanical clearing/ fire/ food availability/ habitat management/ habitat utilization/ scrub/ Texas/ abiotic factors/ conservation/ conservation measures/ ecology/ land zones/ nutrition/ physical factors/ terrestrial habitat/ white-tailed deer/ experiment/ vegetation/ productivity/ food
Abstract: Prescribed burning is a recommended maintenance treatment following mechanical treatments of south Texas brushlands, but it is unknown whether it is preferable to additional mechanical treatments to improve habitat for white-tailed deer (Odocoileus virginianus Raf.). We tested the hypotheses that prescribed burning of aerated (top-growth removal of woody plants) plots during late summer would decrease protein-precipitating tannins in browse, increase forb biomass, and increase deer utilization compared to a second aeration. Ten patches of brush, ranging in size from 2.8-8.1 ha, were aerated during spring 1999. In late summer 2000, maintenance treatments were applied; 5 patches were burned and 5 were aerated a second time. Standing crop, nutritional quality, and tannin concentrations (browse only) of deer forages were estimated. Deer tracks crossing bulldozed lanes surrounding each patch were counted to estimate deer use. Standing crop of browse, forbs, grass, succulents, protein-precipitating tannins in browse, and track density did not differ between treatments. Based on deer use and forage biomass response, burning and a second aeration 16-17 months following an initial aeration appear to have similar effects on habitat characteristics and use of cleared patches by white-tailed deer. Because of lower cost, we recommended prescribed burning as a maintenance treatment of aerated shrublands.

813. **Vegetation cover and forb responses to cattle exclusion: Implications for pronghorn.**
Loeser, Matthew R.; Mezulis, Sharon D.; Sisk, Thomas D.; and Theimer, Tad C.
Rangeland Ecology and Management 58(3): 234-238. (2005)
NAL Call #: SF85.J67; ISSN: 1550-7424
Descriptors: commercial activities/ nutrition/ diet/ ecology/ land zones/ Antilocapra americana (Bovidae): farming and agriculture/ cattle exclusion/ fawn hiding cover/ forb availability/ food plants/ food availability/ habitat utilization/ terrestrial habitat/ rangeland habitat/ Arizona/ Anderson Mesa/ Bovidae/ Artiodactyla/ chordates/ mammals/ ungulates/ vertebrates
Abstract: Cattle grazing is often implicated as a factor that reduces vegetative cover and the abundance of important forage plants for wildlife. Recent declines in northern Arizona populations of pronghorn (Antilocapra americana Ord) have focused public and scientific attention on the factors contributing to low fawn recruitment and the potential benefits of cattle removal. To further understand the effects of cattle grazing, we studied the potential hiding cover provided by standing live and dead herbaceous matter as well as forb richness and canopy cover following 5 years of cattle removal. Cattle removal increased horizontal hiding cover by 8% at a distance of 5 in (P = 0.025), but had no statistically significant effect on the potential hiding cover at distances of 10 in (P = 0.105) or 25 in (P = 0.746). Forb species richness was 16% lower in exclosures than in an adjacent grazed pasture in 2001 (P = 0.036), but no differences were observed in 2002 (P = 0.636). The canopy cover of forbs was generally unaffected by cattle removal. These results suggest that curtailing or removing cattle is unlikely, by itself, to lead to rapid improvements in the hiding cover or forb availability for pronghorn on similar rangelands in northern Arizona. In this region, where immediate improvements in fawn survival and recruitment are important to population persistence, additional management actions should be considered.

814. **Vegetation trends in tallgrass prairie from bison and cattle grazing.**
Towne, E. G.; Hartnett, D. C.; and Cochran, R. C.
Ecological Applications 15(5): 1550-1559. (2005)
NAL Call #: QH540.E23; ISSN: 10510761
Descriptors: bison/ cattle/ grazing effects/ herbivory/ Konza Prairie (Kansas, USA)/ plant community/ species richness/ temporal heterogeneity
Abstract: Comparisons between how bison and cattle grazing affect the plant community are understood poorly because of confounding differences in how the herbivores are typically managed. This 10-year study compared vegetation changes in Kansas (USA) tallgrass prairie that was burned and grazed season-long at a moderate stocking rate by either bison or cattle. We held management practices constant between the herbivores and equalized grazing pressure by matching animals so that the total body mass in all pastures was similar each year. Trends in species cover and diversity indices in the bison and cattle pastures were compared with ungrazed prairie that also was burned annually. We found that little bluestem (Schizachyrium scoparium) cover decreased over time in bison pastures, and big bluestem (Andropogon gerardii) cover increased over time in cattle pastures. Grazing by either herbivore increased the canopy cover of annual forbs, perennial forbs, and cool-season graminoids, but both annual and perennial forb cover increased at a greater rate in bison pastures than in cattle pastures. Missouri goldenrod (Solidago missouriensis) and heath aster (Symphyotrichum ericoides) were primarily responsible for the increased forb cover in grazed pastures. Species richness at both small (10 m^2) and large (200 m^2) spatial scales increased at a greater rate in bison pastures than in cattle pastures, but richness did not change through time in ungrazed prairie. The number of annual forb species was significantly higher in bison pastures than in pastures

