

until shortly after seedling emergence but not after early January. Disked corn stubble is used sporadically, primarily in late January and February just before cranes migrate in spring. Grazed grasslands also support cranes, mostly after the onset of winter rains. Foraging habitat for cranes in the basin is currently ample, but continuing changes in agricultural practices may result in future food shortages.
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829. Words from the woods: Bobwhite.

Overcott, Nancy

Minnesota Birding 40(6): 20-21. (2003)

Descriptors: Colinus virginianus/ vocalization/ pastures/ mortality/ hedgerows/ habits-behavior/ habitat use/ farmland/ environmental factors/ ecosystems/ distribution/ climate/ census-survey methods/ birdwatching/ birds/ bobwhite/ Minnesota: Fillmore County

Abstract: The author discusses the sighting of bobwhites (northern bobwhite quail) in Fillmore County, south of Canton near the Iowa border. The bird's calls and songs

were heard. These birds were familiar across southern Minnesota where small family farms with hedgerows, windbreaks, and pastures provided ideal habitat until the mid 1900s. As farms became larger with fewer hedgerows and pastures, the bobwhite population declined. Only a small number remained in the southeastern counties by 1950. Research indicates that because of a high mortality rate and low life expectancy, up to 4000 birds may be required for a self-sustaining population. Climate also plays a part. Bobwhites in southeastern Minnesota are on the fringes of their northern range. The entire state may eventually become suitable for the species due to regional warming. An increased number of bobwhite sightings in neighboring Houston County were observed. Wisconsin also shows an increasing trend in bobwhites numbers on breeding bird surveys. The species have a tendency to make seasonal movements to food sources, so it seems an expanding population of bobwhite from Wisconsin may occasionally expand into Minnesota.

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Forests

830. Abundance and attributes of wildlife trees and coarse woody debris at three silvicultural systems study areas in the interior cedar-hemlock zone, British Columbia.

Stevenson, Susan K.; Jull, Michael J.; and Rogers, Bruce J. *Forest Ecology and Management* 233(1): 176-191. (2006)
NAL Call #: SD1.F73; ISSN: 0378-1127

Descriptors: commercial activities/ conservation measures/ terrestrial habitat/ land zones/ North America/ Canada/ comprehensive zoology: forestry/ trees and coarse woody debris used by wildlife/ implications/ forest/ habitat management/ logged forest/ forest and woodland/ logging/ British Columbia/ northern interior wetbelt

Abstract: Unmanaged cedar (*Thuja plicata*)-hemlock (*Tsuga heterophylla*) forests of the northern Interior Wetbelt of British Columbia support standing and dead trees with a variety of structural features that provide habitat for wildlife. We describe the pre-harvest abundance and characteristics of wildlife trees (standing trees with special characteristics that provide habitat for wildlife) and coarse woody debris (CWD) at three silvicultural systems trials in cedar-dominated stands, and the short-term effects of forest harvesting on the abundance and attributes of CWD. The treatments were clearcut, group retention (70% volume removal), group selection (30% volume removal), and unlogged control. We measured standing trees in 75 0.125-ha plots and CWD along 225 24-m transects, using a functional classification system to characterize habitat attributes of trees and logs. CWD assessments were repeated on the same transects after the harvest. The relationship between tree size and occurrence of habitat features was strong for both standing trees and logs. Each of the four major tree species in the study area was associated with specific habitat features that occurred more often in that species than in any other. Large concealed spaces at the bases of trees, providing den sites and escape cover, were associated with hybrid white spruce (*Picea engelmannii* x *glauca*). We suggest that these trees had originated on nurse logs that subsequently rotted away; if that supposition is correct, there may be shortages of

these structures in future stands that originate from plantations. Forest harvesting had little effect on the volume of CWD, but did affect the decay class distribution, reduce the proportion of pieces having structural habitat attributes, and reduce piece lengths; these effects were generally proportional to the level of harvest removal. Partial-cut silvicultural systems have the potential to mitigate anticipated deficits in large wildlife trees and logs in managed stands, if components of the stand are managed on longer rotations than those planned for timber production alone. © 2006 Elsevier B.V. All rights reserved.
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831. Abundance and richness of neotropical migrants during stopover at farmstead woodlots and associated habitats in southeastern South Dakota.

Swanson, D. L.; Carlisle, H. A.; and Liknes, E. T. *American Midland Naturalist* 149(1): 176-191. (2003)
NAL Call #: 410 M58; ISSN: 00030031

Descriptors: abundance/ avifauna/ migratory species/ species richness/ stopover/ woodland/ United States/ *Ambrosia trifida*/ *Catharus ustulatus*/ *Coccyzus*/ *Dendroica striata*/ *Icterus*/ *Mimidae*/ *Pheucticus*/ *Troglodytes*/ *Vermivora celata*/ *Vermivora ruficapilla*/ *Wilsonia pusilla*
Abstract: Woodland habitats are scarce in the northern Great Plains and were historically concentrated along river corridors. Over the past century, riparian habitats in this area have been much reduced, but new woodland habitats in the form of farmstead woodlots and shelterbelts have appeared. We used mist net sampling and point counts to document richness and abundance of Neotropical migrant birds in farmstead woodlot habitats during spring and fall migrations (1996-1997) in southeastern South Dakota. A total of 668 individuals of 30 Neotropical migrant species (excluding the taxa *Coccyzus*, *Troglodytes*, *Mimidae*, *Icterus* and *Pheucticus*, in which migratory and non-migratory individuals were difficult to distinguish) was captured in 4342 net hours (using 9-m. rather than the standard 12-m mist nets) in spring. The corresponding fall totals (again using 9-m nets) were 3250 net h, 231

individuals and 29 species. If fall captures in a ragweed (*Ambrosia trifida*) patch occurring within the woodlot are included, however, the fall totals were 5107 net h. 1211 individuals and 29 species. Overall densities of Neotropical migrants from point counts were 1302 birds km⁻² in spring and 898 birds km⁻² in fall. Capture and point count data followed similar phenologies, with peak abundance during mid-May in spring and late August-early September in fall. Both methods indicated seasonal abundance differences for some species, with Swainson's thrush (*Catharus ustulatus*) and blackpoll warbler (*Dendroica striata*) more abundant in spring. Orange-crowned (*Vermivora celata*). Nashville (*V. ruficapilla*) and Wilson's (*Wilsonia pusilla*) warblers were more abundant in fall. Captures within the woodlot were evenly distributed among different microhabitats during spring migration, but fall captures occurred disproportionately in scrubby edge-related microhabitats, especially in ragweed, suggesting that seasonal shifts in microhabitat selection may occur within woodlots. Density and capture rate data were similar to previously reported values for riparian habitats in this area. Thus, a diverse assemblage of Neotropical migrants occurs in woodlots during migration, suggesting that woodlots are regularly used as stopover sites and supplement available natural woodland habitats along river corridors.
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832. Abundance and species composition of amphibians, small mammals, and songbirds in riparian forest buffer strips of varying widths in the boreal mixedwood of Alberta.

Hannon, S. J.; Paszkowski, C. A.; Boutin, S.; DeGroot, J.; Macdonald, S. E.; Wheatley, M.; and Eaton, B. R. *Canadian Journal of Forest Research* 32(10): 1784-1800. (2002)
NAL Call #: SD13.C35; ISSN: 00455067.
Notes: doi: 10.1139/x02-092.
Descriptors: aquaculture/ biodiversity/ water quality/ species composition/ forestry/ amphibians/ avifauna/ buffer zone/ forest management/ riparian forests/ silviculture/ small mammals/ Canada/ Amphibia/ Aves/ Mammalia/ Passeri/ Passeriformes/ Riparia/ Vertebrata
Abstract: Forested buffer strips are left along water bodies after forest harvesting to protect water quality and fish stocks, but little is known about their utility as reserves for forest species in managed landscapes. We report on changes in terrestrial vertebrate communities from pre- to post-harvest in experimentally created buffer strips (20, 100, 200, and 800 m wide) in a boreal mixedwood forest in Alberta, Canada. We trapped anuran amphibians and small mammals and spot-mapped bird territories around 12 lakes (4 treatment levels, 3 replicates) before and after harvesting. Changes in small mammal or amphibian abundance were not detected for any treatment relative to controls; however, these species are habitat generalists that used and even bred in clearcuts. Total bird abundance did not change after harvesting, with the exception of crowding in 20-m buffers 1 year post-harvest. Species composition did not change for amphibians and small mammals after harvest, but forest-dependent bird species declined as buffer width narrowed from 200 to 100 m and narrower. We concluded that 20-100 m buffers would not serve as reserves for forest songbirds

in managed landscapes, but that 200 m wide strips conserved the pre-harvest passerine bird community, at least up to 3 years post-harvest.
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833. Abundance of green tree frogs and insects in artificial canopy gaps in a bottomland hardwood forest.

Horn, Scott; Hanula, James L.; and Ulyshen, Michael D. *American Midland Naturalist* 153(2): 321-326. (2005)
NAL Call #: 410 M58; ISSN: 0003-0031
Descriptors: Anura/ Hylidae/ Lissamphibia/ Hyla cinerea/ Aiken/ bottomland hardwood forest/ canopy/ habitat use/ forests/ ecosystems/ land zones/ population ecology/ status/ South Carolina/ terrestrial ecology
Abstract: We found more green tree frogs (*Hyla cinerea*) in canopy gaps than in closed canopy forest. Of the 331 green tree frogs observed, 88% were in canopy gaps. Likewise, higher numbers and biomasses of insects were captured in the open gap habitat. Flies were the most commonly collected insect group accounting for 54% of the total capture. These data suggest that one reason green tree frogs were more abundant in canopy gaps was the increased availability of prey and that small canopy gaps provide early successional habitats that are beneficial to green tree frog populations.
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834. Active and passive forest management for multiple values.

Carey, Andrew B. *Northwestern Naturalist* 87(1): 18-30. (Apr. 2006)
NAL Call #: QL671.M8
Descriptors: forest management/ wildlife habitat/ management techniques/ habitat fragmentation/ biodiversity
Abstract: Comparisons of natural and managed forests suggest that single-focus management of 2nd growth is unlikely to achieve broad conservation goals because biocomplexity is important to ecosystem capacity to produce useful goods and services. Biocomplexity includes species composition, the absolute and relative abundances of those species, and their arrangement in space (for example, trees and shrubs of various species, sizes, vigor, and decay states). Key to high biocomplexity is patchiness at the appropriate spatial scale (for example, 0.1 to 0.5 ha). Passive management (benign neglect) does not necessarily remedy whatever degradation might have occurred under past management or neglect (for example, lack of biological legacies, artificial homogeneity, loss of biodiversity, missing keystone species, presence of diseases, or increased vulnerability to disturbance). Furthermore, not all management is equal. Purposefully managing processes of forest development and landscape dynamics is more likely to be successful in maintaining ecosystem and landscape function (and adaptiveness) than just providing select structural elements in stands and select structural stages in landscapes, as is often suggested for conservation. Deliberate simplification of ecosystems (for example, even-aged, single-species plantations harvested every 15 to 40 y to maximize wood production) runs counter to conservation, even if rotations are extended slightly and conventional thinning is applied. Recent experiments support the importance of biocomplexity to soil organisms, vascular plants, fungi, invertebrates, birds, small mammals, and vertebrate predators. These studies suggest that various techniques used purposefully over time are more likely to

be successful than any 1-time intervention, passive management, or traditional timber management. Biocomplexity is promoted by variable-retention harvest systems, planting and precommercial thinning for species diversity, variable-density thinning to create spatial heterogeneity and foster species diversity, managing decadence processes to provide cavity trees and coarse woody debris, and long to indefinite rotations. At the landscape scale, passive management (reserves and riparian corridors) that does not take into account restoration needs may be self-fulfilling prophecies of forest fragmentation and landscape dysfunction. Restoring landscape function entails restoring function to both 2nd growth and riparian areas. Intentional (integrated, holistic, and collaborative) systems management seems to offer the best hope for meeting diverse objectives for forests, including conservation of biodiversity, a sustained yield of forest products, and economic, social, and environmental sustainability.

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835. Active vs. passive management for biodiversity and other forest values.

Carey, Andrew B.

Northwestern Naturalist 86(2): 87. (2005)

NAL Call #: QL671.M8; ISSN: 1051-1733

Descriptors: birds/ corridors/ biodiversity/ ecosystem function/ habitat restoration/ wildlife conservation

Abstract: Comparisons of natural and managed forests suggest that neither single-species management nor conventional forestry is likely to be successful in meeting broad and diverse conservation goals. Biocomplexity is important to ecosystem function and capacity to produce useful goods and services; biocomplexity includes much more than trees of different sizes, species diversity, and individual habitat elements. Managing multiple processes of forest development, not just providing selected structures, is necessary to restore biocomplexity and ecosystem function. Experiments in inducing heterogeneity into 2nd-growth forest canopies not only support the importance of biocomplexity to various biotic communities including soil organisms, vascular plants, fungi, birds, small mammals, and vertebrate predators, but also suggest that management can promote biocomplexity. At the landscape scale, strategies emphasizing reserves and riparian corridors that do not take into account ecological restoration of 2nd-growth forest ecosystems and degraded streams may be self-fulfilling prophecies of forest fragmentation and landscape dysfunction. Restoring landscape function entails restoring function to 2nd-growth forest. Intentional management can reduce the need for wide riparian buffers, produce landscapes dominated by late-seral stages that are hospitable to wildlife associated with old-growth forests, provide a sustained yield of forest products, and contribute to economic, social, and environmental sustainability.

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836. Adequacy of roost locations for defining buffers around Mexican spotted owl nests.

Ward, J. P. and Salas, D.

Wildlife Society Bulletin 28(3): 688-698. (Fall 2000)

NAL Call #: SK357.A1W5

Descriptors: Strix occidentalis/ nesting/ wildlife management/ geographic information systems/ New Mexico/ habitat selection/ habitat buffers/ conservation

planning/ natural resources, environment, general ecology, and wildlife conservation/ forestry related/ animal ecology and behavior

This citation is from AGRICOLA.

837. Amphibian and reptile habitat relationships in forest stands scheduled for disturbance: Pre-treatment results.

Sutton, W. B.; Wang, Y.; and Schweitzer, C. J.

Southeastern Biology 53(2): 228. (2006); ISSN: 1533-8436

Descriptors: forest habitats/ forests/ habitat alterations/ anthropogenic disturbances/ habitats/ habitat management/ reptiles/ amphibia/ reptiles/ forest environments/ Alabama

Abstract: Understanding habitat influences upon amphibian and reptile communities is essential for forests currently under a disturbance regime. This study presents pre-treatment analysis of habitat factors and the roles they play in constructing amphibian and reptile communities. Pre-treatment habitat and herpetofaunal variables were collected from eighteen experimental forest stands located within the William B. Bankhead National Forest, Alabama. These plots represent forest stands that are scheduled for forest disturbance. Experimental design for this study consists of a three by two factorial randomized complete block design. Disturbance factors included three thinning levels (no thin, 11 sq m per ha residual basal area (BA), and 17 sq m per h residual BA) and two burn treatments (no burn and burn). Ten habitat variables were assessed along three random line transects within each plot (54 total habitat plots). Amphibians and reptiles were collected by drift fences from April-November 2005. Canonical correspondence analysis (CCA) was used to determine and evaluate habitat features responsible for structuring herpetofaunal communities. Thirty-five total species (17 amphibian species and 18 reptile species) were captured throughout the sampling period. Pre-treatment evaluation of habitat factors is necessary to determine long term effects of forest disturbance on amphibian and reptile communities.

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838. Amphibians in managed, second-growth Douglas-fir forests.

Aubry, Keith B.

Journal of Wildlife Management 64(4): 1041-1052. (2000)

NAL Call #: 410 J827; ISSN: 0022-541X

Descriptors: Ambystoma gracile/ Plethodon vehiculum/ Ascaphus truei/ Ensatina eschscholtzii/ Rana aurora/ Douglas fir/ amphibians and reptiles/ distribution/ habitat management/ ecosystems/ forests, coniferous/ forestry practices/ wildlife-habitat relationships/ amphibia/ species diversity/ clearcutting/ Pseudotsuga menziesii/ secondary forests/ Washington/ species richness/ natural resources/ forest management

Abstract: Few studies have been conducted on amphibian communities in managed, second-growth Douglas-fir (Pseudotsuga menziesii) forests in the Pacific Northwest. The author's objectives were to investigate patterns of amphibian species richness, biomass, and abundance, and explore habitat relationships in different age classes of second-growth Douglas-fir forests primarily for timber production. He sampled terrestrial amphibian populations occurring in four distinct age classes of managed forest in western Washington with pitfall traps from 1992 to 1994. Although these forests were devoid of residual old growth, and all stands were at least in their second rotation, they

contained the same assemblage of amphibian species occurring in unmanaged Douglas-fir forests in this region. Terrestrial amphibian communities in managed forests were structured differently than in unmanaged forests, however, with higher proportions of northwestern salamanders (*Ambystoma gracile*) and western redback salamanders (*Plethodon vehiculum*), and a much lower proportion of tailed frogs (*Ascaphus truei*). Contrary to several previous studies, he found no evidence that variation in amphibian abundances was strongly influenced by the amount of coarse woody debris on the forest floor. Further research is needed to elucidate the effects of intensive timber management on coarse woody debris and its role in the persistence of terrestrial amphibian populations in managed forests. Because rotation-age stands (the oldest age class) had the highest amphibian species richness, total biomass, and total abundance, and contained significantly higher abundances of the ensatina (*Ensatina eschscholtzii*) and red-legged frog (*Rana aurora*) than all younger age classes, silvicultural strategies that increase the percentage of rotation-age forest conditions within managed landscapes are likely to enhance the long-term habitat quality of intensively managed forest landscapes for terrestrial amphibians.

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839. An analysis of late-seral forest connectivity in western Oregon, U.S.A.

Richards, William H.; Wallin, David O.; and Schumaker, Nathan H.

Conservation Biology 16(5): 1409-1421. (2002)

NAL Call #: QH75.A1C5; ISSN: 0888-8892

Descriptors: Mammalia/ Aves/ mammals/ birds/ silviculture/ loss of habitat/ dispersal/ ecological requirements/ territory/ home-range/ simulation/ habitat management/ landscape

Abstract: Habitat loss and fragmentation due to timber harvest in western Oregon has put wildlife species reliant on late-seral forest under demographic pressure as available habitat shrinks and local populations become isolated. Few studies have examined the effects of habitat removal and fragmentation on the ability of wildlife to disperse over large areas. We used a spatially explicit population model to examine the effects of landscape patterns on the dispersal success of territorial wildlife species with different dispersal capabilities and home-range sizes. Simulations of dispersal were conducted on 8.3 million ha of forested landscape in western Oregon, based on forest conditions derived from satellite imagery. We compared dispersal success for baseline conditions of land cover with two alternative landscape patterns: late-seral forest habitat systematically converted to a younger forest class based on (1) public ownership and (2) the Northwest Forest Plan reserve system. Dispersal success increased with larger dispersal distances and with smaller home ranges ($p < 0.01$). Results indicate that the reserve system will not maintain habitat connectivity throughout the landscape for species with relatively short dispersal distances. Patches showing the greatest decrease in dispersal activity following the systematic removal of late-seral forest habitat were identified as important areas of connectivity.

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840. An appraisal of biological diversity 'standards' for forest plantation.

Spellerberg, I. F. and Sawyer, J. W. D.

In: Assessment of biodiversity for improved forest planning: Proceedings of the Conference on Assessment of Biodiversity for Improved Planning. Monte Verita, Switzerland. Bachmann, P.; Kohl, M.; and Paivinen, R. (eds.)

Dordrecht: Kluwer Academic Publishers;

pp. 361-365; 1998.

Notes: Literature review.

NAL Call #: SD1.F627-v.51; ISBN: 0792348729

Descriptors: forest plantations/ biodiversity/ evaluation/ forest management/ standards/ nature conservation/ land use/ wildlife/ forest ecology/ objectives

This citation is from AGRICOLA.

841. Approaches to investigate effects of forest management on birds in eastern deciduous forests: How reliable is our knowledge?

Thompson, F. R.; Brawn, J. D.; Robinson, S.; Faaborg, J.; and Clawson, R. L.

Wildlife Society Bulletin 28(4): 1111-1122. (2000)

NAL Call #: SK357.A1W5; ISSN: 00917648

Descriptors: experimental design/ forest management/ research/ songbirds/ avifauna/ deciduous forest/ forest management/ reproductive success

Abstract: We review some key features of scientific inquiry and experimental design and apply them to studies of the effects of forest management on songbirds. We use examples from contemporary studies in eastern deciduous forests. Scientific methods, observational versus experimental studies, replication and randomization, choice of factors and models, and response variables are important elements in designing research approaches that address effects of forest management. There are significant gaps in our knowledge on the effects of forest management on birds. Many studies have addressed effects of management on species abundance, but we can make only limited inferences from most of these. The design of studies is complicated because of the range of forest management practices, variation in bird species responses, differences among forest types, and the effects of confounding factors such as landscape effects. Few studies have addressed effects of forest management on the reproductive success of forest songbirds. We believe the reliability of our knowledge in this area will be improved most quickly if we use current knowledge to generate hypotheses, use a mix of well-designed observational and manipulative experiments to test them, and more frequently measure reproductive success in addition to bird abundance.

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842. Arboreal squirrel response to silvicultural treatments for dwarf mistletoe control in northeastern Oregon.

Bull, E. L.; Heater, T. W.; and Youngblood, A.

Western Journal of Applied Forestry 19(2): 133-141. (2004)

NAL Call #: SD388.W6; ISSN: 0885-6095

Descriptors: habitats/ mistletoes/ responses/ silvicultural systems/ silviculture/ thinning/ witches' brooms/ *Arceuthobium/ Glaucomys/ Pseudotsuga menziesii/ Tamiasciurus hudsonicus*

Abstract: Various silvicultural treatments are commonly used to sanitize stands by removing trees infected with dwarf mistletoe (*Arceuthobium* spp.), yet witches' brooms in trees infected with dwarf mistletoe often provide structures used by many wildlife species. We compared relative abundance, habitat use, and area of use of red squirrels (*Tamiasciurus hudsonicus*) and northern flying squirrels (*Glaucomys sabrinus*) before and after two different treatments designed to remove a range of dwarf mistletoe-caused witches' brooms in northeastern Oregon in 1998-2002. Dwarf mistletoe sanitation treatments included: (1) an island treatment, with retention of up to 0.5 ha groups of trees containing witches' brooms in evenly distributed uncut islands, and all harvest activity confined to thinning from below outside these islands to eliminate trees containing witches' brooms; and (2) a total removal treatment, which consisted of removing all trees that contained a witches' broom estimated to be >25 cm in diameter. Before treatment, over half of the red squirrels and northern flying squirrels in the treatment area occupied summer rest sites in witches' brooms on large Douglas-fir (*Pseudotsuga menziesii*). Live trapping indicated a pretreatment abundance of 1.0 per 100 trap/nights for red squirrels and 0.4 per 100 trap/nights for northern flying squirrels, and a posttreatment abundance of 2.1 per 100 trap/nights for red squirrels and 0.2 per 100 trap/nights for northern flying squirrels. Type of rest site and amount of red squirrel reuse did not change after the island treatment, although the number of red squirrels located in rest sites increased with the island treatment. Most of the red squirrel locations occurred within the islands. Area of use by red squirrels did not change with island treatment. Type of rest site used by red squirrels and northern flying squirrels shifted after the total removal treatment from mostly witches' brooms to predominantly tree cavities. Area of use by red squirrels increased from 1.8 to 7.6 ha after the total removal treatment. Results suggest that retention of trees containing witches' brooms in small groups or islands offers an opportunity to retain rest site habitat, although northern flying abundance declined with both treatments.
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843. Are temperate mixedwood forests perceived by birds as a distinct forest type?

Girard, Caroline; Darveau, Marcel; Savard, Jean Pierre L.; and Huot, Jean

Canadian Journal of Forest Research 34(9):

1895-1907. (2004)

NAL Call #: SD13.C35; ISSN: 0045-5067

Descriptors: conservation measures/ ecology/ terrestrial habitat/ land zones/ North America/ Canada/ Aves: habitat management/ temperate mixedwood forests significance as distinct habitat/ occurrence data implications/ habitat utilization/ forest and woodland/ temperate mixedwood forests/ perception as distinct habitat/ occurrence data analysis and management implications/ Quebec/ Aves/ birds/ chordates/ vertebrates

Abstract: Forestry practices used in mixedwood forests have led to a reduction of the availability of mixedwood stands and to a simplification of the forest mosaic, with unknown consequences on wildlife. We assessed bird occurrences at different spatial scales (50-, 100-, and 1000-m radius) in response to coniferous, deciduous, and mixedwood stands within the Quebec balsam fir-yellow birch domain. Our objective was to evaluate whether birds

perceive temperate mixedwood forests as distinct from deciduous and coniferous forests. We quantified bird occurrence at 57 observation points and determined habitat composition from forest maps. At the 50-, 100-, and 1000-m scales, the occurrence of two, four, and four species, respectively, was positively related to mixedwood stands. Among them the Blackburnian Warbler, the Northern Parula, the Black-throated Blue Warbler, and the Ovenbird responded at more than one scale. Some species were also influenced by coniferous and deciduous stands at the three spatial scales. Mixedwood stands were positively associated with the occurrence of many species and moreover were preferred over coniferous or deciduous stands by some species. These results support our hypothesis that mixedwood forests are distinct habitats and provide a new justification for preserving this forest type.
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844. Area sensitivity and edge avoidance: The case of the three-toed woodpecker (*Picoides tridactylus*) in a managed forest.

Imbeau, Louis and Desrochers, Andre

Forest Ecology and Management 164(1-3): 249-256. (2002)
NAL Call #: SD1.F73; ISSN: 0378-1127

Descriptors: *Picoides tridactylus*/ Piciformes/ Picidae/ forestry practices/ habitat alterations/ terrestrial ecology/ area sensitivity/ boreal forestry/ edge avoidance/ industrial forestry/ old-growth forest specialization/ distribution/ food-feeding/ ecosystems/ forest management/ habitat management/ habitat use/ Lac Saint-Jean area/ Quebec/ wildlife-human relationships/ Canada/ commercial enterprises/ conservation/ wildlife/ disturbances/ land zones/ nutrition/ northern three-toed woodpecker/ silviculture/ forest fringe/ boundary

Abstract: Given the extensive progression of industrial forestry in boreal regions that reduces the area of old-growth forests and considerably increases the amount of sharp edges, important declines are to be expected among old-forest specialists area-sensitive or edge-avoiding boreal birds. The Three-toed Woodpecker (*Picoides tridactylus*) is likely to be one of the species most negatively affected by boreal forestry and is possibly sensitive to forest area and edges. In this study, we quantify the area sensitivity and edge-avoidance of the Three-toed Woodpecker by analyzing its pattern of occurrence at 100 playback stations that had from 8 to 100% forest cover within a 300 m radius. Behavioral observations were also conducted to further investigate its response to edges in logged forests using foraging locations in relation to the nearest clear-cut border. Moreover, we document their foraging movement patterns in two contrasting landscapes (continuous versus shredded forests after logging). Although the occurrence of Three-toed Woodpeckers was highly related to the area of suitable habitat around the playback station, this relationship was quasi-linear and no critical threshold was found within the range of forest cover sampled. The amount of edge did not provide additional information on woodpecker occurrence. Individual woodpeckers in shredded forests did not select foraging trees further away from clear-cut edges than available ones. However, based on the results of the movement path analysis, continuous forests might provide better nesting habitat than residual, shredded forests. Indeed, spatial configuration of residual forest seemed to highly constrain foraging movements of this species because of its strong avoidance of open areas.

Considering other studies conducted on forest birds, such modified movement patterns could be particularly harmful while both adults must feed their nestlings and behave as central place foragers. Therefore, even if no pattern of area-sensitivity or edge-avoidance were found, harmful consequences of forest shredding following forest logging may still occur for boreal species such as the Three-toed Woodpecker. However, residual forests strips are essential to maintain this species within managed areas, its population density within such residual forests being comparable to the one obtained in continuous forests.
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845. Area sensitivity in grassland passerines: Effects of patch size, patch shape, and vegetation structure on bird abundance and occurrence in southern Saskatchewan.

Davis, S. K.

Auk 121(4): 1130-1145. (2004)

NAL Call #: 413.8 AU4 ; ISSN: 00048038

Descriptors: abundance/ habitat fragmentation/ passerines/ patch dynamics/ patch size/ prairie/ vegetation structure/ Canada/ North America/ Saskatchewan/ Ammodramus/ Ammodramus bairdii/ Ammodramus savannarum/ Anthus/ Anthus spragueii/ Aves/ Calcarius/ Calcarius ornatus/ Eremophila/ Eremophila alpestris/ Molothrus/ Molothrus aeneus/ Molothrus ater/ Passerculus sandwichensis/ Passeri/ Passeriformes/ Spizella pallida/ Sturnella neglecta

Abstract: Information on area sensitivity and effects of habitat fragmentation has come largely from forest and tallgrass-prairie habitats. Research from other ecosystems is required to determine whether the fragmentation paradigm derived from those studies is applicable to passerine communities elsewhere. I examined the effects of habitat fragmentation on abundance and occurrence of nine species of mixed-grass prairie passerines in southern Saskatchewan. I conducted 190 point-counts in 1996 and 1997 on 89 pastures ranging in size from 8 to 6,475 ha. Sprague's Pipit (*Anthus spragueii*), Baird's Sparrow (*Ammodramus bairdii*), Grasshopper Sparrow (*A. savannarum*), and Chestnut-collared Longspur (*Calcarius ornatus*) were found to be area-sensitive, in that they were more abundant or occurred more frequently, or both, in larger patches of mixed-grass prairie. However, the ratio of edge to interior habitat was a better predictor of area sensitivity than patch size in most cases. Horned Lark (*Eremophila alpestris*), Savannah Sparrow (*Passerculus sandwichensis*), Clay-colored Sparrow (*Spizella pallida*), Western Meadowlark (*Sturnella neglecta*), and Brown-headed Cowbird (*Molothrus ater*) were insensitive to patch size, though occurrence of Clay-colored Sparrow and Western Meadowlark tended to be greater in smaller pastures. Vegetation structure was also found to be an important predictor of grassland songbird abundance and occurrence, in that it explained additional variation not accounted for by patch size or the ratio of edge to interior habitat. Although protection of large contiguous tracts of habitat is essential to conservation of native species, small native-prairie patches with minimal edge habitat also play a vital role in conservation of grassland birds.

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846. Arthropod responses to harvesting and wildfire: Implications for emulation of natural disturbance in forest management.

Buddle, Christopher M.; Langor, David W.; Pohl, Greg R.; and Spence, John R.

Biological Conservation 128(3): 346-357. (2006)

NAL Call #: S900.B5; ISSN: 0006-3207

Descriptors: commercial activities/ conservation measures/ land zones/ North America/ Canada/ Araneae/ Carabidae/ Staphylinidae: forestry/ habitat management/ community structure/ wildfire/ forest and woodland/ forest litter/ litter habitat/ Alberta/ arachnids/ arthropods/ beetles/ Chelicerates/ insects/ invertebrates

Abstract: Although natural disturbance has been widely adopted as a template for forest management that protects biodiversity, this hypothesis has not been adequately tested. We compared litter-dwelling arthropod assemblages (Coleoptera: Carabidae and Staphylinidae; Araneae) in aspen-dominated stands originating as clear-cuts or wildfires across three age classes (1-2, 14-15, and 28-29 years old) to test whether the post-harvest and post-fire assemblages converged following disturbances, and to compare faunal succession. These findings were compared to data about epigeic arthropods in old and mature pyrogenic aspen stands (>70 years old) to determine whether diversity and community composition of arthropods from the younger age-classes approached what may have been typical predisturbance conditions. The resulting dataset of almost 27,000 arthropods and 230 species showed convergence in most taxa, and some general similarities between 28- and 29-year-old stands and old and mature stands. However, not all taxa responded similarly, and faunal succession following clear-cutting appeared to progress more rapidly than following wildfire. Rarefaction-estimated diversity was elevated in 1-2-year-old stands, compared to unharvested stands, reflecting a mix of closed-canopy and open-habitat species. Nonmetric multi-dimensional scaling ordinations showed that samples from young wildfire disturbed stands (1-2 years old) included more variable assemblages than all other study sites, and contained species that may depend on unique post-fire habitat characteristics. The fauna of old and mature stands exhibited low diversity, but contained species with limited dispersal abilities, and species tied to old-growth habitats such as dead wood. Harvesting systems that do not allow adequate recovery following a first harvesting pass, or do not maintain microhabitat features associated with older fire-origin forests, may threaten persistence of some elements of boreal arthropod faunas. © 2005 Elsevier Ltd. All rights reserved.

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847. Artificial inoculation of decay fungi into Douglas-fir with rifle or shotgun to produce wildlife trees in western Oregon.

Filip, G. M.; Parks, C. G.; Baker, F. A.; and Daniels, S. E.

Western Journal of Applied Forestry 19(3): 211-215. (2004)

NAL Call #: SD388.W6; ISSN: 08856095

Descriptors: cavity-nester habitat/ Fomitopsis cajanderi/ internal decay/ rifle and shotgun inoculation/ tree topping/ Trichaptum abietinum

Abstract: A total of 188 Douglas-fir trees were treated to determine whether fungal inoculation with rifle or shotgun promoted stem decay and subsequent use by cavity-nesting birds in the Coast Range in Oregon. Inoculated

trees were either live or killed by topping. Topped trees were climbed and severed just below the lowest whorl of live branches. Fungal inoculum was delivered by either a 0.45-70 caliber rifle or a 12-gauge shotgun to tree trunks at a height of about 8 m aboveground. Inoculum of either *Phellinus pini* or *Fomitopsis cajanderi* was grown on small wooden dowels or sawdust and fitted into the rifle slug (dowels) or behind the shotgun slug (sawdust). Sterile dowels or sawdust were used as a control. After 5 years, all topped trees had died, and at least 50% had sap rot as indicated by the presence of conks of *Trichaptum abietinum*. Conks of *Cryptoporus volvatus*, *Fomitopsis pinicola*, or *P. pini* were sometimes observed on topped (dead) trees. Almost half of the topped trees had evidence of wildlife activity including foraging holes, nest cavities, or bark removal. There was no difference in sap rot incidence or subsequent wildlife activity among three treatments (rifle, shotgun, or not shot) or among three inoculum types (*P. pini*, *F. cajanderi*, or sterile). None of the untopped (live) but artificially inoculated trees had conks or evidence of wildlife use. Of seven live and shot trees that were destructively sampled, there was an average of 68.7 cm² of decay area on each wood disc that was associated with each bullet. There was no apparent difference in internal decay area between sterile and viable inoculum, but sample size was small. It appears that tree killing by topping below the live crown is a faster method of creating wildlife habitat than ballistic inoculation of live Douglas-fir trees in the Oregon Coast Range. Topped and dead trees had more avian foraging holes, deep cavities, and bark removed than did live inoculated trees. Based on the seven live shot trees that we sampled for internal decay, it appears that shooting trees with a shotgun or rifle is effective in creating internal decay within 5 years, but it may take several more years to form a decay column large enough to be used by cavity-nesting birds.

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848. Assessing and monitoring forest biodiversity: A suggested framework and indicators.

Noss, R. F.

Forest Ecology and Management 115(2/3): 135-146. (1999)
NAL Call #: SD1.F73; ISSN: 0378-1127.

Notes: Literature review.

Descriptors: biodiversity/ forest management/ biological indicators/ assessment/ planning/ nature conservation/ methodology/ protection of forests/ wildlife communities/ old growth forests/ virgin forests/ forest fragmentation/ forest fires/ road construction/ forest ecology/ North America

Abstract: Enlightened forest management requires reliable information on the status and condition of each forest (interpreted from a broad context) and of change in forest conditions over time. The process of forest planning must begin with a clear statement of goals, from which detailed objectives and management plans follow. Goals and objectives for forest management should reflect the conservation value of a forest relative to other forests of the same general type. This paper reviews some recent assessments (with emphasis on North America), presents a framework for forest assessment and monitoring, and suggests some indicators of biodiversity in forests. Among the broad assessments of forest status and conservation value are a global 'forest frontiers' assessment by the World Resources Institute, gap analysis projects that assess the level of representation of forests and other communities in

protected areas, and ecoregion-based conservation assessments conducted by the World Wildlife Fund. Also important is information on change in forest area and condition over time. Among the common changes in forests over the past two centuries are loss of old forests, simplification of forest structure, decreasing size of forest patches, increasing isolation of patches, disruption of natural fire regimes, and increased road building, all of which have had negative effects on native biodiversity. These trends can be reversed, or at least slowed, through better management. Progress toward forest recovery can be measured through the use of ecological indicators that correspond to the specific conditions and trends of concern. Although there is a wealth of indicators to choose from, most have been poorly tested and require rigorous validation in order to be interpreted with confidence.

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849. Assessing risks to spotted owls from forest thinning in fire-adapted forests of the western United States.

Lee, D. C. and Irwin, L. L.

Forest Ecology and Management 211: 191-209. (June 2005)

NAL Call #: SD1.F73

Descriptors: temperate forests/ *Strix occidentalis*/ endangered species/ wild birds/ risk assessment/ wildlife management/ forest thinning/ forest ecology/ fire ecology/ wildfires/ fire hazard reduction/ prescribed burning/ overstory/ stand density/ stand structure/ simulation models/ California/ risk modeling/ plant ecology/ forest fire management/ mathematics and statistics

This citation is from AGRICOLA.

850. Assessing the influence of forest management of amphibian microhabitat.

Risenhoover, Ken L. and McBride, Tim C.

Northwestern Naturalist 82(2): 80. (2001)

NAL Call #: QL671.M8; ISSN: 1051-1733

Descriptors: amphibians/ microhabitat/ conservation/ soil temperature/ forest management/ riparian zones/

Abstract: Because of their limited mobility and apparent narrow tolerance for microhabitat conditions, there is a growing concern that amphibians may be negatively impacted by harvest activities in managed forests. Here, we summarize preliminary results from our investigations of microhabitat conditions in managed forests and relate them to patterns of amphibian occurrence. We measured fine-scale patterns in microhabitat (soil moisture, soil temperature, relative humidity, ambient air temperature, and vegetation) along transects running perpendicular from the stream edge and extending up to 60 m into the adjacent upland. We contrasted patterns of microhabitat found in mature (55 to 65 yr old) and recently harvested stands with continuous or discontinuous riparian management zones. Generally, soil temperature increased slightly with increasing distance from the stream edge, and ambient air and soil temperatures were highest in clearcuts outside of streamside buffers. Soil moisture was highly variable and showed no consistent trend in relation to distance from streams. Soil moisture was higher in clearcuts than in forested areas. Surprisingly, the range of microhabitat conditions present in clearcuts did not differ greatly from those found in riparian buffers and in unharvested stands. Although microhabitat conditions tended to be more

variable in recently harvested stands. Diel patterns of ambient temperature and relative humidity suggested that microclimatic conditions were similar between clearcut and unharvested areas with the exception of 4 to 6 hr in the mid-afternoon during dry summer months. During July to August, 90% of surface active amphibians occurred within 2 m of streams suggesting that protection of near-stream microhabitat should be the focus of conservation measures. Surface vegetation and woody debris available in recently harvested stands appears to provide suitable microclimate and refugia for the amphibians.

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851. Association between severity of prescribed burns and subsequent activity of conifer-infesting beetles in stands of longleaf pine.

Sullivan, B. T.; Fettig, C. J.; Orosina, W. J.; Dalusky, M. J.; and Berisford, C. W.