grazed by cattle. Residual graminoid biomass at the end of the grazing season was lower in bison pastures than in cattle pastures, whereas forb residuum increased over time at a greater rate in pastures grazed by bison than in pastures grazed by cattle. Although bison and cattle differentially altered some vegetation components, the plant communities in bison and cattle pastures were 85% similar after 10 years of grazing. We conclude that most measurable differences between bison-grazed and cattle-grazed pastures in tallgrass prairie are relatively minor, and differences in how the herbivores are typically managed may play a larger role in their impact on prairie vegetation than differences between the species. © 2005 by the Ecological Society of America.

815. **Viewpoint: The ecological value of shrub islands on disturbed sagebrush rangelands.**
Longland, William S. and Bateman, Sheryl L.
Journal of Range Management 55(6): 571-575. (2002)
NAL Call #: 60.18 J82; ISSN: 0022-409X.
Notes: Literature review.
Descriptors: conservation measures/ habitat utilization/ land zones/ comprehensive zoology: habitat management/ Disturbed sagebrush rangelands/ ecological value of shrub vegetation islands/ community structure/ biodiversity and succession in shrub vegetation islands/ implications for recovery of rangelands/ succession in habitats/ role of shrub vegetation islands/ terrestrial habitat/ sagebrush rangelands/ ecological value of shrub vegetation islands in disturbed landscapes/ conservation implications/ ecological value of shrub vegetation islands in disturbed sagebrush rangelands/ Mammalia/ chordates/ mammals/ vertebrates

816. **Vole herbivory shapes vegetation in experimental tallgrass prairie restorations (Illinois and Wisconsin).**
Howe, Henry F.
Ecological Restoration 20(4): 278-279. (2002);
ISSN: 1522-4740
Descriptors: nutrition/ ecology/ terrestrial habitat/ land zones/ Microtus pennsylvanicus: feeding behavior/ herbivory/ plant community restoration/ Illinois/ Wisconsin/ grasslands/ tallgrass prairie/ Chicago/ Morton Arboretum/ Viola/ Mammalia, Rodentia, Muridae/ chordates/ mammals/ rodents/ vertebrates

817. **A VSA-based strategy for placing conservation buffers in agricultural watersheds.**
Qiu, Z.
Environmental Management 32(3): 299-311. (2003)
NAL Call #: HC79.E5E5; ISSN: 0364152X
Descriptors: Benefit-cost analysis/ conservation buffers/ landscape planning/ variable source areas/ agriculture/ biodiversity/ environmental engineering/ flood control/ soils/ water quality/ wetlands/ agricultural landscapes/ wildlife habitats/ watersheds/ buffer/ agricultural land/ buffer zone/ landscape planning/ nonpoint source pollution/ watershed/ agriculture/ environmental protection/ watershed/ agriculture/ Conservation of natural Resources/ environment Design/ models, theoretical
Abstract: Conservation buffers have the potential to reduce agricultural nonpoint source pollution and improve terrestrial wildlife habitat, landscape biodiversity, flood control, recreation, and aesthetics, Conservation buffers, streamside areas and riparian wetlands are being used or have been proposed to control agricultural nonpoint source pollution. This paper proposes an innovative strategy for placing conservation buffers based on the variable source area (VSA) hydrology. VSAs are small, variable but predictable portion of a watershed that regularly contributes to runoff generation. The VSA-based strategy involves the following three steps: first, identifying VSAs in landscapes based on natural characteristics such as hydrology, land use/cover, topography and soils; second, targeting areas within VSAs for conservation buffers; third, refining the size and location of conservation buffers based on other factors such as weather, environmental objectives, available funding and other best management practices. Building conservation buffers in VSAs allows agricultural runoff to more uniformly enter buffers and stay there longer, which increases the buffer's capacity to remove sediments and nutrients. A field-scale example is presented to demonstrate the effectiveness and cost-effectiveness of the within-VSA conservation buffer scenario relative to a typical edge-of-field buffer scenario. The results enhance the understanding of hydrological processes and interactions between agricultural lands and conservation buffers in agricultural landscapes, and provide practical guidance for land resource managers and conservationists who use conservation buffers to improve water quality and amenity values of agricultural landscape.