Forest Ecology and Management 185: 327-340. (2003)
NAL Call #: SD1.F73; ISSN: 0378-1127

Descriptors: bark-beetles/ forest/ silviculture/ fire/ forest damage/ population dynamics/ abundance/ South Carolina
Abstract: A randomized complete block experiment was performed to measure the effect of prescribed, dormant-season burns of three different levels of severity (measured as fuel consumption and soil surface heating) on subsequent insect infestation and mortality of mature longleaf pine (*Pinus palustris* Mill.). Multiple-funnel traps baited with a low release rate of turpentine and ethanol were used to monitor activity of certain coniferophagous beetles. Non-aggressive species, including the root beetles *Hylastes salebrosus* Eichhoff and *H. tenuis* Eichhoff, the ambrosia beetle *Xyleborus pubescens* Zimmermann, the reproduction weevil *Pachylobius picivorus* (Germar), and buprestid borers, were attracted to burned plots in numbers that correlated positively with burn severity. Beetle attraction to burned sites was greatest in the first weeks post-burn and disappeared by the second year. Two potential tree-killing bark beetles, *Dendroctonus terebrans* (Olivier) and *Ips grandicollis* (Eichhoff), were trapped in significant numbers but exhibited no attraction to burned plots. Tree mortality correlated significantly with the severity of the burns and amounted to 5% of stems in the hottest burn treatment after 3 years. The majority of the mortality was observed in the second and third years post-burn. Attacks of *Ips* and *Dendroctonus* bark beetles were apparent on nearly all dead or dying trees, and evidence suggested that root pathogens may have contributed to tree susceptibility to beetle attack and mortality. Our data indicate that selection of burn regimes that reduce or eliminate consumption of duff (e.g., favoring heading fires over backing fires) could significantly reduce mortality of longleaf pine managed for long rotations.

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852. The association of small mammals with coarse woody debris at log and stand scales.

Bowman, Jeffrey C.; Sleep, Darren; Forbes, Graham J.; and Edwards, Mark

Forest Ecology and Management 129(1/3): 119-124. (2000)
NAL Call #: SD1.F73; ISSN: 0378-1127

Descriptors: *Blarina brevicauda*/ *Clethrionomys gapperi*/ *Microtus chrotorrhinus*/ *Microtus pennsylvanicus*/ *Napaeozapus insignis*/ *Peromyscus maniculatus*/ *Sorex*/ *Synaptomys cooperi*/ *Zapus hudsonius*/ Rodentia/

Insectivora/ behavior/ habitat management/ mammals/ wildlife-habitat relationships/ dead wood/ diversity/ fauna/ insectivores/ rodents/ bank vole/ red-backed mouse/ red-backed vole/ deer mouse/ woodland jumping mouse/ jumping mouse/ meadow vole/ bog lemming/ short-tailed shrew/ long-tailed shrew/ Canada/ New Brunswick
Abstract: Coarse woody debris is an important structural element in forests. The authors empirically investigated the relationships between small mammals and coarse woody debris decay stage at two different scales: individual logs and forest stands. There were no significant relationships between small mammals and individual logs of different decay classes. They investigated the stand scale using areas with contrasting management intensities (a reference area and a more intensively managed area). No significant relationships were found between small mammal abundance (any species) and either mean decay class of logs in a stand, or overall abundance of logs. There was evidence of a landscape context effect. Red-backed voles, the most abundant microtine in the region, were significantly related to the abundance of the most decayed logs. This relationship was only significant on the intensively managed landscape, where highly decayed logs were rare.

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853. Associations between forest fire and Mexican spotted owl.

Jeness, J. S.; Beier, P.; and Ganey, J. L.

Forest Science 50: 765-772. (Dec. 2004)

NAL Call #: 99.8 F7632

Descriptors: *Strix occidentalis*/ owls/ threatened species/ forest fires/ prescribed burning/ forest stands/ *Pinus*/ reproduction/ wildlife management/ forest wildlife relations/ Arizona/ New Mexico/ natural resources, environment, general ecology, and wildlife conservation/ forest fire management/ forestry production natural regeneration
Abstract: In 1993, the US Fish and Wildlife Service listed the Mexican spotted owl (*Strix occidentalis lucida*) as threatened, in part because of the rising threat to its habitat from stand-replacing wildfires. In 1997, we surveyed 33 owl sites that, in the previous four years, had burned at various levels ranging from light controlled burns to stand-replacing fires. We compared owl occupancy and reproduction in these burned sites to 31 unburned owl sites with similar habitat and topography. Although unburned sites showed higher proportions of both occupancy and reproduction, the negative relationship observed between recent fire occurrence and owl occupancy rank was statistically weak (Test for Marginal Homogeneity, $P = 0.110$). Owls tended not to be present where pure pine stands (*Pinus* spp.) comprised a large proportion (38-85%) of burned sites, but no other factors relating to habitat or fire severity had a significant, biologically interpretable influence on occupancy rank. We suspect that relatively low-intensity ground fires, including most prescribed fires, probably have little or no short-term impact on Mexican spotted owl presence or reproduction, but we have no data on long-term effects of fire. We recommend proactive fuels-management treatments in areas not currently occupied by owls as a means of reducing fire risk in areas occupied by owls. Within areas occupied by owls, judicious treatments may be appropriate after case-by-case evaluations of potential benefits and risks within those sites.
This citation is from AGRICOLA.

854. Associations of forest-floor vertebrates with coarse woody debris in managed forests of western Oregon.

Butts, Sally R. and McComb, William C.

Journal of Wildlife Management 64(1): 95-104. (2000)

NAL Call #: 410 J827; ISSN: 0022-541X

Descriptors: forests/ woody debris/ forest management/ habitat management/ vertebrates/ mammals/ amphibians/ forest floor/ *Sorex trowbridgii*/ *Aneides ferreus*/ *Ensatina eschscholtzii*

Abstract: Forests managed primarily for wood resources may be lacking in adequate amounts of coarse woody debris (CWD) for forest-floor vertebrates. We assessed associations between captures of forest-floor vertebrates and volume of CWD in 18 closed-canopy stands of Douglas-fir (*Pseudotsuga menziesii*). The volume of CWD ranged from 14 to 859 m³/ha. Pitfall traps and timed, area-constrained ground searches were used to capture small mammals and amphibians. The abundance of ensatina (*Ensatina eschscholtzii*) and clouded salamanders (*Aneides ferreus*) increased with volume of CWD. In addition, the probability of encountering either ensatina or Trowbridge's shrew (*Sorex trowbridgii*) increased with cover of CWD on the forest-floor. The average distance from the nearest CWD for amphibians captured during timed, area-constrained ground searches was 0.5 m, versus 1 m between random points and the nearest CWD. Our study suggests that current management guidelines for CWD retention may not provide adequate habitat for forest-floor vertebrates that depend on this component of the habitat. © NISC

855. Associations of winter birds with riparian condition in the lower Calapooia Watershed, Oregon.

McComb, B. C.; Bilsland, D.; and Steiner, J. J.

Northwest Science 79(2-3): 164-171. (2005)

NAL Call #: 470 N81; ISSN: 0029344X

Descriptors: avifauna/ community composition/ riparian vegetation/ species richness/ vegetation type/ Oregon/ Willamette River/ Aves

Abstract: We examined the association between winter bird community composition and three riparian vegetation types common in the central Willamette River basin: grass-riparian, shrub-riparian, and forest-riparian. There were 20 times more birds detected and 3 times as many species detected in forest-riparian sites than in grass-riparian sites. There were over three times as many species observed in forest-riparian sites as grass-riparian sites. Not all species were associated with trees or shrubs, and not all that were associated with trees or shrubs were riparian dependent. A significant curvilinear relationship was detected between tree cover and winter bird species richness. Based on this relationship we hypothesize that providing 10-15% of a square km in tree cover would maximize winter bird richness within the range of conditions that we sampled. © 2005 by the Northwest Scientific Association. All rights reserved.

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856. Avian nest success in Midwestern forests fragmented by agriculture.

Knutson, M. G.; Niemi, G. J.; Newton, W. E.; and Friberg, M. A.

Condor 106(1): 116-130. (2004)

NAL Call #: QL671.C6; ISSN: 00105422

Descriptors: agriculture/ driftless area/ forest fragmentation/ functional group/ landscape/ midwestern United States/ nest success/ *Contopus virens*/ *Molothrus ater*/ *Setophaga ruticilla*

Abstract: We studied how forest-bird nest success varied by landscape context from 1996 to 1998 in an agricultural region of southeastern Minnesota, southwestern Wisconsin, and northeastern Iowa. Nest success was 48% for all nests, 82% for cavity-nesting species, and 42% for cup-nesting species. Mayfield-adjusted nest success for five common species ranged from 23% for the American Redstart (*Setophaga ruticilla*) to 43% for the Eastern Wood-Pewee (*Contopus virens*). Nest success was lowest for open-cup nesters, species that reject Brown-headed Cowbird (*Molothrus ater*) eggs, species that nest near forest edges, and Neotropical migrants. The proportion of forest core area in a 5-km radius around the plot had a weakly negative relationship with daily survival rate of nests for all species pooled and for medium or high canopy nesters, species associated with interior and edge habitats, open-cup nesters, and nests located between 75 and 199 m from an edge. The proportion of forest core area was positively related to daily survival rate only for ground and low nesters. Our findings are in contrast to a number of studies from the eastern United States reporting strong positive associations between forest area and nesting success. Supported models of habitat associations changed with the spatial scale of analysis and included variables not often considered in studies of forest birds, including the proportion of water, shrubs, and grasslands in the landscape. Forest area may not be a strong indicator of nest success in landscapes where all the available forests are fragmented.

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857. Avian response to bottomland hardwood reforestation: The first 10 years.

Twedt, Daniel J.; Wilson, R. Randy; Henne-Kerr, Jackie L.; and Grosshuesch, David A.

Restoration Ecology 10(4): 645-655. (2002)

NAL Call #: QH541.15.R45R515; ISSN: 1061-2971

Descriptors: conservation measures/ ecology/ habitat utilization/ terrestrial habitat/ land and freshwater zones/ Aves: habitat management/ reforestation strategies/ habitat colonization relations/ habitat colonization/ reforestation strategy relations/ Louisiana and Mississippi/ forest and woodland/ bottomland hardwood/ Louisiana/ Madison Parish/ Mississippi/ Issaquena County/ reforestation strategy relations/ Aves/ birds/ chordates/ vertebrates

Abstract: Bottomland hardwood forests were planted on agricultural fields in Mississippi and Louisiana predominantly using either *Quercus* species (oaks) or *Populus deltoides* (eastern cottonwood). We assessed avian colonization of these reforested sites between 2 and 10 years after planting. Rapid vertical growth of cottonwoods (circa 2-3 m/year) resulted in sites with forest structure that supported greater species richness of breeding birds, increased Shannon diversity indices, and supported greater territory densities than on sites planted with slower-growing oak species. Grassland birds (*Spiza americana* [Dickcissel] and *Sturnella magna* [Eastern Meadowlark]) were indicative of species breeding on oak-dominated reforestation no more than 10 years old. *Agelaius phoeniceus* (Red-winged Blackbird)

and *Colinus virginianus* (Northern Bobwhite) characterized cottonwood reforestation no more than 4 years old, whereas 14 species of shrub-scrub birds (e.g., *Passerina cyanea* [Indigo Bunting]) and early-successional forest birds (e.g., *Vireo gilvus* [Warbling vireo]) typified cottonwood reforestation 5 to 9 years after planting. Rates of daily nest survival did not differ between reforestation strategies. Nest parasitism increased markedly in older cottonwood stands but was overwhelmed by predation as a cause of nest failure. Based on Partners in Flight prioritization scores and territory densities, the value of cottonwood reforestation for avian conservation was significantly greater than that of oak reforestation during their first 10 years. Because of benefits conferred on breeding birds, we recommend reforestation of bottomland hardwoods should include a high proportion of fast-growing early successional species such as cottonwood.

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858. Avian species richness and reproduction in short-rotation coppice habitats in central and western New York.

Dhondt, A. A.; Wrege, P. H.; Cerretani, J.; and Sydenstricker, K. V.

Bird Study 54(1): 12-22. (2007); ISSN: 00063657

Descriptors: species richness/ wildlife habitats/ birds/ nesting/ habitat management/ coppicing/ New York

Abstract: Capsule: Species richness and density increase rapidly with coppice age, and are similar to estimates from early successional habitats. Aim: To investigate avian species richness, density and breeding success in short-rotation woody crops (SRWC) planted as potential source of renewable bioenergy. Methods: We carried out regular bird censuses and systematic nest searches in dense plantations of fast-growing willow and poplar clones coppiced at three- to five-year intervals in New York, USA. Results: Thirty-nine species regularly used SRWC plantations; of these at least 21 were confirmed breeding on study plots. A total of 63% of the variation in bird species richness was explained by the number of years since coppicing and plot area together. Both the richness and overall density of avian species in SRWC plots was similar to estimates obtained from the Breeding Bird Census for more typical shrublands and successional habitats (e.g. abandoned fields, second-growth forest, regenerating clearcuts). Nesting success for the most common species was within the range of values from published studies in alternative nesting habitats, although often at the lower end of the range. Brood parasitism by Brown-headed Cowbirds *Molothrus ater*, often an important actor in nesting success, was extremely low on the study plots. Conclusion: If planted on a fairly large scale with staggered coppicing schedules, SRWC plantations would help to maintain breeding populations of birds that range from open-habitat species to woodland species. There is no evidence that conversion of substantial land area to SRWC would result in an 'ecological trap' for species common in the farmland-small woodland landscapes of the northeastern USA.

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859. Avian use of early successional habitats: Are regenerating forests, utility right-of-ways and reclaimed surface mines the same?

Bulluck, Lesley P. and Buehler, David A.

Forest Ecology and Management 236(1): 76-84. (2006)

NAL Call #: SD1.F73; ISSN: 0378-1127

Descriptors: conservation measures/ ecology/ population dynamics/ terrestrial habitat/ land zones/ Aves: habitat management/ early successional habitats use/ community structure/ early successional habitats comparison/ population size/ habitat utilization/ terrestrial habitat/ utility right of way/ reclaimed surface mines/ habitat use/ comparison with other early successional habitats/ forest and woodland/ regenerating forest/ Tennessee/ Cumberland Mountains/ Aves/ birds/ chordates/ vertebrates
Abstract: The importance of early successional habitats for breeding and post-breeding birds has received recent attention. Common early successional habitats in the eastern United States are regeneration after timber harvests, utility right-of ways and reclaimed surface mines. Few studies, however, have compared the characteristics of these with regard to avian habitat use. We conducted a passive mist-netting study to assess the breeding and post-breeding avian communities associated with these land uses in the Cumberland Mountains of eastern Tennessee. We used analysis of variance to compare the vegetation structure among these habitat types and discriminant function analyses to illustrate differences in vegetation structure and bird abundance among habitats. We banded 1562 individuals of 40 species (1.08 birds/net-hour). The percent cover of saplings, forbs and grass differed among habitat types, but there was no detectable difference in shrub cover. Vegetation structure allowed good discrimination between habitat types (Wilks' $\lambda = 0.16$), specifically in differentiating clearcuts from surface mines and right-of-ways. Although the three habitat types had several avian species in common, the abundance of 12 species differed substantially among habitat types, and their species abundance patterns allowed for excellent discrimination between these habitat types (Wilks' $\lambda = 0.08$). We conclude that these three early successional habitat types are different with regard to vegetation structure and avian community assemblage. These differences are important for local and landscape-scale conservation planning for both early and late successional avian species. © 2006 Elsevier B.V. All rights reserved.
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860. Avian use of successional cottonwood (*Populus deltoides*) woodlands along the middle Missouri River.

Rumble, M. A. and Gobeille, J. E.

American Midland Naturalist 152(1): 165-177. (2004)

NAL Call #: 410 M58; ISSN: 00030031

Descriptors: *Passerina cyanea*/ *Populus deltoides*/ *Toxostoma rufum*/ *Vireo bellii*

Abstract: Cottonwood (*Populus deltoides*) woodlands are important habitats for birds. Yet, little is known of the relations between bird habitat and succession in these woodlands. We studied the bird community in cottonwood woodlands from early to late seral stages along the Missouri River in central South Dakota from 1990 to 1992 to describe quantitative relations between avifauna and ecological patterns of succession in cottonwood woodlands along the Missouri River. The vegetation in the early seral

cottonwood was characterized by a high density of seedlings and saplings that were restricted to narrow bands along the rivers. Late seral cottonwoods were characterized by a few large old trees that extended across the flood plain. Seventy-nine percent of the bird species were woodland obligates. Birds that nest in trees or cavities were the most common, while shrub and ground nesting birds were relatively uncommon. Total bird abundance, species diversity, species richness, richness of woodland obligates, abundance in the tree-nesting guild, abundance in the cavity-nesting guild and abundance in the shrub-nesting guild were greater ($P < 0.01$) in late and late intermediate seral cottonwood stands. Patterns of bird use in cottonwood seral stages by individual species were less evident. Several species were more abundant ($P < 0.08$) in late or late intermediate seral cottonwood and no species were more abundant ($P > 0.10$) in early or early intermediate seral cottonwood. Bell's vireos (*Vireo belli*), indigo buntings (*Passerina cyanea*) and brown thrashers (*Toxostoma rufum*) occurred predominantly in early or early intermediate seral stages, but no significant differences among seral stages were noted. Expanses of late seral cottonwood on flood plains will likely decline because controlled river flows reduce flooding that is necessary for cottonwood regeneration. Cottonwood regeneration was evident only in narrow bands along the river channels. Cavity nesting species will be the most negatively affected by loss of late seral cottonwood.

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861. Avifauna in oak woodlands of the Willamette Valley, Oregon.

Hagar, Joan C. and Stern, Mark A.

Northwestern Naturalist 82(1): 12-25. (2001)

NAL Call #: QL671.M8; ISSN: 1051-1733

Descriptors: birds/ communities/ ecosystems/ white oak/ forests, deciduous/ succession/ wildlife-habitat relationships/ species diversity/ conservation/ wildlife management/ habitat management/ Oregon, Central

Abstract: Oregon white oak (*Quercus garryana*) woodlands are an important habitat for breeding birds that is threatened by development and altered disturbance regimes. The authors described habitat characteristics and examined species composition and abundance of breeding birds in nine oak woodland sites in the Willamette Valley, Oregon during May and June, 1994 to 1996. Based on comparisons to earlier studies, their results suggest that avian community composition has changed in recent decades. Changes in species composition likely have been associated with a shift from open- to closed-canopy habitats, resulting from successional advancement in the absence of fire. Although there is some evidence that avian species composition has changed to more closely resemble that of closed-canopy, conifer-dominated habitats, oak woodlands in the Willamette Valley nonetheless support both neotropical migrant and resident bird species that are uncommon in or absent from coniferous habitats in western Oregon. The authors identified 12 species currently occurring in oak woodlands that may be negatively affected by the replacement of oak habitats with closed-canopy, conifer-dominated forest. Because conifers dominate much of the forested regions of western Oregon, Willamette Valley oak woodlands provide an important element of regional diversity and should receive priority consideration in conservation planning. The conservation and

management of semi-open woodlands with large-diameter oaks may be particularly critical for some species that have declined in abundance and/or do not occur in dense forests.

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862. Bachman's sparrow habitat in the lower Flint River Basin, Georgia.

Perkins, Micah W. and Conner, L. Mike

Proceedings of the Annual Conference Southeastern Association of Fish and Wildlife Agencies 57: 235-242. (2003)

NAL Call #: SK1.S6; ISSN: 0276-7929

Descriptors: conservation measures/ ecology/ habitat utilization/ terrestrial habitat/ land zones/ *Aimophila aestivalis*: habitat management/ habitat preference/ forest and woodland/ habitat suitability/ habitat availability/ Georgia/ Lower Flint River System/ Aves, Passeriformes, Emberizidae/ birds/ chordates/ vertebrates

Abstract: Bachman's sparrow (*Aimophila aestivalis*) populations are generally declining throughout much of the Southeast, and habitat loss is suspected as the principal force driving declines. Therefore, we assessed the potential effects of current land use practices on Bachman's sparrows (BACS) within the lower Flint River Basin (LFRB). We then used a previously developed habitat model to quantify current available BACS habitat and used common landscape metrics to describe fragmentation of remaining habitat. Prior to major land use changes associated with European settlement, approximately 86% of the LFRB was suitable for BACS. Of this once suitable habitat, 3.8% is now urban, 42.4% is now in agriculture, and 48.2% is now in forests unsuitable for BACS. We estimated that only 3.3% of the original upland forests within the basin remain suitable for BACS. Today, 97.4% of suitable habitat occurs in patches <30 ha with 17.9% of patches fragmented by >1000 m. Small patch size and increased distance between patches combine to yield low proximity indices. Pine plantation management emphasizing prescribed fire and thinning may increase overall habitat availability for BACS while reducing habitat fragmentation. The recent interest in longleaf pine (*Pinus palustris*) restoration may similarly benefit BACS.

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863. Bat activity is low in thinned and unthinned stands of red pine.

Tibbels, A. E. and Kurta, A.

Canadian Journal of Forest Research 33(12): 2436-2442. (2003)

NAL Call #: SD13.C35; ISSN: 00455067.

Notes: doi: 10.1139/x03-177.

Descriptors: forestry/ insect control/ ultrasonic devices/ plantations/ ultrasonic detectors/ ecology/ bats/ forest management/ plantation forestry/ stand structure/ thinning/ Manistee National Forest/ Michigan/ *Pinus resinosa*

Abstract: We investigated the use of red pine (*Pinus resinosa* Ait.) plantations by bats in the Manistee National Forest of Michigan. Using ultrasonic detectors, we compared the activity of bats in the interior of stands of red pine and in openings within the stands, both before and after thinning (mean time after thinning = 7 years). Bat activity was more than 20 times greater in small openings within thinned and unthinned stands than within the stands themselves, and bat activity was associated with greater

insect abundance in openings. Thinning lead to a significant change in structural complexity, as shown by a 39% decrease in basal area and a 45% decline in tree density, although these changes did not lead to an increase in use of red pine stands by bats. Red pine plantations, even after thinning, most likely are too structurally complex and have low insect abundance, making them a largely unsuitable habitat for bats.

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864. Benefits and tradeoffs of timber management for wildlife habitat on industrial and nonindustrial private landownerships (Mississippi).

Barlow, Rebecca Jo. Mississippi State University, 2005.

Notes: Degree: PhD; Advisor: Grado, Stephen C.

Descriptors: wildlife management/ forest management/ geographic information systems/ habitat management/ Pinus spp./ bobwhite quail/ white-tailed deer/ wild turkey/ gray squirrel/ Mississippi

Abstract: Nonmarketed forest outputs such as clean air and water, recreation, and wildlife habitat need to be measured quantitatively, to allow projections of the economic gains and losses associated with varying amounts of these outputs relative to timber production. of particular importance to many landowners is the quantity and value of timber production forgone relative to varying amounts of wildlife habitat created. Scenario planning and Geographic Information Systems (GIS) were used to estimate potential economic gains or losses for Mississippi resulting from manipulations of timber growing stock to produce more or less habitat for Northern bobwhite quail (*Colinus virginianus*), white-tailed deer (*Odocoileus virginianus*), bobcat (*Lynx rufus*), Eastern wild turkey (*Meleagris gallopavo*) and eastern gray squirrel (*Sciurus carolinensis*). Current United States Department of Agriculture (USDA) Forest Service (USFS), Forest Inventory and Analysis (FIA) data, and 2000 USFS Resource Planning Act (RPA) data were examined using the USFS forest-planning model, SPECTRUM, and the GIS software ArcView, to determine effects of management options for wildlife habitat in the North Central Hills, Tombigbee Hills, South Central Hills, and Pine Belt physiographic regions of Mississippi. Baseline scenarios, which maximized Net Present Value (NPV), produced higher Land Expectation Value (LEV) and Equal Annual Income (EAI) values per acre and allocated fewer acres of habitat for all wildlife species in all regions versus managing for wildlife habitat quality. When high quality wildlife habitat was the management objective, improved Northern bobwhite and Eastern wild turkey habitat in the Tombigbee Hills region of the state had the most favorable opportunity costs of any species in any region when compared to Npv maximization in the same region. Low-level Northern bobwhite and white-tailed deer habitat management in the North Central Hills, Central region had the least favorable opportunity costs of all scenarios. Inclusion of fee hunting reduced the cost difference between Npv and wildlife management scenarios in all cases. Simulations that compare management regimes maximizing NPV and optimum wildlife habitat result in quantitative measures useful for land managers to evaluate tradeoffs inherent in multiple-use management, and potential impacts on both state and regional timber inventories and affected economies.

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865. Bicknell's thrushes (*Catharus bicknelli*) in New Brunswick clear cuts: Their habitat associations and co-occurrence with Swainson's thrushes (*Catharus ustulatus*).

Nixon, E. A.; Holmes, S. B.; and Diamond, A. W.

Wilson Bulletin 113(1): 33-40. (2001)

NAL Call #: 413.8 W692; ISSN: 00435643

Descriptors: coexistence/ habitat use/ interspecific interaction/ passerines/ population density/ Canada/ *Abies balsamea*/ *Betula papyrifera*/ *Catharus bicknelli*/ *Catharus ustulatus*/ *Prunus pensylvanica*

Abstract: We studied the use of regenerating clear cuts in the central highlands of New Brunswick by Bicknell's (*Catharus bicknelli*) and Swainson's (*Catharus ustulatus*) thrushes during the 1997 breeding season. Bicknell's Thrushes were found at 57 of the 90 points surveyed on six mountains. Swainson's Thrushes occupied 89 of 90 survey points. Bicknell's Thrushes had a lower probability of detection ($P = 0.40$) than Swainson's Thrushes ($P = 0.76$). Fixed-radius point counts yielded breeding density estimates for birds on individual mountains ranging from about 3-22 pairs/100 ha (average 16 pairs/100 ha) for Bicknell's Thrushes, and from about 39-69 pairs/100 ha (average 51 pairs/100 ha) for Swainson's Thrushes. White birch (*Betula papyrifera*), balsam fir (*Abies balsamea*), and pin cherry (*Prunus pensylvanica*) were the dominant tree species on regenerating sites. Points occupied by Bicknell's Thrushes tended to be at higher elevations than unoccupied points and to have a greater proportion of white birch stems, a greater number of stems in the 5-10 cm diameter class and a lower diversity of trees and shrubs. No attempt was made to characterize Swainson's Thrush habitat since this species was present at virtually all survey points. We believe that relatively young (average height about 4 m) mixed stands of regeneration with moderate to high stem densities provide important habitat for Bicknell's Thrushes in New Brunswick. Suggestions are made about the direction of future research needed to formulate habitat management and conservation plans for this species.

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866. Bioassessment of silvicultural impacts in streams and wetlands of the eastern United States.

Hutchens, J. J.; Batzer, D. P.; and Reese, E.

Water, Air and Soil Pollution 4(1): 37-53. (2004)

NAL Call #: TD172.W36; ISSN: 1567-7230

Descriptors: wetlands/ streams/ bioindicators/ environment management/ forestry/ nature conservation/ environmental policy/ logging/ conservation/ United States, eastern region/ environmental action/ water resources and supplies/ water quality control/ general environmental engineering

Abstract: Bioassessment is a useful tool to determine the impact of logging practices on the biological integrity of streams and wetlands. Measuring biota directly has an intuitive appeal for impact assessment, and biota can be superior indicators to physical or chemical characteristics because they can reflect cumulative impacts over time. Logging can affect stream and wetland biota by increasing sedimentation rates, altering hydrologic, thermal, and chemical regimes, and changing the base of food webs. Biotic impacts of logging on streams compared to wetlands probably differ, and in this paper we review some of those differences. In streams, invertebrates, fishes, amphibians, algae, and macrophytes have been used as indicators of logging impacts. In wetlands, bioassessment is just

beginning to be used, and plants and birds are the most promising indicator taxa. Various best management practices (BMPs) have been developed to reduce the impacts of logging on stream and wetland biota, and we review quantitative studies that have evaluated the efficacy of some of these techniques in streams and wetlands in the eastern United States. Remarkably few studies that address the overall efficacy of BMPs in limiting biotic changes in streams and wetlands after BMP implementation have been published in scientific journals, although some work exists in reports or is unpublished. We review these works, and compile conclusions about BMP efficacy for biota from this body of research.

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867. Biocomplexity and restoration of biodiversity in temperate coniferous forest: Inducing spatial heterogeneity with variable-density thinning.

Carey, A. B.

Forestry 76(2): 127-136. (2003); ISSN: 0015752X

Descriptors: biodiversity/ coniferous forest/ forest management/ restoration ecology/ thinning/ United States
Abstract: Single-species conservation and natural reserves seem insufficient for protecting biodiversity to scientists, and conventional forestry seems suspect in sustainability to much of the public. In north-western USA, comparisons of natural and managed coniferous forests support the idea that both single-species conservation and conventional forestry are unlikely to be successful because biocomplexity is more important than individual habitat elements in maintaining the diversity of forest ecosystems and their capacity to produce useful goods and services. Experiments in inducing heterogeneity into forest canopies support the importance of biocomplexity to various biotic communities including soil organisms, vascular plants, fungi, birds, small mammals and vertebrate predators. Holistic management, however, requires a suite of techniques to direct developmental processes to useful trajectories.

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868. Biotic diversity of Natchez Trace State Forest, western Tennessee.

Franklin, S. B.; Kupfer, J. A.; Grubaugh, J. W.; and Kennedy, M. L.

Environmental Monitoring and Assessment 93(1-3): 31-54. (2004)

NAL Call #: TD194.E5; ISSN: 01676369

Descriptors: biodiversity/ biological inventory/ eastern deciduous forest/ ecological land types/ forest management/ biodiversity/ ecology/ forestry/ biotic community/ biotic resources/ atmospheric chemistry/ forest inventory/ land type/ birds/ conservation of natural resources/ trees/ Tennessee

Abstract: We carried out a multiple-scale assessment of biotic resources within Natchez Trace State Forest (NTSF) in western Tennessee, focusing on the relation between biotic communities and seven previously developed ecological land types (ELT, based on topography and soils). We wanted to test the functional ability of ELTs for biodiversity stewardship. Woody and herbaceous flora as well as herpetofauna and avifauna communities had substantial differences between upland and lowland forests. However, none of the faunal communities distinguished among upland ELTs. In addition, herbaceous taxa also

failed to distinguish upland ELTs. The results suggest the present use of ELTs at NTSF will not be a helpful guide to land stewardship focusing on biodiversity. The disturbance history of the Forest and the mobility of animals are given as potential explanations for a poor relationship between abiotic ELTs and the resident biota. © 2004 Kluwer Academic Publishers.

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869. Bird communities are affected by amount and dispersion of vegetation retained in mixedwood boreal forest harvest areas.

Schieck, J.; Stuart-Smith, K.; and Norton, M.

Forest Ecology and Management 126(2): 239-254. (2000)
 NAL Call #: SD1.F73; ISSN: 03781127.

Notes: doi: 10.1016/S0378-1127(99)00088-2.

Descriptors: bird communities/ harvest/ mixedwood boreal forest/ residual trees/ structured cut-blocks/ avifauna/ boreal forest/ community response/ dispersion
Abstract: We evaluated bird community response to type, amount, and dispersion of trees, snags, and shrubs that were retained at harvest in mixedwood boreal forests of Alberta, Canada. We also evaluated whether the degree of similarity between bird communities in harvest and old-growth areas was related to the type and amount of materials retained at harvest. We combined data from three separate studies to generate a large data set covering a wide range of cut-block structures. Birds were surveyed using point counts and line transects. Residual vegetation was surveyed partially on the ground, and partially from aerial photographs. Bird species commonly associated with parkland and open country habitats had high densities in harvest areas that contained abundant shrubs and few residual trees or snags. Within harvest areas where more trees, particularly large deciduous trees, were retained, and when those trees were retained in clumps, bird communities were more similar to those found in old-growth forests. Thus, by retaining clumps of large trees and snags in harvest areas managers may be able to create habitats that are used by old-growth forest bird species. However, for many forest birds, density was lower in cut-blocks with residual trees and snags than it was in old-growth forest. Results should be interpreted cautiously because survival and reproductive success of forest birds in cut-blocks with residual trees and snags was not determined.

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870. Bird communities associated with harvested hardwood stands containing residual trees.

Rodewald, A. D. and Yahner, R. H.

Journal of Wildlife Management 64(4): 924-932. (2000)
 NAL Call #: 410 J827; ISSN: 0022541X

Descriptors: bird community/ clearcutting/ deciduous forest/ even-aged management/ habitat management/ Pennsylvania/ residual trees/ variable retention system/ avifauna/ community structure/ forest management/ habitat structure/ harvesting/ United States/ *Molothrus ater*/ *Vireo olivaceus*

Abstract: Retention of residual trees in even-aged harvested stands is an alternative to traditional clearcutting, seed-tree, and shelterwood systems, but little is known about effects of new even-aged retention methods on bird communities. Clearcutting on Pennsylvania state forests recently has been replaced by a new forest-management practice termed even-aged reproduction stands with

reservation guidelines (hereafter, EAR stands), in which high densities of trees in multiple crown and size classes (101 live trees/ha \pm 28 SE on study sites) of both commercially and non-commercially important tree species are permanently reserved to maintain species and structural diversity. We compared habitat structure and breeding-bird communities between EAR stands (harvested) and reference stands (unharvested) in 2 state forests of Pennsylvania in 1997-98 and related bird abundance within harvested stands to differences in habitat characteristics among EAR stands and the surrounding landscapes. Total abundance of all bird species combined, abundances of early-successional and edge-habitat guilds, and abundances of many early-successional bird species were significantly higher in EAR stands than in reference stands, but abundances of the forest habitat guild and of 8 forest-associated species were lower in EAR stands. Although EAR stands provide suitable habitat for bird species associated with early-successional forests, abundances of species associated with mature forests were lower in EAR stands than in reference stands despite retention of residual trees. However, some species of forest birds (e.g., red-eyed vireos [*Vireo olivaceus*]), which usually are absent from recent clearcut stands until 12-20 years post-harvest, were often detected in EAR stands. Thus, residual trees in EAR stands provide to forest birds habitat components that are generally lacking in clearcut stands. Because abundances of both forest habitat and forest-canopy nesting guilds declined and abundance of brown-headed cowbirds (*Molothrus ater*) increased with size of EAR stands (especially when >20 ha), managers should consider limiting the size of EAR stands.

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871. Bird communities associated with live residual tree patches within cut blocks and burned habitat in mixedwood boreal forests.

Schieck, Jim and Hobson, Keith A.

Canadian Journal of Forest Research 30(8): 1281-1295. (2000)

NAL Call #: SD13.C35; ISSN: 0045-5067

Descriptors: Aves/ birds/ communities/ density/ ecosystems/ fires-burns/ forestry practices/ forests, boreal/ habitat islands/ habitat management/ wildlife-habitat relationships/ biocenosis/ fire/ Canada/ Alberta

Abstract: By retaining patches of trees in cut blocks, managers expect to retain some forest birds and create bird communities more similar to those found after fires. The authors surveyed birds from a range of patch sizes (1 to >3000 live residual trees), at four ages (2, 15, 30, 60 years), following two disturbance types (harvest, fire) in mixedwood boreal forest. Bird communities varied among patch size, forest ages, and disturbance types. Immediately post-disturbance, bird communities from large patches (>100 residual trees) were more similar to those from old forest than were communities from small patches (<or=10 residual trees). Birds that nest or forage in open or riparian habitats had highest densities in small patches two years post-harvest, whereas birds that nest in large snags had highest densities in small patches two years post-fire. Throughout the chronosequence following both disturbance types, birds from small patches became more similar to those from old forest. Birds that nest and forage in small trees and shrubs were common 15 and 30 years post-disturbance, and generalist forest birds were common 60

years post-disturbance. Birds associated with old forest were present in all patch sizes 15, 30, and 60 years post-disturbance, although larger patches had higher densities of these species.

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872. Bird community structure across riparian buffer strips of varying width in a coastal temperate forest.

Shirley, S. M. and Smith, J. N. M.

Biological Conservation 125(4): 475-489. (2005)

NAL Call #: S900.B5; ISSN: 00063207.

Notes: doi: 10.1016/j.biocon.2005.04.011.

Descriptors: bird communities/ habitat loss/ Pacific Northwest/ riparian forests/ species-area relationships/ avifauna/ buffer zone/ community structure/ habitat loss/ riparian forest/ species richness/ British Columbia/ Canada/ North America/ Vancouver Island/ Aves/ riparia

Abstract: Buffer strips are strips of forest retained along streambanks after harvesting to mitigate negative impacts of forestry on aquatic and riparian fauna and water quality. The capacity of riparian buffer strips of old-growth forest to maintain species richness and abundance of natural bird communities was explored in coastal montane forest on Vancouver Island, Canada. Breeding bird communities in buffer strips of varying widths along rivers were compared with controls of equivalent area in uncut old-growth riparian forest to identify shifts in species richness, diversity, abundance and composition. We observed that effects on riparian bird communities were greatest in very narrow buffers with high amounts of edge habitat. Several forest-interior species were found almost exclusively in wider buffers and abundances dropped dramatically between wide (125 m) and medium (41 m) width buffers with replacement by open-edge species in narrow buffers. Species composition of communities in wide buffers were very similar to controls while narrow buffers shared less than half of their species with controls. Species richness and diversity increased in buffers over the three years while remaining constant in controls. Increases in species richness and abundance within buffers were positively correlated with similar increases in the adjacent clearcuts, suggesting that regeneration in clearcuts may facilitate recolonization of forest in remnant buffers. For the forest-interior species found primarily in wide buffers, buffers >100 m may need to be retained.

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873. Bird-forestry relationships in Canada: Literature review and synthesis of management recommendations.

Wedeles, C. and Donnelly, M.

NCASI Technical Bulletin (892)(2004); ISSN: 08860882

Descriptors: avian communities/ avian populations/ bird communities/ bird conservation regions/ bird populations/ Canada/ forest age/ forest management/ forest products industry/ forest structure/ forestry practices/ natural disturbance/ timber harvest/ biodiversity/strategic planning/ vegetation/ bird-forestry relationships/ landscape-scale assessments/ natural disturbances/ operational planning/ forestry/ biodiversity/ planing/ plants/ productivity/ Aves

Abstract: The influences of forest management on birds in Canada are described. The existing knowledge on the effects of forest management on birds and bird habitat were also described. The synthesis of management recommendations is expected to provide both broad and

specific suggestions which can be of great use to forest managers in contemplating methods to take bird responses to forest management. The practical aspects of forest management with future research needs are also identified. © 2008 Elsevier B.V. All rights reserved.

874. Bird responses to burning and logging in the boreal forest of Canada.

Hannon, Susan J. and Drapeau, Pierre
Studies in Avian Biology 30: 97-115. (2005)
 NAL Call #: QL671.S8; ISSN: 0197-9922.
 Notes: Literature review.

Descriptors: commercial activities/ conservation measures/ terrestrial habitat/ abiotic factors/ land zones/ Canada/ Aves: forestry/ logging/ habitat management/ burning/ logging/ boreal forest communities/ fire/ Alberta/ Quebec/ Saskatchewan/ Aves/ birds/ chordates/ vertebrates
Abstract: We compared how bird communities differed between burned and logged stands in black spruce (*Picea mariana*) forests of the boreal shield in Quebec and mixed-wood forests on the boreal plain in Alberta and Saskatchewan. Bird community composition was quite different in burns and clearcuts shortly after disturbance. In burns, cavity nesters and species that forage on beetles in dead trees predominated, whereas clearcuts were dominated by open-country species. Generally, snag-dependent species decreased and shrub-breeding species increased by 25 yr postfire. Species that forage and nest in canopy trees were more common 25 yr post-logging because of the retention of live residual trees. The bird communities tended to converge over time as the vegetation in burns and logged areas became more similar. Black-backed Woodpeckers (*Picoides arcticus*) and Three-toed Woodpeckers (*Picoides tridactylus*) exploit recently burned coniferous forest to forage on wood-boring insect larvae (*Cerambycidae* and *Buprestidae*) and bark beetle larvae (*Scolytidae*) for a short period after fire and then decline. Black-backs were absent from mature forests and found at low density in old-growth forest. Over the long term, burns may be temporary sources for fire specialists. The major conservation issue for fire-associated species is salvage logging, because woodpecker foraging and nesting trees are removed. Maintenance of suitable amounts of postfire forests spared from salvage logging is essential for sustainable forest management. Climate change is predicted to alter fire cycles: they will be shorter in the prairies leading to a shortage of old-growth forest and will be longer in Quebec leading to a shortage of younger forest.

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875. Bird species diversity and nesting success in mature, clearcut and shelterwood forest in northern New Hampshire, USA.