818. **Waterfowl use of dense nesting cover in the Canadian parklands.**
Arnold, Todd W.; Craig-Moore, L. E.; Armstrong, Llwellyn M.; Howerter, David W.; Devries, James H.; Joynt, Brian L.; Emery, Robert B.; and Anderson, Michael G.
Journal of Wildlife Management 71(8): 2542-2549. (Nov. 2007)
NAL Call #: 410 J827
Descriptors: waterfowl/ nesting/ habitat management/ ducks/ wetlands/ Anas/ prairie
Abstract: Dense nesting cover (DNC) has been a conspicuous component of habitat management for upland-nesting ducks for >30 years, but its benefits for nesting ducks have been contentious. During 1994-1999 we monitored 3,058 dabbling duck (Anas spp.) nests in 84 DNC fields located throughout the Canadian Parklands to examine sources of among-field variation in nest density and nesting success. Nest density averaged 1.51 (SE = 0.15) nests/ha and overall nesting success was 20.4%, but there was pronounced annual variation in both estimates. Nesting success increased with increasing field size (range = 6-111 ha), but nest density remained constant. Nest density increased with percent wetland habitat within DNC fields and declined with percent perennial cover in the surrounding 2.4 X 2.4-km landscape, but these variables were not important for predicting nesting success. Nest abundance and nesting success roughly doubled in fields seeded with alfalfa (Medicago sativa) or sweet clovers (Melilotus spp.), but there was no benefit from using native as opposed to tame grasses. We recommend that waterfowl managers in the Canadian Parklands establish DNC with alfalfa in large fields in landscapes with abundant wetlands but minimal competing cover.

819. **What factors determine where invertebrate-feeding birds forage in dry agricultural grasslands?**
Atkinson, Philip W.; Buckingham, David; and Morris, Antony J.
Ibis 146(Suppl. 2): 99-107. (2004); ISSN: 0019-1019
Descriptors: mowing: applied and field techniques/ agricultural grassland/ foraging behavior/ grazing
Abstract: Increases in the intensity of the management of agricultural grasslands over the past 50 years have reduced plant species diversity in swards and increased uniformity in structure through changes in fertilizer regimes, grazing and mowing practices. These factors, as well as increased disturbance and trampling, have reduced the number and diversity of forbs and thus the diversity and abundance of invertebrates, in particular of foliar species. Associated with these changes in management, there has been a large decline in the abundance of many species of farmland birds in pastoral areas and more local extinctions compared with arable areas. To understand the impact of these management changes on bird populations, and design measures to reverse the declines, it is necessary to identify the key factors influencing bird usage of fields. We review results from five studies, which have related fertilizer and grazing management to bird usage of grass fields. Species that fed on soil invertebrates tended to show a positive response to the amount of nitrogen fertilizer added and increased grazing pressure, although there was a high degree of correlation between these two variables. In summer, many species, including corvids, Common Blackbird Turdus merula, Common Starling Sturnus vulgaris, Pied Wagtail Motacilla alba and Hedge Accentor Prunella modularis, showed a negative relationship with sward height, and in winter more species showed a positive relationship with bare ground. Taller sward heights are associated with a greater abundance and diversity of bird invertebrate food resources, and accessibility of food items or a lower risk of predation (actual or perceived) are likely to be the reasons for birds choosing to forage on shorter swards and in areas with more bare ground. Birds feeding on soil invertebrates were found to be generally tolerant of modern management practices that maintain short swards short, as accessibility to the soil has been increased. Species that feed on foliar invertebrates or forb seeds have been affected negatively by modern grassland agricultural practices.