King, David I. and DeGraaf, Richard M.
Forest Ecology and Management 129(1/3): 227-235. (2000)
 NAL Call #: SD1.F73; ISSN: 0378-1127
Descriptors: Aves/ artificial structures/ birds/ communities/ ecosystems/ forestry practices/ forests/ habitat alterations/ habitat management/ nest predation/ productivity/ species diversity/ wildlife/ wildlife-habitat relationships/ fauna/ diversity/ abundance/ mortality/ nest/ New Hampshire, northern/ New Hampshire: White Mountain National Forest
Abstract: Bird species distribution and predation rates on natural and artificial nests were compared among

unmanaged mature, shelterwood, and clearcut northern hardwoods forest to evaluate the effect of these practices on bird populations. Twenty-three of the 48 bird species detected during the study differed significantly in abundance among unmanaged mature forest, shelterwoods, and clearcuts. Results of multiple regressions of bird abundance and habitat variables suggest that differences in bird species distribution among treatments were the result of differences in habitat structure among treatments. Bird species diversity and species richness were significantly higher in shelterwoods than either mature forest or clearcuts, although there were bird species that occurred exclusively, or nearly so, in each of the three treatments. Predation rates on artificial nests were lowest in mature forest, and predation rates on natural nests was highest in mature forest, although neither of these differences was statistically significant. The authors conclude that use of partial cutting exclusively would result in the decline of several species of mature forest and clearcut specialists, and, consequently, a decrease in species diversity at the landscape scale. The use of a variety of silvicultural techniques is recommended to maintain bird species diversity in forested landscapes. © NISC

876. Bird use of forest structural classes in grand fir forests of the Blue Mountains, Oregon.

Sallabanks, Rex; Riggs, Robert A.; and Cobb, Lynda E.
Forest Science 48(2): 311-321. (2002)
 NAL Call #: 99.8 F7632; ISSN: 0015-749X
Descriptors: *Sialia currucoides*/ *Troglodytes aedon*/ *Passeriformes*/ forestry practices/ habitat alterations/ terrestrial ecology/ cluster analysis/ forest structural classes/ Blue mountains/ ecosystems/ habitat management/ habitat use/ Oregon/ wildlife-human relationships/ commercial enterprises/ wildlife management/ disturbances/ land zones/ mountain bluebird/ house wren
Abstract: We sampled breeding birds in 83 stands in the Blue Mountains, northeastern Oregon, 1994-1996, to describe bird use of forest structural classes in grand fir (*Abies grandis*) forests. We classified stands, based on basal area in different tree-size categories, into six forest structural classes: (1) stand initiation (SI); (2) stem exclusion, open canopy (SEOC); (3) stem exclusion, closed canopy (SECC); (4) understory reinitiation (UR); (5) young forest, multistory (YFMS); and (6) old forest, multistory (OFMS). Most species were detected in all structural classes, but slightly more than one-third of species analyzed (13 of 38) differed in abundance among structural classes ($P < 0.004$). Cluster analysis, based on structural attributes measured in each stand and weighted by avian abundance, grouped birds with similar habitat associations and allowed us to identify "non-SI associates," "SI associates," "structural class generalists," and "mature forest associates." We did not identify any species that could be considered strictly "OFMS associates." With the exception of some SI associates, such as the mountain bluebird (*Sialia currucoides*) and house wren (*Troglodytes aedon*), we found little evidence of structural class specialization by birds. In grand fir forests of the Blue Mountains, ecologists and managers should focus on understanding how specific silvicultural prescriptions influence structural attributes that are correlated with avian abundance, rather than on stand age per se. © NISC

877. Birds of upland oak forests in the Arkansas Ozarks: Present community structure and potential impacts of burning, borers, and forestry practices.

Smith, Kimberly G.; Mlodinow, Michael; Self, Janet S.; Haggerty, Thomas M.; and Hocut, Tamara R.
 In: Proceedings of the Upland Oak Ecology Symposium: History, Current Conditions, and Sustainability, General Technical Report-SRS 73/ Spetich, M.; Asheville, NC: Southern Research Station, Forest Service, U.S. Department of Agriculture, 2004. pp. 243-252.
http://www.srs.fs.usda.gov/pubs/gtr/gtr_srs073/gtr_srs073.pdf

Descriptors: commercial activities/ conservation measures/ ecology/ terrestrial habitat/ abiotic factors/ physical factors/ land zones/ Aves: forestry/ Impact on community structure in upland oak forest/ habitat management/ burning of upland oak forest/ Impact on community structure/ community structure/ influencing factors/ forest and woodland/ upland oak forest/ fire/ Arkansas/ Ozark region/ community structure in upland oak forest/ Aves/ birds/ chordates/ vertebrates

Abstract: Based on published works, our own research, and the U.S. Forest Service's R8 Bird database, we characterize breeding bird communities in mesic and xeric upland hardwood forests of the Arkansas Ozarks. Although 59 species have been recorded as breeding, typical breeding assemblages in mesic forests are 20-25 species, with only 5 species commonly found in xeric forests. Due to changes in forest composition, the breeding assemblages of today were probably rare or absent from the Ozarks 150 years ago. Any forestry practice that opens the closed canopy increases the number of species in upland hardwood forests. Development of a shrub-layer allows a difference suite of birds to occupy the forest, which typically would be unsuitable habitat for them. Relatively few birds occur in upland forest in fall migration and especially winter, but many migrants use this habitat in spring. The recent decline in oaks due to the borer infestation may dramatically change the avifauna of this upland habitat. Prescribed burning in deciduous forests may also have positive and negative effects, which need further investigation. Cowbirds do not occur in upland forests, and their spread should be limited by the lack of feeding sites.
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878. Black bear home-range sizes in Washington: Climatic, vegetative, and social influences.

Koehler, Gary M. and Pierce, D. John
Journal of Mammalogy 84(1): 81-91. (2003)
 NAL Call #: 410 J823; ISSN: 0022-2372

Descriptors: Ursus americanus/ Ursidae/ Euarctos americanus/ American black bear/ wildlife-habitat relationships/ classification by gender/ home-range size/ private land/ public land/ browse plants/ age-sex relationships/ habitat management/ forage availability/ land management/ social behavior/ habitat use/ aerial census/ North America/ adaptive kernels/ forest practices/ vegetative conditions/ land zones/ cover types/ error polygons/ precipitation/ climate/ female/ male/ Washington, USA/ utilization/ rain/ shrubs/ reproduction/ ecosystems/ silviculture/ cover/ food/ telemetry/ trees/ forests

Abstract: We evaluated size of home ranges for male and female black bears (*Ursus americanus*) at 3 study sites in Washington to determine whether home-range sizes differed between sexes, study sites, and objectives of forest management. Vegetative conditions differed among study

sites as a result of differences in mean annual precipitation (52, 200, and 380 cm/year) and forest management practices. We analyzed ranked proportions of forest-cover types within error polygons for telemetry locations as measures of use, interspersion, and juxtaposition of cover types and compared these with ranks of cover types available within composite home ranges for all bears in each study site and with those available within adaptive-kernel home ranges for individual bears. Fixed-kernel estimates of home ranges for males were 3.8 times larger than those for females. Home-range size for females differed ($P=0.04$) between study sites but home-range size for males did not ($P=0.79$). In the study site with intensively managed and relatively undisturbed forestlands, home ranges for females were of similar size. Males and females occupied cover types different from that available within study sites and within individual home ranges. Differences among study sites for home-range sizes for females may be correlated to differences in available forage plants and cover, which may be explained by differences in annual precipitation. Behavioral differences for males and females, too, may explain differential use of forest-cover types. Hence, differences in home-range sizes between males and females and among regions may result, in part, from climatic and vegetative conditions, as well as from social status.

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879. Black-throated blue warbler and veery abundance in relation to understory composition in northern Michigan forests.

Kearns, Laura J.; Silverman, Emily D.; and Hall, Kimberly R.
Wilson Journal of Ornithology 118(4): 461-470. (2006)
 NAL Call #: QL671.W55 ; ISSN: 1559-4491

Descriptors: conservation measures/ ecology/ terrestrial habitat/ land zones/ *Catharus fuscescens*/ *Dendroica caerulescens*: habitat management/ Hardwood forests/ population dynamics/ forest and woodland/ relations with understory composition/ implications for habitat management/ Michigan/ Mackinac County/ Hiawatha National Forest/ Aves, Passeriformes, Parulidae/ birds/ chordates/ vertebrates

Abstract: Balsam fir (*Abies balsamea*) understory may be an important predictor of Black-throated Blue Warbler (*Dendroica caerulescens*) and Veery (*Catharus fuscescens*) distributions in northern hardwood forests that are heavily browsed by white-tailed deer (*Odocoileus virginianus*). We examined the abundance and age ratios of Black-throated Blue Warblers, and the abundance of Veerys, in 16 plots of hardwood forest with different understory composition within a heavily browsed region of the Hiawatha National Forest in Michigan's eastern Upper Peninsula. Four of these 36-ha plots had minimal understory and 12 had dense understory with variable amounts of balsam fir. Black-throated Blue Warbler abundance was significantly greater in plots with an average of 27% balsam fir understory cover than in plots dominated by deciduous understory; no Black-throated Blue Warblers were detected on the minimal understory plots. Age ratios did not differ significantly relative to balsam fir understory density. Veery abundance also did not vary with balsam fir understory density, but it increased with overall understory density. In forests such as these, where deer are abundant but rarely browse balsam fir,

active management of balsam fir understory could provide key habitat for sustaining populations of Black-throated Blue Warblers and Veerys. We recommend that managers consider the presence of balsam firs in the understory when planning forest harvests in deer-impacted areas, so that they leave some balsam fir and stagger the cutting of stands with balsam fir over time to create and maintain heterogeneous understory structure.
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880. Boreal bird community response to jack pine forest succession.

Venier, Lisa A. and Pearce, Jennie L.
Forest Ecology and Management 217(1): 19-36. (2005)
NAL Call #: SD1.F73; ISSN: 0378-1127
Descriptors: Passeriformes/ Aves/ age ratio/ biodiversity/ bird community response/ breeding season/ Canada/ communities/ distribution/ habitat use/ forests/ ecosystems/ forest succession/ forestry practices/ habitat alterations/ habitat availability/ land zones/ North America/ White River vicinity/ Ontario/ density/ population ecology/ species composition/ succession/ birds/ Biocenosis/ fauna/ diversity/ habitat/ abundance/ dispersion/ ecological requirements/ habitat management
Abstract: The objective of this study was to examine bird communities in regenerating (5-25 years) and mature (40-100 years) jack pine (*Pinus banksiana*) forest in boreal Ontario. The study area was located near White River in north central Ontario with an area of 187,800 ha. We explored the response of bird community structure to stand age, and the influence of stand age on the distribution of individual species. We were interested in two principal questions. The first was how unique are the bird communities to specific age classes. If bird communities are highly specific to age classes then alterations to the age class distribution of the forest can have important impacts on the overall bird community composition and structure. The second question was how specific are individual species to age classes. Species that are highly specific to a single age class are expected to be highly sensitive to the amount and potentially the configuration of that age class on the landscape. We sampled birds for three breeding seasons. The number of bird species increased with stand age. Tree species composition did not change as stands aged, but there were distinctive changes in vegetation structure through succession. For example, the total amount of vertical vegetation structure increased significantly with age. More than half of the bird species examined were significant indicators of individual age classes. Blue-headed vireo, brown creeper, black-throated green warbler, golden-crowned kinglet, ovenbird and red-breasted nuthatch were all significant indicators of the mature age class. The bird assemblage of mature stands was significantly different from that of regenerating forest and within regenerating forest, 3-5-year-old stands contained a significantly different bird assemblage to that of 8-25-year-old regenerating forest. These results suggest that the distribution of forest age classes on the landscape is a critical element in determining habitat availability and therefore the viability of boreal bird populations in managed forests. © 2005 Elsevier B.V. All rights reserved.
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881. Bottomland hardwood reforestation for neotropical migratory birds: Are we missing the forest for the trees?

Twedt, Daniel J. and Portwood, Jeff
Wildlife Society Bulletin 25(3): 647-652. (1997)
NAL Call #: SK357.A1W5; ISSN: 0091-7648
Descriptors: behavior/ birds/ bottomlands/ ecosystems/ forestry practices/ forests, deciduous/ habitat management/ habitat use/ management/ migration/ succession/ wildlife/ bottomland forests/ afforestation/ wild birds/ natural resources/ forest practices/ forests/ growth/ habitat management for wildlife/ hardwoods/ land, private/ oak/ plant succession/ planting/ rehabilitation/ seeding/ species diversity/ wildlife management/ neotropical migrant
Abstract: The authors identify the benefits derived by land managers and wildlife resources when fast-growing trees, such as cottonwood or sycamore, alone or mixed with oaks, are established on lands under cultivation. Reforestation with fast-growing species promotes rapid colonization of sites by forest-breeding neotropical migrants. The authors recommend silvicultural practices to promote succession from the fast-growing trees to forests dominated by heavy-seeded, slow-growing species. klf.
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882. Breeding and post-breeding habitat use by forest migrant songbirds in the Missouri Ozarks.

Pagen, R. W.; Thompson, F. R.; and Burhans, D. E.
Condor 102(4): 738-747. (2000)
NAL Call #: QL671.C6; ISSN: 00105422
Descriptors: early-successional/ habitat use/ Missouri Ozarks/ post-breeding/ songbirds
Abstract: We compared habitat use by forest migrant songbirds during the breeding and post-breeding periods in four Missouri Ozark habitats: mature upland forest, mature riparian forest, 9- to 10-year-old upland forest, and 3- to 4-year-old upland forest created by clearcutting. Adult forest-ground species showed a decrease in abundance in all habitats during the post-breeding period, but hatching-year birds of one of the two forest-ground species were most abundant in early-successional forest during this time. Adults of the two forestcanopy species tended to increase in abundance in 3- to 4-year-old forest from breeding season to post-breeding season. During the breeding season, some forest species were detected with mist-nets in the two early-successional habitats, but infrequently or not at all with point counts in those habitats. Forest birds captured in early-successional habitats during the breeding season may have been nonbreeding floaters, or may have been foraging there from nearby territories in mature forest. Dense shrubs or young trees in early-successional forest may provide habitat for nonbreeding and post-breeding forest migrant songbirds in the Missouri Ozarks.
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883. Breeding biology of the yellow-billed cuckoo relative to timber harvest in a bottomland hardwood forest.

Wilson, Jennifer Karen. University of Georgia, 2000.
Notes: Advisor: Chapman, Brian R.
Descriptors: forestry/ thinning/ birds/ yellow-billed cuckoo/ habitat management/ nesting success/ breeding/ bottomland hardwood forests

Abstract: I studied the breeding biology of the Yellow-billed Cuckoo in relation to thinning cuts and patch cuts at White River National Wildlife Refuge, from 1994-1997. Nesting success, basic nesting ecology, nest-site selection, and nest-patch selection were compared between harvested study plots and control plots before and after harvest. Yellow-billed Cuckoos were observed nesting from April-August each year. No time or treatment effect on mean clutch size was detected. Predation accounted for the majority of nest failures observed. Nests constructed on thinned plots had a lower survival probability than nests built prior to harvest. Nesting success increased within the breeding season. Unsuccessful nests located on thinned plots also had a lower mean nest height than did successful nests, suggesting that higher nests had a better survival probability. Nests of this species were located in forest tree gaps in various successional stages. I found no evidence of timber harvest or nesting outcome influencing patch characteristics. These results suggest that the thinning treatment used did impact the ability of the Yellow-billed Cuckoo to successfully breed on the refuge. Since the results reported come from a single study site, and the study was not replicated over space and time, I cannot state that the manipulations studied similarly affect the breeding biology of this species throughout its range.
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884. Breeding bird response to riparian buffer width in managed Pacific Northwest Douglas-fir forests.

Pearson, S. F. and Manuwal, D. A.
Ecological Applications 11(3): 840-853. (2001)
NAL Call #: QH540.E23 ; ISSN: 10510761

Descriptors: American robin/ bird species richness/ black-throated gray warbler/ breeding bird density/ Douglas-fir forest/ Pacific-slope flycatcher/ riparian bird community/ riparian buffer width/ riparian forest management/ species turnover/ winter wren/ breeding population/ community response/ forest management/ habitat selection/ riparian forest/ United States/ *Alnus rubra*/ *Bombycilla cedrorum*/ *Certhia americana*/ *Dendroica nigrescens*/ *Empidonax difficilis*/ *Junco hyemalis*/ *Melospiza melodia*/ *Regulus satrapa*/ *Rubus spectabilis*/ *Troglodytes troglodytes*/ *Turdus migratorius*

Abstract: We examined the relative importance of riparian vs. upland habitats to breeding birds by comparing species abundance, richness, and similarity of bird communities in managed Douglas-fir forests in western Washington State, USA. We also examined whether forested buffer strips along second- and third-order streams effectively maintain the pre-logging riparian breeding bird community by comparing species abundance, richness, and turnover among three treatments: (1) unharvested controls; (2) sites that were clear-cut, leaving a narrow (~14 m) forested buffer on both sides of the stream; and (3) sites that were clear-cut, leaving a wide (~31 m) forested buffer along both sides of the stream. Deciduous trees, berry-producing shrubs, and other deciduous shrubs less common in adjacent upland forest characterized streamside zones. Despite different vegetation features, riparian and upland habitats did not differ in any measures of bird species richness and composition. No species or species group was more abundant in the upland. Neotropical migrants, resident species, and species associated with deciduous trees and shrubs in forested habitats were more abundant in riparian habitats than in adjacent uplands. Total bird

abundance and abundance of four species (American Robin [*Turdus migratorius*], Pacific-slope Flycatcher [*Empidonax difficilis*], Black-throated Gray Warbler [*Dendroica nigrescens*], and Winter Wren [*Troglodytes troglodytes*]) were higher in riparian habitats. Abundance of these riparian associates was correlated with percent cover of berry-producing shrubs and the number of deciduous trees in the canopy. We found that the number of breeding bird species on sites with narrow buffers increased from slightly fewer than controls before harvest to an average of 10 more species than controls after harvest, a change reflected in an average 20% increase in species turnover on narrow-buffer sites relative to controls. Total bird abundance did not differ between treatments and controls. Resident species, those species associated with shrubs in forested habitats and conifer trees, declined on both buffer treatments. Species associated with upland and riparian forests (Black-throated Gray Warbler, Golden-crowned Kinglet [*Regulus satrapa*], and Brown Creeper [*Certhia americana*]) decreased in abundance on riparian buffer treatments relative to controls, whereas species associated with open, shrubby habitats (Dark-eyed Junco [*Junco hyemalis*], Cedar Waxwing [*Bombycilla cedrorum*], and Song Sparrow [*Melospiza melodia*]) increased in abundance on one or both riparian buffer treatments. High species turnover on narrow-buffer treatments indicated that buffers <14 m on each side of the stream did not maintain the pre-logging bird community. There was little difference in species turnover or species richness between the wide-buffer treatment and the control, indicating that a 30-m buffer on both sides of second-order and third-order streams maintains most of the pre-logging bird community in the first two years postharvest. The Black-throated Gray Warbler was the only riparian associate to decline on both the narrow- and wide-buffer treatments; its abundance was positively correlated with buffer width, and a buffer ≥ 45 m wide on each side of second- and third-order streams was needed to support populations at densities found on unharvested controls. To maintain the entire breeding bird community associated with forested riparian habitats in the coastal Northwest, we recommend a minimum buffer of 45 m along both sides of second- and third-order streams. Habitat features such as deciduous trees (*Alnus rubra* and *Acer macrophyllum*) and berry-producing shrubs (especially *Rubus spectabilis*) appear to be important and should be maintained within forested riparian buffer strips. This study documents short-term effects of riparian treatments on the breeding bird community, which may take several years to respond to habitat manipulations. Thus, we recommend continued monitoring to assess long-term effects of buffer width reduction.
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885. Breeding bird response to riparian forest harvest and harvest equipment.

JoAnn Hanowski, J.; Danz, N.; Lind, J.; and Niemi, G.
Forest Ecology and Management 174(1-3): 315-328. (2003)
NAL Call #: SD1.F73

Descriptors: breeding bird communities/ buffers/ Cut-to-length/ forest/ Minnesota/ riparian/ Principle response curves/ streams/ buffers

Abstract: We examined response of breeding bird communities to timber harvest in riparian areas using two harvest techniques (full tree harvest and cut-to-length (CTL)) along first to third order streams in northern

Minnesota, USA. Although many studies have quantified bird response to riparian buffer harvest, we are unaware of any study that examined the response of breeding birds to riparian forest harvest using different cutting practices. We compared community composition, total abundance and species richness, as well as abundance of six individual species on plots within four treatments (three plots/treatment) completed within 30 m on both sides of the stream. Treatments in the riparian area (30 m on both sides of the stream) were: (1) riparian control (no harvest); (2) reduction of basal area to an average of 7-10 m²/ha with full tree harvest system; (3) reduction of basal area to an average of 7-10 m²/ha with CTL harvest system; and (4) control (no harvest in riparian area or upland). For treatments 1, 2, and 3, adjacent upland forests on the plots were clearcut. Bird surveys were completed 1 year prior to, and 3 years after harvest and revealed a significant response of the bird community to timber harvest in the riparian area. Bird communities were most affected by tree removal with both harvest methods, but harvest type also affected bird communities. Early-successional species, e.g. song sparrow (*Melospiza melodia*), white-throated sparrow (*Zonotrichia albicollis*), mourning warbler (*Oporornis philadelphia*), and chestnut-sided warbler (*Dendroica pensylvanica*) were associated with harvested plots, whereas forest species, e.g. scarlet tanager (*Piranga olivacea*) and black-throated green warbler (*Dendroica virens*) were associated with riparian control and control plots. Of six individual species tested for response to riparian harvest treatment over time, only the ovenbird (*Seiurus aurocapillus*) showed a significant time by treatment interaction. Ovenbird numbers decreased in both the CTL and full tree harvest plots through 2000, when no individuals were observed. Two other forest-dependent species, black-throated green warbler and hermit thrush (*Catharus guttatus*), showed similar responses to treatment as the ovenbird. The winter wren (*Troglodytes troglodytes*) responded positively to the greater amount of slash that was left on-plot with the CTL harvest system. However, with the exception of the winter wren, we found that bird species and communities did not differ in their response to harvest system.

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886. Breeding birds in forestry plantations and natural forest in the vicinity of Fundy National Park, New Brunswick.

Johnson, G. A. M. and Freedman, B.
Canadian Field Naturalist 116(3): 475-487. (2002)
 NAL Call #: 410.9 Ot8 ; ISSN: 00083550
Descriptors: breeding birds/ forestry/ Fundy National Park/ monitoring/ New Brunswick/ plantations/ abundance/ avifauna/ breeding population/ community composition/ plantation/ species diversity/ Canada
Abstract: We studied the populations of breeding birds in five reference stands of natural mixedwood forest and 11 conifer plantations up to 21-years old in southern New Brunswick, Canada. Variations of the distribution and abundance of birds were related to changes in the plant-species composition and structural attributes of their habitat. Bird species occurred in plantations in levels of abundance and diversity similar to that of reference forest, although community composition was highly dissimilar. Species of reference stands were typical of mature, mixedwood forest. Species of younger plantations were

typical of open, early successional, upland habitats. Once the plantations became older than 13 years and the tree height exceeded about 5 m, birds typical of conifer forest began to invade the habitat, resulting in a mixed-species composition. Although cavity-containing snags were rare in the plantations, if they did occur in them or near their edge they were used by hole-nesting birds. Although we could not study a complete rotation, the field data and habitat trajectory suggest that the plantations will not support some elements of the avian biodiversity of the natural forest in the study area. The mature plantations will be highly depauperate in coarse-woody debris, snags, and cavities, and will not support species dependent on these critical habitat elements. In addition, birds requiring habitat containing trees of larger size and of various species, including hardwoods, will not find the mature plantations to be suitable. To accommodate the needs of species potentially at risk from the extensive development of plantations, the following changes in forestry management practices should be instituted: (1) retention of natural cavity-trees, snags, coarse-woody debris, and hardwood trees and shrubs in residual non-harvested "islands" within clearcuts and plantations; (b) retention of a patchy angiosperm component by leaving some areas untreated during herbicide applications; and (c) setting aside large areas of natural forest as non-harvested protected areas. Although we believe that these mitigations would help sustain elements of indigenous biodiversity that are at risk in an extensive industrial forest, we stress that these predictions would have to be tested through additional research and monitoring.

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887. Breeding birds in riparian and upland dry forests of the Cascade Range.

Lehmkuhl, John F.; Burger, E. Dorsey; Drew, Emily K.; Lindsey, John P.; Haggard, Maryellen; and Woodruff, Kent Z.
Journal of Wildlife Management 71(8): 2632-2643. (Nov. 2007)
 NAL Call #: 410 J827
Descriptors: birds/ breeding/ wildlife habitat/ forest management/ upland dry forests/ upland mesic forests/ riparian forests/ Cascade Range/ Washington
Abstract: We quantified breeding bird abundance, diversity, and indicator species in riparian and upland dry forests along 6 third- to fourth-order streams on the east slope of the Cascade Range, Washington, USA. Upland dry forest on southerly aspects was dominated by open ponderosa pine (*Pinus ponderosa*) and dry Douglas-fir (*Pseudotsuga menziesii*) plant associations. Upland mesic forest on northerly aspects was dominated by closed-canopy Douglas-fir or dry grand fir (*Abies grandis*) plant associations. Riparian overstory vegetation was dominated by black cottonwood (*Populus trichocarpa*) plant associations with a prominent hardwood tree and shrub component. We quantified bird assemblages, diversity, and abundance from parallel point transects on riparian and adjacent dry and mesic upslope forests. We detected 80 bird species from >12,000 point-transect observations during 1998-1999. Eighteen species accounted for 75% of all detections. Species richness and evenness were similar in all 3 forest types, with approximately 35 species and high evenness (0.85) in each forest type. Bird species assemblages differed among dry, mesic, and riparian forest

types, with the greatest differences between riparian and both dry and mesic upland forests. Riparian forest had the greatest number (9) of strong characteristic, or indicator, species among the 3 forest types. Upland mesic forest was characterized by 7 indicator species. Upland dry forest had 4 indicator species. Our results indicate that current standards and guidelines for riparian buffers zones would allow for avian refuge and corridor functions along these streams. Forest managers could use our indicator species to predict and monitor shifts in upland forest species composition from thinning and prescribed burning practices that are used to reduce fuels in uplands and to reduce continuity of fire effects between riparian and upland zones.
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888. Breeding birds of even- and uneven-aged pine forests of eastern Texas.

Thill, R. E. and Koerth, N. E.

Southeastern Naturalist 4(1): 153-176. (2005)

NAL Call #: IPSP11706 ; ISSN: 15287092

Descriptors: pine forests/ forest management/ thinning/ breeding/ birds/ Texas

Abstract: While single-tree selection, uneven-aged management is being used increasingly on southern national forests as an alternative to clearcutting and planting of pine, its effects on wildlife are largely unknown. We compared breeding season bird abundance, species richness, diversity, and composition among uneven-aged stands and six seral stages of even-aged stands in upland pine (predominantly loblolly pine, *Pinus taeda* Linnaeus) forests of eastern Texas. Even-aged stands 18-80 years old generally had the lowest abundance, richness, and diversity of birds; uneven-aged stands and even-aged stands 1-9 years old generally had comparable values for all three of these measures. Numbers of migrants were highest in seedling, sapling, and pre-commercially thinned even-aged stands. Although many migrants were encountered in uneven-aged stands, their frequencies of occurrence there (even in the most recently harvested stands) were generally less than in early seral even-aged stands. While overall bird abundance, species richness, and diversity under single-tree selection may be comparable or higher than that found throughout most of a typical national forest even-aged rotation, our data suggest that single-tree selection management will not provide suitable habitat for many migrant species that require early succession conditions.

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889. Breeding songbird abundance related to secondary succession in the subarctic forests of western Labrador.

Schwab, F. E.; Simon, N. P. P.; and Carroll, C. G.

Ecoscience 8(1): 1-7. (2001)

NAL Call #: QH540.E366; ISSN: 11956860

Descriptors: fire/ Labrador/ secondary succession/ snags/ songbirds/ subarctic forest/ abundance/ breeding population/ disturbance/ forest fire/ secondary succession/ snag/ songbirds/ Canada/ *Betula papyrifera*

Abstract: To describe the effects of natural disturbance on birds in western Labrador, we mapped songbird territories in fourteen 10-ha plots originating by natural fire. Plots were 2, 18, 40, < 70 (young conifer) and > 135 years old (mature conifer and mature white birch, *Betula papyrifera*, forests). Three species, dark-eyed junco, white-throated sparrow

and ruby-crowned kinglet, accounted for 50% of all bird records. Bird density and species richness peaked in 2-year-old burns and mature forest stages. High bird densities in 2-year-old burns were likely due to high snag densities. Most species were not unique to a particular age since disturbance, but there were different species in early, <40-year-old burns, and later stages. Some birds such as yellow-billed flycatcher and Swainson's thrush were exclusive to white birch forests, a rare forest type in western Labrador.

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890. Bridging native and scientific observations of snowshoe hare habitat restoration after clearcutting to set wildlife habitat management guidelines on Waswanipi Cree land.

Jacqmain, H.; Belanger, L.; Hilton, S.; and Bouthillier, L.

Canadian Journal of Forest Research 37(3):

530-539.(Mar. 2007)

NAL Call #: SD13.C35

Descriptors: habitat management/ snowshoe hare/ forest management/ tribal peoples/ Quebec/ Canada

Abstract: Large-scale timber harvesting in the northern black spruce forest, on Quebec Cree territory, causes immediate loss of productive wildlife habitat for Cree hunters. Duration of this impact is key information to improve forest management. The objective here was to examine the postharvesting habitat restoration delay for snowshoe hare, a species valuable to Cree hunters, as well as a wildlife indicator of the sapling stage. A minimum threshold for vegetation development was established, at which the return of hare populations is considered acceptable by Cree hunters. To do so, an adaptive approach was used, combining Cree hunter knowledge and biological assessment. Hare populations were monitored in 36 cut blocks, ranging from 0 to 30 years after harvest. Cree hunters were interviewed to determine when a cut block becomes adequate for snaring. The combined analysis of the two knowledge sources indicated that stands that meet the threshold average 4 m in height, 6300 trees/ha in density, and are aged between 13 and 27 years. Current regulation sets this threshold at 3 m in height, regardless of cut block scale, and at 20 years postcut when considering family hunting ground scale, and thus, does not fully meet sustainable resource development objectives. This citation is from AGRICOLA.

891. Burning for wild turkey.

Speake, D.

Forest Landowner 62(1): 28-29. (2003)

NAL Call #: SD144.A15F67; ISSN: 10879110

Descriptors: combustion/ competition/ cost effectiveness/ vegetation/ habitat management/ forestry

Abstract: The use of burning as a tool for control of vegetation for food and cover is discussed. It is a cost-effective, natural force that plants and animals are adapted to and it can be used over large areas in a short period of time. The use of controlled burning along with other habitat controls to manage the wild turkey habitats was also discussed.

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892. Burrow availability and desiccation risk of mole salamanders (*Ambystoma talpoideum*) in harvested versus unharvested forest stands.

Rothermel, B. B. and Luhring, T. M.

Journal of Herpetology 39(4): 619-626. (2005)

NAL Call #: QL640.J6; ISSN: 00221511.

Notes: doi: 10.1670/251-04A.1.

Descriptors: Ambystoma/ *Ambystoma talpoideum*/ Ambystomatidae/ Amphibia/ Amphiuma means/ Caudata/ Pinus taeda

Abstract: Clearcutting and other forest management practices that remove canopy and disturb ground cover may exacerbate the risk of desiccation, particularly for newly metamorphosed amphibians. We examined dehydration rates of juvenile Mole Salamanders (*Ambystoma talpoideum*) in relation to burrow availability in four experimental forest management treatments. Juvenile salamanders (N = 41) were confined to small enclosures in four treatments representing a range of habitat disturbance: clearcut with coarse woody debris (CWD) removed; clearcut with CWD retained; thinning; and an unharvested control of second-growth, mature loblolly pine. Half of the salamanders in each habitat treatment were provided with artificial burrows. Water loss over 72 h was significantly higher in the clearcut with CWD retained than in the other three treatments. Most water loss occurred during the first two nights, when salamanders may have been most active. Only 40% of salamanders without burrows survived in the clearcuts, versus 90% in the thinned stand and 100% in the control. Ninety percent of the salamanders with access to a burrow survived in the clearcuts versus 100% in the thinning and control. We found no correlation between soil moisture and water loss and attribute higher desiccation rates in the clearcuts to high temperatures (> 44°C). Although habitat changes resulting from thinning did not lead to increased desiccation, complete canopy removal greatly increased risk of mortality caused by desiccation. Our results also demonstrate that this risk is strongly mediated by the availability of burrows. © 2005 Society for the Study of Amphibians and Reptiles.
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893. Canada lynx (*Lynx canadensis*) habitat and forest succession in northern Maine, USA.

Hoving, C. L.; Harrison, D. J.; Krohn, W. B.; Jakubas, W. J.; and McCollough, M. A.

Wildlife Biology 10(4): 285-294. (2004)

NAL Call #: SK351.W663; ISSN: 09096396

Descriptors: Akaike's information criterion/ AIC/ habitat/ *Lepus americanus*/ *Lynx canadensis*/ Maine/ model/ regeneration/ succession/ lynx/ *Lynx lynx*

Abstract: The contiguous United States population of Canada lynx, *Lynx canadensis*, was listed as threatened in 2000. The long-term viability of lynx populations at the southern edge of their geographic range has been hypothesized to be dependent on old growth forests; however, lynx are a specialist predator on snowshoe hare *Lepus americanus*, a species associated with early-successional forests. To quantify the effects of succession and forest management on landscape-scale (100 km²) patterns of habitat occupancy by lynx, we compared landscape attributes in northern Maine, USA, where lynx had been detected on snow track surveys to landscape attributes where surveys had been conducted, but lynx tracks had not been detected. Models were constructed a

priori and compared using logistic regression and Akaike's Information Criterion (AIC), which quantitatively balances data fit and parsimony. In the models with the lowest (i.e. best) AIC, lynx were more likely to occur in landscapes with much regenerating forest, and less likely to occur in landscapes with much recent clearcut, partial harvest and forested wetland. Lynx were not associated positively or negatively with mature coniferous forest. A probabilistic map of the model indicated a patchy distribution of lynx habitat in northern Maine. According to an additional survey of the study area for lynx tracks during the winter of 2003, the model correctly classified 63.5% of the lynx occurrences and absences. Lynx were more closely associated with young forests than mature forests; however, old-growth forests were functionally absent from the landscape. Lynx habitat could be reduced in northern Maine, given recent trends in forest management practices. Harvest strategies have shifted from clearcutting to partial harvesting. If this trend continues, future landscapes will shift away from extensive regenerating forests and toward landscapes dominated by pole-sized and larger stands. Because Maine presently supports the only verified populations of this federally threatened species in the eastern United States, changes in forest management practices could affect recovery efforts throughout that region.

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894. A case for using plethodontid salamanders for monitoring biodiversity and ecosystem integrity of North American forests.

Welsh, H. H. and Droege, S.

Conservation Biology 15(3): 558-569. (2001)

NAL Call #: QH75.A1C5; ISSN: 0888-8892.

Notes: Literature review.

Descriptors: biodiversity/ canopy/ ecosystems/ forest health/ forests/ microclimate/ microhabitats/ monitoring/ small mammals/ Amphibia/ birds/ Caudata/ Lepidoptera/ North America/ vertebrates/ Chordata/ animals/ insects/ arthropods/ invertebrates

Abstract: Terrestrial salamanders of the family Plethodontidae have unique attributes that make them excellent indicators of biodiversity and ecosystem integrity in forested habitats. Their longevity, small territory size, site fidelity, sensitivity to natural and anthropogenic perturbations, tendency to occur in high densities, and low sampling costs mean that counts of plethodontid salamanders provide numerous advantages over counts of other North American forest organisms for indicating environmental change. Furthermore, they are tightly linked physiologically to microclimatic and successional processes that influence the distribution and abundance of numerous other hydrophilic but difficult-to-study forest-dwelling plants and animals. Ecosystem processes such as moisture cycling, food-web dynamics, and succession, with their related structural and microclimatic variability, all affect forest biodiversity and have been shown to affect salamander populations as well. We determined the variability associated with sampling for plethodontid salamanders by estimating the coefficient of variation from available time-series data. The median coefficient of variation indicated that variation in counts of individuals among studies was much lower in plethodontids (27%) than in lepidoptera (93%), passerine birds (57%), small mammals (69%), or other amphibians (37-46%), which means

plethodontid salamanders provide an important statistical advantage over other species for monitoring long-term forest health.

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895. Cattle grazing in a national forest greatly reduces nesting success in a ground-nesting sparrow.

Walsberg, Glenn E.

Condor 107(3): 714-716. (2005)

NAL Call #: QL671.C6; ISSN: 0010-5422

Descriptors: dark-eyed junco/ *Pinus ponderosa*/ *ponderosa* pine/ Arizona/ cattle grazing/ Coconino County, Kaibab National Forest/ commercial enterprises/ disturbances/ farming and agriculture/ forest/ grazing/ habitat destruction/ land zones/ nesting success/ North America/ predation/ productivity/ reproduction/ savanna/ terrestrial ecology/ vegetation cover/ wildlife-human relationships/ *Junco hyemalis*

Abstract: Grazing of domestic livestock on public lands in the western United States is a major source of habitat destruction. I quantified nest success of ground-nesting Dark-eyed Juncos (*Junco hyemalis*) breeding in *ponderosa* pine forests and pine savanna in the Kaibab National Forest of northern Arizona. Comparison of results for areas grazed by cattle to results for immediately adjacent areas protected from grazing revealed that cattle grazing was associated with a dramatic (75%) reduction in nest success. Cattle grazing reduced vegetation cover over nests by an average of 41%, exposing the nest to more extreme climatic conditions as well as possibly making them more conspicuous to predators.

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896. Cavity-nester habitat development in artificially made Douglas-fir snags.

Brandeis, T. J.; Newton, M.; Filip, G. M.; and Cole, E. C.

Journal of Wildlife Management 66(3): 625-633. (2002)

NAL Call #: 410 J827; ISSN: 0022541X

Descriptors: beetle colonization/ Decay development/ Douglas-fir/ *Fomitopsis cajanderi*/ *Fomitopsis pinicola*/ Fungal inoculation/ Oregon/ *Phellinus pini*/ *Phlebiopsis gigantea*/ *Pseudotsuga menziesii*/ snags/ wildlife habitat/ beetle/ cavity/ nesting/ wildlife management/ *Cryptoporus volvatus*/ *Dendroctonus*/ *Dryocopus pileatus*/ *Fomitopsis cajanderi*/ *Fomitopsis pinicola*/ *Phellinus pini*/ *Phlebiopsis gigantea*/ *Picoides villosus*/ *Pseudotsuga menziesii*/ *Trichaptum abietinum*

Abstract: Standing dead trees, or snags, are a source of foraging habitat and nesting cavities for wildlife. We evaluated the efficacy of creating Douglas-fir (*Pseudotsuga menziesii*) snags (by girdling, silvicide treatment, and topping) and their influence on deterioration rate by describing bark beetle activity, fungal colonization, and use by cavity nesters. To compare the development of artificial with natural fungal infection, we inoculated snags with *Fomitopsis pinicola*, *Fomitopsis cajanderi*, *Phellinus pini*, and *Phlebiopsis gigantea*. Silvicide-treated and fully topped trees took just over 1 year to die; girdled trees took slightly over 2 years to die. Trees topped at mid-crown that died took almost 3 years. Top breakage began 4 years after treatment. Neither snag-creation methods nor artificial inoculation directly affected bark beetle (*Dendroctonus* spp., *Ips* spp.) activity or the presence of externally visible fungal fruiting bodies 4 years after treatment. Native decay fungi, particularly *Trichaptum abietinum* and *Cryptoporus*

volvatus, extensively colonized snag sapwood. Snag-creation method and artificial inoculation did not appreciably affect woodpecker activity after 4 years. Rather, length of time the snag had been dead had the most influence on bird use. All snags except the living mid-crown topped trees provided foraging habitat and may be a suitable condition for cavity-nest excavation. Pileated woodpeckers (*Dryocopus pileatus*), hairy woodpeckers (*Picoides villosus*), and other species excavated and debarked the created snags during foraging, and possibly during nesting activity.

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897. Cervid forage utilization in noncommercially thinned *ponderosa* pine forests.

Gibbs, M. C.; Jenks, J. A.; Deperno, C. S.; Sowell, B. F.; and Jenkins, K. J.