820. **Where should buffers go? Modeling riparian habitat connectivity in northeast Kansas.**
Bentrup, G. and Kellerman, T.
Journal of Soil and Water Conservation 59(5): 209-215. (2004)
NAL Call #: 56.8 J822 ; ISSN: 0022-4561
Descriptors: fragmentation/ geographical information systems/ habitats/ indicators/ riparian vegetation/ riverbank protection/ vegetated strips/ water quality/ watersheds/ Ambystoma/ Glaucomys/ Papilio glaucus/ Zapus hudsonius
Abstract: Through many funding programmes, riparian buffers are being created on agricultural lands to address significant water quality problems. Society and landowners are demanding many other environmental and social services (e.g., wildlife habitat and income diversification) from this practice. Resource planners therefore need to design riparian buffer systems in the right places to provide multiple services. However, scientific guidance for this is lacking. We developed a geographic information system (GIS)-based assessment method for quickly identifying where buffers can be established to restore connectivity of riparian areas for the benefit of terrestrial wildlife. An area in northeastern Kansas, USA, was selected to evaluate this tool. Species with limited dispersal capabilities were used as indicators for riparian connectivity. These include meadow jumping mouse (Zapus hudsonius), tiger salamander (Ambystoma tigrinum), southern flying squirrel (Glaucomys volans) and eastern tiger swallowtail butterfly (Papilio glaucus). To improve connectivity, results indicated that 22% of the perennial stream length in the study area would need riparian buffers. This coarse-filter approach appears to be appropriate for large area planning and can be used singly or in combination with other GIS-guided resource assessments to guide riparian buffer design and implementation.

821. **Where the bobolinks roam: The plight of North America's grassland birds.**
Mccracken, Jon D.
Biodiversity 6(3): 20-29. (2005); ISSN: 1488-8386
Descriptors: wildlife management: conservation/ urbanization/ habitat fragmentation/ habitat loss
Abstract: Grassland birds, in this study defined as species that are wholly or mostly dependent upon upland grasslands for their survival, have experienced the most pronounced declines of any other group of birds on the North American continent, and the declines appear to be continuing unabated. Widespread declines of farmland birds are also occurring in Great Britain and western Europe, largely due to the intensification of agricultural operations. Habitat loss has been the major driving force for declines of grassland birds up until the last 50 years when the intensification of mechanized agricultural operations, along with increased habitat fragmentation that is associated with larger "industrial" farm sizes, became strong factors Other threats to grassland birds come from invasive species and planting of exotic grasses, urbanization, residential development, oil and gas extraction, wind power development, excessive predation/parasitism, fire suppression that results in succession to shrubland, ground water depletion, development of transportation corridors, use of pesticides, and rodent eradication programs. No single management approach or conservation solution will benefit the entire suite of grassland bird species across large geographic regions. Just stabilizing populations of grassland birds at their present levels presents a huge conservation challenge.

822. **Wild ungulate influences on the recovery of willows, black cottonwood and thin-leaf alder following cessation of cattle grazing in northeastern Oregon.**
Case, Richard L. and Kauffman, J. Boone
Northwest Science 71(2): 115-126. (1997)
NAL Call #: 470 N81; ISSN: 0029-344X
Descriptors: biomass/ black cottonwood/ crown volume/ ecosystem restoration/ grazer/ grazing/ habitat degradation/ herbivore/ salmonid habitat recovery/ seedling establishment/ thin leaf alder/ tree recovery
Abstract: Restoration of degraded riparian ecosystems is of great importance for the recovery of declining and

endangered stocks of Columbia River salmonids as well as riparian-obligate wildlife species. Willows (Salix spp.), thin-leaf alder (Alnus incana), and black cottonwood (Populus trichocarpa) are important features of western riparian ecosystems having multiple functional roles that influence biological diversity, water quality/quantity, and aquatic/terrestrial food webs and habitats. Removal of domestic livestock and the construction of big game enclosures have been hypothesized to be effective restoration techniques for riparian ecosystem as well as for salmonid habitat recovery. Following more than a century of livestock grazing, cattle were removed from Meadow Creek in 1991 and the rates of riparian shrub recovery were measured for the two years following. Elk and deerproof enclosures were constructed to quantify the browsing influences of native large ungulates. The initial mean height of 515 deciduous trees and shrubs (14 species) was 47 cm. After two years in the absence of livestock, significant increases in height, crown area, crown volume, stem diameter and biomass were measured both outside and inside of the enclosures. Mean crown volume of willows increased 550% inside of wild ungulate exclosures and 195% outside. Black cottonwood increased 773% inside and 808% outside, while thin-leaf alder increased 1046% inside and 198% outside. Initial shrub densities on gravel bars were low averaging 10.7 woody plants/100m-2. Shrub numbers significantly increased apprxeq 50% (to 15.8 plants/100m-2 m or one new shrub for every 9 meters of transect length) outside of elk and deer proof enclosures through both clonal and seedling establishment. At the beginning of the study (1991), catkin production on willows was low (i.e., only 10% produced catkins). Wild herbivores had a significant influence on the reproductive output of willows; in 1993 catkins were produced by 34% of the tagged willows within enclosures but only 2% outside of enclosures. Wild herbivores were found to have significant influences on the rate of height growth of black cottonwood. For willows, wild herbivores had a significant influence on the rate of growth for the parameters of height, crown area, crown volume, and standing biomass. Nevertheless, due to the inherent resilience and adaptions to natural disturbance processes displayed by the riparian species, there was a rapid and positive response to cessation of those land use activities (i.e, cattle grazing) that caused habitat degradation and/or were preventing recovery.