Journal of Range Management 57(5): 435-441. (2004)

NAL Call #: 60.18 J82; ISSN: 0022409X

Descriptors: *Cervus elaphus*/ diets/ forage/ standing biomass/ mule deer/ *Odocoileus hemionus*/ *Odocoileus virginianus*/ white-tailed deer/ habitat use/ thinning/ ungulate/ Custer State Park/ South Dakota/ *Pinus ponderosa*

Abstract: To evaluate effects of noncommercial thinning, utilization of forages consumed by elk (*Cervus elaphus* L.), mule deer (*Odocoileus hemionus* Raf.), and white-tailed deer (*Odocoileus virginianus* Raf.) was measured in *ponderosa* pine (*Pinus ponderosa* P. & C. Lawson) stands in Custer State Park, S. D. Treatments consisted of unthinned (control; 22 to 32 m²/ha basal area), moderately thinned (12 to 22 m²/ha basal area), and heavily thinned (3 to 13 m²/ha basal area) stands of *ponderosa* pine. During June, July, and August, 1991 and 1992, about 7,000 individual plants were marked along permanent transects and percent-weight-removed by grazing was ocularly estimated. Sample plots were established along transects and plants within plots were clipped to estimate standing biomass. Pellet groups were counted throughout the study area to determine summer habitat use of elk and deer. Diet composition was evaluated using microhistological analysis of fecal samples. Average percent-weight-removed from all marked plants and percent-plants-grazed were used to evaluate forage utilization. Standing biomass of graminoids, shrubs, and forbs increased ($P < 0.05$) from unthinned to moderately and heavily thinned stands. Utilization of graminoids and shrubs averaged less than 1% when measured as percent-weight-removed and percent-plants-grazed and did not differ ($P > 0.05$) across treatments. Forb use averaged less than 5% within sampling periods when measured as percent-weight-removed and percent-of-plants grazed and did not differ among treatments. Results of pellet group surveys indicated that cervids were primarily using meadow habitats. When averaged over the 2 years, forbs were the major forage class in deer diets, whereas graminoids were the major forage class in diets of elk.

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898. Change in wildlife habitats in Quebec forests: Analysis of major trends over three decades.

Crete, M. and Marzell, L.

Forestry Chronicle 82(3): 368-382. (2006)

NAL Call #: 99.8 F7623; ISSN: 0015-7546

Descriptors: boreal forests/ dead wood/ fauna/ forest management/ forest pests/ habitats/ insect pests/ plant

communities/ plant pests/ species diversity/ wildlife conservation/ *Abies balsamea*/ *Acer saccharum*/ *Betula alleghaniensis*/ *Carya cordiformis*/ *Choristoneura fumiferana*/ mosses/ *Odocoileus virginianus*/ *Picea*

Abstract: As forest management intensified between the 1970s and the 1990s, we tested the prediction that three forest attributes, likely essential for some wildlife species, became rarer during this time interval: old (>100 years) stands, dead wood and woody species diversity. We used a network of about 7000 permanent plots, surveyed at least three times, for determining trends followed by these variables during the last three decades of the 20th century. We stratified our analysis according to the six vegetation domains of the southern half of Quebec where forest management occurs, i.e., from the sugar maple-bitternut to the spruce-moss domain. The proportion of old stands clearly diminished only in the western part of the sugar maple- and balsam fir-yellow birch domains. However, stands composed of old trees were already very scarce during the 1970s everywhere except in the spruce-moss domain where they could have increased in importance during the study period. Snags tended to become rarer only in the western part of sugar maple- and balsam fir-yellow birch domains whereas their abundance increased elsewhere, sometimes substantially, because of the spruce budworm epidemic that affected Quebec between 1975 and 1990. Results suggest that tree diversity was impoverished in the two southernmost forest domains; the same tendency existed also for saplings, particularly because of intense browsing by white-tailed deer. In the boreal forest, the spruce budworm epidemic favoured sapling diversity during the 1980s and 1990s. Our analysis indicates that we must: (1) quickly exclude some typical old stands from forest management in all vegetation domains; (2) determine if some woody species became rarer in forest stands of southern Quebec; (3) identify which elements of the forest fauna depend on old stands, rare tree species and senescent trees, and (4) continue to monitor the trend of dead wood present in Quebec forests.

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899. Changing fire regimes and the avifauna of California oak woodlands.

Purcell, Kathryn L. and Stephens, Scorr L.
Studies in Avian Biology (30): 33-45. (2005)
NAL Call #: QL671.S8; ISSN: 0197-9922

Descriptors: violet-green swallow/ western bluebird/ western kingbird/ anthropogenic/ avian diversity/ fire/ fire frequency/ fire intensity/ fire suppression/ livestock grazing/ oak woodlands

Abstract: Natural and anthropogenic fire once played an important role in oak woodlands of California. Although lightning-ignited fires were infrequent, the California Indians used fire to modify oak woodland vegetation for at least 3,000 yr. These high-frequency, low-intensity fires likely resulted in little mortality of mature oaks, low but continuous tree recruitment, an open understory, and a fine-grained mosaic of vegetation patches. Following settlement by Europeans in the mid-1800s, ranchers burned to reduce shrub cover and to increase grassland area and forage production; surface fires were common with average fire-return intervals of 8-15 yr. Fire suppression, begun in the 1940s to 1950s, led to increases in surface and crown fuels, invasion of woody vegetation in the understory, and increased tree density. In the absence of demonstrated fire

effects on oak woodland birds, we used changes in vegetation structure expected to result from fire and fire suppression to predict the response of oak woodland birds to fire and fire suppression based on nesting habitat of 17 common oak woodland species breeding at the San Joaquin Experimental Range, Madera County, California. Our results suggest that populations of Western Kingbirds (*Tyrannus verticalis*), Western Bluebirds (*Sialia mexicana*), and Violet-green Swallows (*Tchycineta thalassina*), would increase in abundance following fire, because they consistently nested in habitat similar to that expected to result from frequent, low-intensity fire. The species predicted to respond negatively to changes resulting from fire differed among the variables examined. If fire produces a mosaic of habitat patches rather than a homogeneous landscape, we expect that the differing habitat needs of most species will be provided for. As with fire, the most obvious change resulting from excluding livestock was an increase in shrub cover. The question naturally arises to what extent livestock grazing creates habitat similar to that created by historical fire, but this question remains unstudied. More fire-history research is needed to understand past fire regimes of oak woodlands and the effects of fire, including prescribed fire, on the vegetation and the bird community. The effects of grazing and the extent to which grazing mimics fire clearly require more study. We encourage others to test our hypotheses regarding responses of birds to variables expected to be altered by fire: shrub cover, tree density, and numbers of snags, saplings, and logs. Finally, we need to test our working hypothesis that a mosaic of habitat patches will provide the habitat conditions needed to sustain the high avian diversity characteristic of oak woodlands.

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900. Changing perceptions of the role of managed forests as wildlife habitat in the Pacific Northwest.

Aubry, K. B.
In: *Managing for wildlife habitat in westside production forests*, General Technical Report-PNW 695/
Harrington, T. B. and Nicholas, G. E.; Portland, OR: Pacific Northwest Research Station, Forest Service, U.S. Department of Agriculture, 2007. pp. 3-17.
Notes: 08874840 (ISSN).

Descriptors: forest management/ landscape/ old growth/ riparian/ wildlife

Abstract: Forest management objectives and the perceived role of managed forests as wildlife habitat in the Pacific Northwest changed in many significant ways during the 20th century. Before 1900, wildlife was generally considered something to be exploited or exterminated, not managed or protected. This perspective began to change in the early 1900s when Theodore Roosevelt promoted the doctrine of "conservation through wise use," and Aldo Leopold established the science and practice of wildlife management with the publication of his seminal textbook, *Game Management*. However, the most revolutionary changes in public and professional perceptions regarding forest management for wildlife objectives occurred in the latter part of the 20th century. Many of these changes began during the 1970s, after the environmental movement of the 1960s resulted in the enactment of federal legislation designed to minimize environmental degradation, perpetuate biological diversity, and protect endangered species. In this paper, I argue that changing perceptions

about the role of managed forests as wildlife habitat were associated primarily with the following four key conceptual turning points that were strongly influenced by these legislative mandates and the ground-breaking research and landmark publications of various scientists and resource professionals in this region: (1) for which species should forests be managed? (2) at what spatial or ecological scales should forests be managed? (3) which riparian zones should be managed? (4) can old-growth attributes be created in managed forests?

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901. Characteristics of Mount Graham red squirrel nest sites in a mixed conifer forest.

Merrick, Melissa J.; Bertelsen, Sadie R.; and Koprowski, John L.

Journal of Wildlife Management 71(6): 1958-1963. (2007)

NAL Call #: 410 J827; ISSN: 0022-541X

Descriptors: Rodentia/ Sciuridae/ Tamiasciurus hudsonicus grahamensis/ Arizona/ breeding grounds/ forests/ ecosystems/ forest management/ forestry practices/ habitat alterations/ forestry management/ Graham County, Pinaleno Mountains/ habitat management/ habitat use/ mixed conifer forest/ nest site characteristics/ wildlife-human relationships/ commercial enterprises/ conservation/ wildlife management/ disturbances/ land zones/ reproduction/ breeding/ Picea engelmannii/ Populus ssp.

Abstract: The Mount Graham red squirrel (*Tamiasciurus hudsonicus grahamensis*) is constrained to the Pinaleno Mountains in southeastern Arizona, USA. The population's endangered status and extensive forest damage from insects and fire warrants a better understanding of habitat variables important for nest site selection. We examined characteristics of cavity (n = 91) and drey (n = 38) nests and compared these to random sites (n = 113). Dreys were found primarily in Engelmann spruce (*Picea engelmannii*) and corkbark fir (*Abies lasiocarpa* var. *arizonica*). Cavity nests occurred primarily in aspen (*Populus tremuloides*) and corkbark fir. Squirrels selected nest sites with higher canopy cover and more corkbark fir, decayed logs, and living trees. Forest management plans emphasizing thinning must consider how altering these habitat characteristics could affect availability and suitability of tree stands for nesting squirrels.

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902. Characteristics of roost sites of adult wild turkey females.

Chamberlain, Michael J.; Leopold, Bruce D.; and Burger, L. Wes

Journal of Wildlife Management 64(4): 1025-1032. (2000)

NAL Call #: 410 J827; ISSN: 0022-541X

Descriptors: Meleagris gallopavo silvestris/ wild turkey/ Meleagris gallopavo/ birds/ behavior/ roosts/ roosting/ habitat use/ movements/ home range-territory/ ecosystems/ pine/ forests, mixed/ riparian habitat/ diurnal rhythm/ habitat management for wildlife/ modeling/ seasonal activities/ statistics/ wildlife management areas/ wild turkey/ habitat/ sleeping place/ dispersion/ female/ movement/ season/ eastern wild turkey/ Mississippi: central region/ Jasper County, Mississippi/ Newton County, Mississippi/ Scott County, Mississippi/ Smith County, Mississippi

Abstract: Little research has examined roost-site selection processes by eastern wild turkeys (*Meleagris gallopavo silvestris*). Additionally, few studies have quantified

selection of roost sites relative to availability of habitats within the home range and female movements prior to roosting. Hence, the authors examined selection of roost sites relative to availability of habitats within the home range and assessed the relationship between selected landscape metrics and location of roost sites. They obtained 638 triangulated roost locations on 34 adult female wild turkeys during 1996-97 on a study area composed of different landowners in central Mississippi. Roosting habitat use differed ($P < 0.01$) from availability within home ranges, with females preferring to roost in sawtimber pine (*Pinus* spp.) and pine-hardwood stands. Distance to nearest creek and stand age frequently differed ($P < 0.05$) between roost and random sites. Roost sites were closer to creeks and in older aged stands than random sites. Females did not appear to increase movements prior to roosting, suggesting that roosting may influence female movements throughout the day, allowing females to be at preferred roosting sites at dusk. Alternatively, females may simply roost in the nearest suitable habitat at the end of the day. The authors suggest managers and biologists consider the importance of stand age and landscape metrics to roost site selection when managing for eastern wild turkeys.

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903. Clearcut logging restricts the movements of terrestrial Pacific giant salamanders (*Dicamptodon tenebrosus* Good).

Johnston, Barbara and Frid, Leonardo

Canadian Journal of Zoology 80(12): 2170-2177. (2002)

NAL Call #: 470 C16D; ISSN: 0008-4301

Descriptors: Dicamptodon tenebrosus/ Caudata/ Dicamptodontidae/ Lissamphibia/ behavior/ wildlife management/ clearcut logging/ movement patterns/ precipitation/ British Columbia/ Chilliwack and Nooksack Drainage Basins/ distribution/ forests/ ecosystems/ forestry practices/ habitat alterations/ home range/ territory/ Washington/ wildlife-human relationships/ Canada/ commercial enterprises/ disturbances/ habitat use/ land zones/ Pacific giant salamander

Abstract: Pacific giant salamanders (*Dicamptodon tenebrosus* Good) in the Chilliwack River valley of southwestern British Columbia are at the periphery of their range, and therefore of conservation concern. Although logging is a potential threat to the species, no studies have examined how clear-cutting affects its terrestrial stage. We used radiotelemetry to compare the movements of 35 terrestrial Pacific giant salamanders at sites with three different logging histories: forested, clearcut to the stream margin, and clearcut with riparian buffer strips. The results demonstrate that logging affected movements of the salamanders. Salamanders in clearcuts remained significantly closer to the stream, spent more time in subterranean refuges, and had smaller home ranges than those at forested sites. During a dry year, salamanders in clearcuts were significantly more dependent on precipitation for their movement than salamanders in forested habitats. Salamander movement behavior in riparian buffer strips was not significantly different from that at forested sites but was significantly different from that at clearcut sites. Riparian buffer strips appear to mitigate some of the negative effects of clearcuts on salamander movement.

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904. Coarse woody debris and pine litter manipulation effects on movement and microhabitat use of *Ambystoma talpoideum* in a *Pinus taeda* stand.

Moseley, K. R.; Castleberry, S. B.; and Ford, W. M. *Forest Ecology and Management* 191(1-3): 387-396. (2004)
NAL Call #: SD1.F73; ISSN: 03781127.

Notes: doi: 10.1016/j.foreco.2004.01.015.

Descriptors: *Ambystoma talpoideum*/ Ambystomidae/ coarse woody debris/ pine litter/ plantation silviculture/ debris/ forestry/ radar/ mole salamanders/ pine litters (PL)/ ecology/ amphibians/ habitat use/ litter/ silviculture/ woody debris/ *Ambystoma talpoideum*/ *Pinus taeda*

Abstract: We examined effects of coarse woody debris (CWD) and pine litter (PL) manipulations on movement and microhabitat use by mole salamanders (*Ambystoma talpoideum*) in the upper Coastal Plain of South Carolina. Individuals were tracked within field enclosures using harmonic radar detection from 3 December 2002 to 1 August 2003. Enclosure study one (ES1) consisted of three treatments: (1) high CWD/high PL; (2) low CWD/low PL; (3) high CWD/low PL. Enclosure study two (ES2) consisted of two treatment types: complete PL removal and unmanipulated control. Activity of *A. talpoideum* within ES1 high CWD/low PL, low CWD/high PL and high CWD/high PL treatments did not differ. Individuals subject to ES2 PL removal treatments moved during more nights than individuals in control treatments. During night surveys ES2 PL removal treatments moved on a greater percentage of nights, and were active for longer periods of time, than individuals in control treatments. *A. talpoideum* exposed to low PL treatments may have utilized CWD as a means of compensating for inadequate microclimate conditions provided by reduced pine litter depth. Our results suggest that reduction of CWD and pine litter has little effect on *A. talpoideum* activity levels. Conversely, complete pine litter removal prompts individual salamanders to move more frequently and for longer periods, thereby potentially being subjected to increased desiccation and predation risk. Within managed pine forests in the southeastern United States, forest management practices that minimize pine litter and CWD removal can help to maintain suitable habitat for amphibian groups such as ambystomatid salamanders.

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905. Combining pine timber and wildlife management objectives.

Goerlich, D. and Parkhurst, J. *Forest Landowner* 62(4): 42-44. (2003)

NAL Call #: SD144.A15F67; ISSN: 10879110

Descriptors: conservation/ logging (forestry)/ softwoods/ vegetation/ pine timber management/ regeneration harvest/ wildlife habitat/ wildlife management/ forestry/ conservation/ forest management/ forests/ harvesting/ plantations/ prescribed burning/ reforestation/ thinning/

Abstract: In some cases pine plantations, once established, are not managed effectively to produce maximum wildlife benefit. Pine plantations can provide great wildlife habitat over time where landowners are willing to adopt well-established management strategies. No single vegetation group-pine plantation or otherwise-can satisfy the habitat needs for all wildlife species. With proper design and periodic and timely management efforts, pine timber and wildlife management objectives can be compatible.

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906. A comparison of density and reproductive indices of songbirds in young and old boreal forest.

Rangen, S. A.; Hobson, K. A.; and Clark, R. G. *Wildlife Society Bulletin* 28(1): 110-118. (2000)

NAL Call #: SK357.A1W5; ISSN: 00917648

Descriptors: boreal forest/ density/ forest management/ habitat quality/ nest success/ power analysis/ reproductive behaviors/ songbirds/ critical analysis/ estimation method/ index method/ passerines/ reproductive success/ *Zonotrichia albicollis*

Abstract: Reproductive behaviors have been used to estimate relative reproductive success for songbirds in grasslands, but little is known about the ease of detecting these behaviors in more complex habitats such as forests. We evaluated the feasibility of detecting differences in reproductive effort and success, using songbird behavior and number of fledglings observed, and investigated the relationship of indices of reproductive behaviors and fledgling frequencies versus species densities in 2 age-classes of forest. We used spot-mapping to determine breeding bird densities, whereas behavioral censuses and spot-mapping documented reproductive activity. Eighty-three percent of species did not differ in density between young and old stands. Census coverage totalled 4.3 hour/ha (SE = 0.12, n = 6) for young (25 years) and 4.1 hour/ha (SE = 0.13, n = 6) for old stands (76-100 years), when we combined behavioral observations obtained from late morning surveys and early morning spot-mapping on the same grids. Two of 7 ground and 1 of 5 aboveground nesting species showed greater productivity in young than old stands and 1 of 7 ground-nesting species had greater reproductive success in old than young stands, using indices of reproductive behavior. However, differences between forest age-classes in detections of fledglings were found only for white-throated sparrows (*Zonotrichia albicollis*). Lack of differences in indices of reproductive behavior between stand ages was related to low statistical power and poor visibility of birds in forests, particularly in stands with high canopies. Power analysis indicated that 126 spot-mapping grids/treatment are required to attain 80% power with a hypothesized difference in the index reproductive behavior of 50% (i.e., effect size = 0.5) and $\alpha = 0.05$. Thus, using indices of reproductive behavior and observations of fledglings to estimate nesting success in forested habitats is not feasible unless number of replicate spot-mapping grids is extremely large, species are very abundant, and birds concentrate their activities in lower parts of the canopy. Relationships between indices of reproductive behaviors or frequencies of fledglings and density were positive for 40-45% of species, yet were weak for species overall. Further work is needed in different habitat types, including varied forest types, to test the feasibility of collecting reproductive behaviors and estimating fledgling numbers and to verify the assumption that breeding bird density is a good predictor of habitat quality.

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907. Comparison of rodent communities in sites with different degrees of disturbance in deciduous forest of southeastern Morelos, Mexico.

Garcia Estrada, Carlos; Romero Almaraz, Ma De Lourdes; and Sanchez Hernandez, Cornelio

Acta Zoologica Mexicana Nueva Serie (85): 153-168. (2002); ISSN: 0065-1737

Descriptors: age structure/ cattle grazing/ community composition/ conservation biology/ deciduous forests: habitat/ demographic parameters/ environmental disturbance/ firewood extraction/ intersite differences/ lumber harvesting/ microhabitat preference/ population density/ soils/ species diversity/ topography

Abstract: This study is the first work that compares rodent communities in a deciduous forest in Mexico. It documents differences between sites experiencing different degrees of disturbance caused by firewood and lumber extraction, and cattle grazing; a relatively undisturbed site (Site 1) and another more disturbed site (Site 2) in southeastern Morelos State. In each site we captured six species of rodents. Though habitat disturbance did not modify diversity or evenness of rodent species, the total number of individuals captured in Site 1 (n=319) was greater than in Site 2 (n=90). Effects of habitat fragmentation were expressed in significant differences in population density, age structure and microhabitat preference between two sites for *Baiomys musculus*, *Peromyscus levipipes* and *P. melanophrys*. The disturbance of deciduous forest appears to be the principal factor explaining differences in demographic parameters of rodent species between the two study sites, as these two sites have the same climate, similar soils, and topography which differ only slightly.
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908. Compatibility of delayed cutting regime with bird breeding and hay nutritional quality.