823. **Wildlife and livestock grazing alternatives in the Sierra Nevada.**
Kie, John G.
Transactions of the Western Section of the Wildlife Society 27: 17-29. (1991)
NAL Call #: SK351.W523; ISSN: 0893-214X.
Notes: Literature review.
Descriptors: conservation measures/ land and freshwater zones/ Strix nebulosa (Strigidae)/ Molothrus ater (Icteridae)/ Empidonax traillii (Tyrannidae)/ Mammalia: farming and agriculture/ alternative livestock grazing strategies/ habitat conservation benefit/ habitat management/ benefit of alternative livestock grazing strategies/ conservation benefit of alternative livestock grazing strategies/ California/ Sierra Nevada/ habitat conservation benefit of alternative livestock grazing strategies/ Strigidae/ Strigiformes/ Aves/ birds/ chordates/ mammals/ vertebrates

824. **Wildlife on ungrazed and grazed bottomlands on the South Platte River, northeastern Colorado: Habitats, land management, adverse effects.**
Crouch, G. L.
In: Proceedings of the Wildlife-Livestock Relationships Symposium. Coeur D'alene, Idaho. Peek, James M. and Dalke, P. D. (eds.)
Moscow, Idaho: Forest, Wildlife and Range Experiment Station, University of Idaho; pp. 186-197; 1982.
NAL Call #: SF84.84.W5 1981
Descriptors: Colorado/ lowlands/ wildlife/ livestock/ grazing/ South Platte River
This citation is from AGRICOLA.

825. **Wildlife responses to grazing management and habitat manipulation: The Welder Wildlife Refuge experience.**
Drawe, D. L.
In: Proceedings of a conference on multispecies grazing. Baker, Frank H. and Jones, R. Katherine (eds.)
Morrilton, Ark.: Winrock International Institute for Agricultural Development; pp. 93-108; 1985.
NAL Call #: SF85.3.P76
Descriptors: range management/ objectives/ United States
This citation is from AGRICOLA.

826. **Wildlife use of livestock water under short duration and continuous grazing.**
Prasad, N. L. and Guthery, F. S.
Wildlife Society Bulletin 14(4): 450-454. (1986)
NAL Call #: SK357.A1W5; ISSN: 0091-7648
Descriptors: Odocoileus virginianus/ Procyon lotor/ Canis latrans/ Meleagris gallopavo/ Zenaida macroura/ Tayassu tajacu/ Molothrus ater/ cattle/ grazing management/ Texas

827. **Willow flycatcher and yellow warbler response to cattle grazing.**
Taylor, D. M. and Littlefield, C. D.
American Birds 40(5): 1169-1173. (1986)
NAL Call #: QL671.A32; ISSN: 0004-7686
Descriptors: Empidonax traillii/ Dendroica petechia/ human activity/ habitat protection

828. **Winter foraging habitat of greater sandhill cranes in northern California.**
Littlefield, Carroll D.
Western Birds 33(1): 51-60. (2002)
NAL Call #: QL684.C2; ISSN: 0160-1121
Descriptors: nutrition/ feeding behavior/ ecology/ habitat utilization/ man-made habitat/ land and freshwater zones/ Grus canadensis tabida (Gruidae): foraging/ habitat preference/ cultivated land habitat/ California/ Sacramento Valley/ Upper Butte Basin/ winter foraging habitat/ Gruidae/ Gruiformes, Aves/ birds/ chordates/ vertebrates
Abstract: In the upper Butte basin (Butte, Colusa, Glenn, and Sutter counties) of California's Sacramento Valley, wintering Greater Sandhill Cranes select unaltered harvested rice stubble most consistently for foraging. They feed in burned and flooded rice stubble for brief periods; their use of such fields decreases dramatically by January and remains low thereafter. Few cranes forage in rice stubble disked in autumn. Recently planted winter wheat attracts large numbers of cranes from the time of planting