Nocera, J. J.; Parsons, G. J.; Milton, G. R.; and Fredeen, A. H.

Agriculture, Ecosystems and Environment 107(2-3): 245-253. (2005)

NAL Call #: S601.A34; ISSN: 01678809.

Notes: doi: 10.1016/j.agee.2004.11.001.

Descriptors: bobolink/ breeding phenology/ crude protein/ fledging rate/ grassland birds/ hay cutting/ livestock nutrition/ grassland/ hay/ phenology/ Canada/ North America/ Nova Scotia/ *Ammodramus nelsoni*/ *Dolichonyx oryzivorus*/ *Passerculus sandwichensis*

Abstract: The breeding phenology of three grassland bird species was studied in managed hayfields of Nova Scotia, Canada: bobolink (*Dolichonyx oryzivorus*), savannah sparrow (*Passerculus sandwichensis*), and Nelson's sharp-tailed sparrow (*Ammodramus nelsoni subvirgatus*), under delayed hay cutting regimes (post-1 July). Weekly changes were monitored in several measures of hay nutritional quality (percent crude protein (CP %), acid detergent fibre (ADF), calcium (Ca) and phosphorus (P)). Timing of peak fledging was variable across years, but generally occurred in the first week of July. Delay of cutting by 1 week in late June or early July resulted in a small reduction in hay nutritional quality. However, that hay would still meet energy and CP % requirements for non-lactating beef cows. Regression models showed that a delay of 1.5 weeks (from 20 June to 1 July) in cutting translated to a mean decrease in CP % of 2.1. Conversely, this delay secured an increase in the rate of fledging, from 0 to 20% for bobolink, 56% for savannah sparrow, and 44% for Nelson's sharp-tailed sparrow. Postponing cut by 1 more week (to a minimum of 7 July) gave the benefit of allowing maximum fledging rates for all species, while CP % lost 3.5. While this level of CP % is unlikely to support high maintenance periparturient cows and feeder/finisher cattle, it could be made profitable through mineral supplementation. ADF levels were

considerably elevated, while Ca and P improved in the same time period. These trends show delayed hay cutting can be a viable option for farmers opting to conserve breeding birds on hayfields. The feasibility of delaying cut varies with a farm's specialization, and to a degree, breed kept. Such practices can be incorporated into a holistic approach to agroecosystem management.
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909. Competitive effects on plantation white spruce saplings from shrubs that are important browse for moose.

Posner, Scott D. and Jordan, Peter A.

Forest Science 48(2): 283-289. (2002)

NAL Call #: 99.8 F7632; ISSN: 0015-749X

Descriptors: *Alces alces*/ *Cervidae*/ *Artiodactyla*/ forestry practices/ habitat alterations/ terrestrial ecology/ herbicide control/ competitive suppression/ frost damage/ USDA Forest Service/ browse shrub species/ conifer plantations/ controlling competing shrubs/ foods-feeding/ forests/ ecosystems/ habitat management/ Minnesota/ Superior National Forest/ wildlife-human relationships/ commercial enterprises/ conservation/ wildlife management/ diets/ disturbances/ land zones/ nutrition/ moose

Abstract: Conifer planting is often accompanied by herbicide control of surrounding broadleaf, woody plants that may interfere with conifer growth, a process that releases conifers from competitive suppression. Because potential competitors often provide browse for wildlife, their removal may conflict with objectives in multiple-resource management. While some agencies, such as the USDA Forest Service (USFS), have greatly reduced herbicide use, many other timber producers still rely on chemicals to release conifers from competing vegetation. In northeastern Minnesota, where moose (*Alces alces*) are a highly valued resource, we studied impacts of broadleaf shrubs on 4- to 16-yr-old white spruce (*Picea glauca*) along with the extent of browsing by moose on these shrubs. Height, diameter, and current vertical growth increment of spruce were compared among four levels of presence (density strata) of shrubs immediately surrounding each sapling. Spruce grew as well or better in the low and medium density strata as in the non-shrub stratum. In the high density stratum, height and growth increment, particularly in 10- to 16-yr-old spruce, appeared reduced. Presence of shrubs seemed to reduce frost damage in young spruce. Moose browsing reduced height of most shrub species, suggesting that these animals provide a release effect on adjacent spruce. We recommend a release strategy that avoids reduction of shrubs beyond the level that assures normal growth in young spruce, so as both to minimize loss of browse for wildlife and avoid unnecessary silvicultural costs.
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910. Conservation incentives programs for endangered species: An analysis of landowner participation.

Langpap, C.

Land Economics 80(3): 375-388. (2004); ISSN: 00237639

Descriptors: economic incentives/ forestry/ habitat conservation/ wildlife habitat

Abstract: It has been argued that the land-use restrictions prescribed by the Endangered Species Act have failed to protect endangered species on private land. Hence, there has been a call for using incentives to complement this regulatory approach. This paper uses data from a survey of

private forest owners to examine the demographic and land characteristics that determine landowner participation in incentives programs. The results suggest that targeting incentives to younger landowners who have acquired property more recently, who own more woodland, and who are interested in conservation and providing wildlife habitat may be effective in increasing participation rates. © 2004 by the Board of Regents of the University of Wisconsin System.

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911. Conservation of endangered species: Can incentives work for private landowners?

Langpap, C.

Ecological Economics 57(4): 558-572. (2006)

NAL Call #: QH540.E26; ISSN: 09218009.

Notes: doi: 10.1016/j.ecolecon.2005.05.007.

Descriptors: Endangered Species Act/ incentives/ NIPFs/ non-industrial private forests/ voluntary conservation agreements

Abstract: It has been argued that the traditional regulatory approach of the Endangered Species Act, based on land-use restrictions, has failed to protect endangered species on private land. In response, there has been a call for the use of incentives to complement this regulatory approach. This paper examines the potential of incentives programs to elicit conservation-oriented management choices from landowners. Data obtained from a survey of non-industrial private forest owners in Oregon and Washington is used to examine the effectiveness of various incentives. The results indicate that incentives, in particular compensation and assurances, can be effective in increasing the conservation effort provided by landowners. The results also suggest that conservation policy for private lands could be improved by relying on a combination of incentives, including financial incentives and assurances, rather than exclusively on the threat of regulation.

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912. Conservation of the marbled murrelet under the northwest forest plan.

Raphael, Martin G.

Conservation Biology 20(2): 297-305. (2006)

NAL Call #: QH75.A1C5 ; ISSN: 0888-8892

Descriptors: conservation measures/ ecology/ terrestrial habitat/ abiotic factors/ land zones/ *Brachyramphus marmoratus*: disturbance by man/ habitat management/ forest management plan application/ endangered species/ national parks and reserves/ forest and woodland/ abiotic factors/ United States/ Aves, Charadriiformes, Alcidae/ birds/ chordates/ vertebrates

Abstract: The Marbled Murrelet (*Brachyramphus marmoratus*) was listed as threatened in 1992, primarily because of loss of its old-forest nesting habitat. Monitoring conducted over the first 10 years following implementation of the Northwest Forest Plan shows at-sea murrelet populations appear to be stationary, but recruitment is very low and demographic models project a 4-6% annual rate of decline. Monitoring of nesting habitat indicated there were about 1.6 million ha of higher-suitability nesting habitat on all lands at the start of the plan, about half of which occurred on federal lands. Most (88%) of higher-suitability habitat on federal lands was protected within reserves. Over the past 10 years, losses of habitat due primarily to fire have totalled about 2% on federal lands. Losses have

been much greater (12%) on nonfederal lands, due primarily to timber harvest. Habitat is expected to accrue within reserves as younger forest matures and attains sufficient diameter to support nesting sites. At-sea estimates of population size are strongly and positively correlated with amounts of adjacent nesting habitat at a broad scale, supporting the idea that amounts of nesting habitat are a primary driver in wide-scale murrelet population distribution. Conditions at sea, however, such as temperature regimes, prey availability, and pollutants, continue to affect murrelet populations. The system of large reserves seems to have achieved the short-term objective of conserving much of the remaining nesting habitat on federal lands. These reserves are also likely to contribute to the long-term objective of creating large, contiguous blocks of nesting habitat. The plan has a primary role in conserving and restoring nesting habitat on federal land but will succeed in this role only if land allocations calling for such protection are in place for many decades.

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913. Conservation of the northern spotted owl under the northwest forest plan.

Noon, Barry R. and Blakesley, Jennifer A.

Conservation Biology 20(2): 288-96. (2006)

NAL Call #: QH75.A1C5; ISSN: 0888-8892

Descriptors: *Strix occidentalis*/ ecosystem/ strigiformes/ trees/ conservation of natural resources [history]/ conservation of natural resources [methods]/ forestry [organization and administration]/ conservation of natural resources [legislation and jurisprudence]/ forestry [history]/ history, 20th century/ northwestern United States/ weather/ spotted owl/ habitat management/ forest/ silviculture/ population/ loss of habitat/ competition/ prey/ food

Abstract: Development of the Northwest Forest Plan (NWFP) was motivated by concerns about the over-harvest of late-seral forests and the effects of intensive forest management on the long-term viability of the Northern Spotted Owl (*Strix occidentalis caurina*). Following several years of intense political and legal debates, the final NWFP was approved in 1994. Even though the plan evolved with a broad ecosystem perspective, it remained anchored in the Spotted Owl reserve design proposed in 1990. Based on a criterion of stable or increasing populations, a decade later it remains unclear whether the enactment of the NWFP has improved the conservation status of Spotted Owls. The results of intensive monitoring of several Spotted Owl populations for over a decade suggest a continuing range-wide decline even though rates of timber harvest have declined dramatically on federal lands. The cause of the decline is difficult to determine because the research needed to establish cause and effect relations has not been done. One plausible hypothesis is that the owl's life history greatly constrains its rate of population growth even when habitat is no longer limiting. Since enactment of the NWFP, new threats have arisen, including the movement of Barred Owls (*S. varia*) into the range of the Spotted Owl, political pressure to increase levels of timber harvest, and recent changes to forest laws that eliminate the requirement to assess the viability of wildlife populations on U.S. Department of Agriculture Forest Service lands. At this time it appears that Spotted Owl conservation rests critically on continued implementation of the protections afforded by the NWFP and the U.S. Endangered Species Act.

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914. Convergence in arthropod assemblages with various restoration approaches for Canadian deciduous forests.

Bellocoq, M. Isabel and Smith, Sandy M.

Journal of Insect Conservation 7(2): 99-109. (2003)

NAL Call #: QL362.J68 ; ISSN: 1366-638X

Descriptors: conservation measures/ ecology/ population dynamics/ terrestrial habitat/ land zones/ Canada/ North America/ Arthropoda: habitat management/ deciduous forest restoration/ treatments effect on abundance and community structure/ trophic structure/ deciduous forest restoration treatments effect/ community structure/ population density/ forest and woodland/ deciduous forest/ restoration treatments effect on abundance and community structure/ Ontario/ Durham Regional Forest/ deciduous forest restoration treatments effect on abundance and community structure/ Insecta, Coleoptera, Adephaga, Caraboidea/ arthropods/ beetles/ insects/ invertebrates

Abstract: Silvicultural practices are traditionally aimed at increasing forest profits; however, recent approaches to forest conservation have broadened to include nature-based silviculture for regenerating forests. In southern Ontario (Canada), originally dominated by deciduous forests, conifer plantations were established on abandoned agricultural sites. Currently, there is an increasing interest to convert these conifer stands to a state that mimics the original deciduous forest. We investigated arthropod abundance, species richness of carabid beetles, and abundance of arthropod assemblages (trophic and prey groups) under five silvicultural treatments conducted to regenerate deciduous forests (the natural forest type) from the old conifer plantations. The treatments included: (1) uniform canopy removal; (2) uniform canopy removal and understory removal; (3) group canopy removal; (4) group canopy removal and understory removal; and (5) untreated control plots (relatively pure red pine). Insects were sampled annually using sweepnets and pitfall traps. Results revealed treatment effects on the abundance of Coleoptera, Heteroptera, herbivores, and small arthropods (<3 mm) caught in sweepnet samples, where plots subjected to group shelterwood removal and understory removal supported higher abundances than the control plots. There was no treatment effect on the abundance of other arthropod groups or on the species richness and abundance of carabid beetles. The silvicultural treatments used to encourage natural regeneration did not seem to affect arthropod food availability for insectivorous vertebrates. Thus, the type of silvicultural strategy used to convert pine plantations to a stage that mimics the natural deciduous forests had little overall impact on arthropods.

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915. Coordinating short-term projects into an effective research program: Effects of site preparation methods on bird communities in pine plantations.

Kilgo, John C.; Miller, Karl V.; and Moore, William F.

Studies in Avian Biology (21): 144-147. (2000)

NAL Call #: QL671.S8; ISSN: 0197-9922

Descriptors: habits-behavior/ birds/ communities/ conservation/ ecosystem management/ ecosystems/ forestry practices/ habitat management/ habitat use/ management/ pine plantations/ techniques/ wildlife/ wildlife-habitat relationships/ Pinus spp./ South Carolina, Western/ Savannah River Site

Abstract: Several short-term projects conducted at the Savannah River Site have focused on the effects on avian populations of different techniques of preparing a site for tree planting in young pine plantations. The purpose of this paper is to provide an overview of these studies, to summarize the information they provide regarding the effects of pine management on avian communities, and to demonstrate how multiple short-term projects can be used to address pressing management issues. O'Connell (1993), Sparling (1996), and Branch (1998) examined breeding and wintering bird use of areas treated with several mechanical and chemical site preparation methods. Overall, there were few treatment-related effects on bird populations. Both O'Connell and Sparling believed that the few differences in bird use of treatment plots were associated with minor differences in the structural diversity of the vegetation. Each of these short-term studies provided timely information on an issue of management importance and, taken together, they provide a more comprehensive picture of the effects of site preparation methods on bird communities in pine plantations than a single long-term study.

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916. Corridor use by diverse taxa.

Haddad, Nick M.; Bowne, David R.; Cunningham, Alan; Danielson, Brent J.; Levey, Douglas J.; Sargent, Sarah; and Spira, Tim

Ecology 84(3): 609-615. (2003)

NAL Call #: 410 Ec7; ISSN: 0012-9658

Descriptors: conservation measures/ ecology/ population dynamics/ terrestrial habitat/ land zones/ comprehensive zoology: habitat management/ retention of corridors between habitat patches/ evaluation of corridor use by diverse taxa/ landscape level experiments/ emigration/ effects of habitat corridors between patches/ diverse taxa/ landscape experiment study/ distribution within habitat/ dispersal along habitat corridors of diverse taxa/ habitat utilization/ habitat corridors/ use by diverse taxa/ conservation implications/ terrestrial habitat/ fragmented landscapes/ use of habitat corridors by diverse taxa/ forest and woodland/ fragmented pine forest/ landscape level experiment/ South Carolina/ Savannah River National Environment Research Park/ corridor use by diverse taxa in experimentally fragmented forest

Abstract: One of the most popular approaches for maintaining populations and conserving biodiversity in fragmented landscapes is to retain or create corridors that connect otherwise isolated habitat patches. Working in large-scale, experimental landscapes in which open-habitat patches and corridors were created by harvesting pine forest, we showed that corridors direct movements of different types of species, including butterflies, small mammals, and bird-dispersed plants, causing higher movement between connected than between unconnected patches. Corridors directed the movement of all 10 species studied, with all corridor effect sizes >68%. However, this corridor effect was significant for five species, not significant for one species, and inconclusive for four species because of small sample sizes. Although we found no evidence that corridors increase emigration from a patch, our results show that movements of disparate taxa with broadly different life histories and functional roles are directed by corridors.

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917. Corridors may not improve the conservation value of small reserves for most boreal birds.

Hannon, S. J. and Schmiegelow, F. K. A.
Ecological Applications 12(5): 1457-1468. (2002)
 NAL Call #: QH540.E23; ISSN: 10510761
Descriptors: boreal birds/ boreal mixedwood forest/ clearcuts/ conservation value/ corridors/ fragmentation/ gap sensitivity/ habitat generalists/ landscape connectivity/ logging/ old-forest specialists/ reserve size/ avifauna/ boreal forest/ conservation management/ habitat corridor/ habitat fragmentation/ reserve design
Abstract: Building or maintaining corridors in fragmented landscapes may be an important method to conserve gap-sensitive species that avoid crossing gaps in forest cover. We tested the effectiveness of corridors by examining the changes in abundance of boreal birds pre- and post-logging in experimental 10-ha and 40-ha reserves that were isolated or connected by corridors, relative to their abundance responses in continuous forest (reference sites). Prior to the analysis, we categorized birds as to their predicted gap sensitivity based on two measures: their use of corridors and gap-crossing behavior in small-scale trials, and their habitat affinities (forest species vs. habitat generalists). The abundance of forest species as a group was consistently higher in reference reserves than in isolated or connected reserves after harvest, except for the first year after harvest, when crowding occurred in isolates. Habitat generalist species showed no differences in abundances across reserve types. As a group, resident species were more abundant in reference and connected reserves than in isolates in three of five years post-harvest, suggesting that corridors might benefit these species. None of the single species analyzed showed consistent evidence of benefiting from corridors. Although four species were most abundant in connected reserves after harvest, their abundances were not significantly lower in isolates than in reference sites. Behavioral classification (gap-crossing propensity) was not useful in classifying single species as to how gap sensitive they would be in response to our experiment: habitat affinity was a better predictor. We suggest that corridors may be useful to retain resident birds on harvested landscapes, but that corridors connecting small reserves of forest are unlikely to offset the impacts of fragmentation for most boreal birds. Assessments of the utility of corridors must, however, be done in the context of the full plant and animal communities that live in the boreal forest.

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918. Created snag monitoring on the Willamette National Forest.

Boleyn, Pat; Wold, Eric; and Byford, Ken
 In: Proceedings of the Symposium on the Ecology and Management of Dead Wood in Western Forests, General Technical Report-PSW 181/ Laudenslayer, W. F.; Shea, P. J.; Valentine, B. E.; Weatherspoon, C. P.; and Lisle, T. E.; Albany, CA: Pacific Southwest Research Station, Forest Service, U.S. Department of Agriculture, 2002. pp. 765-775.
Notes: 0196-2094 (ISSN); Symposium held November 2-4, 1999 in Reno, NV.
<http://www.fs.fed.us/psw/publications/documents/gtr-181/>
Descriptors: conservation measures/ nutrition/ feeding behavior/ reproduction/ reproductive behavior/ ecology/ terrestrial habitat/ land zones/ Picidae: habitat management/ Creation of standing dead trees/ foraging/

breeding site/ nest site/ roosting/ habitat utilization/ Created standing dead tree use/ forest and woodland/ Oregon/ Cascade mountains/ Willamette National Forest/ Aves, Piciformes/ birds/ chordates/ vertebrates
Abstract: Management agencies currently create snags from live trees and leave them in stands after cutting. Little information exists on the use of these snags by wildlife. This study had two objectives: to document whether created snags were used by wildlife, and if used, to elucidate stand and snag features associated with the use of these created snags by wildlife. We documented sign of woodpecker foraging and/or nesting or roosting use, along with snag and stand features in 55 systematically selected stands across the Willamette National Forest in Oregon. We found that woodpecker use was associated with created snag characteristics. Mainly, the status (live or dead) of the created snag was associated with the presence or absence of woodpecker foraging excavations. Management considerations are discussed, including the need to monitor wildlife use before and after created snags are killed and in subsequent years.
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919. A cross-sectional analysis of Michigan nonindustrial private forest landowners.

Potter-Witter, K.
Northern Journal of Applied Forestry 22(2): 132-138. (2005)
 NAL Call #: SD143.N6; ISSN: 07426348
Descriptors: landowner assistance program effectiveness/ private nonindustrial forestland/ budget control/ harvesting/ soils/ taxation/ timber/ landowner assistance program effectiveness/ private nonindustrial forest management/ private nonindustrial forestland/ wildlife habitats/ forestry/ forest management/
Abstract: Incentive and assistance programs for nonindustrial private landowners in Michigan were evaluated for their effectiveness in encouraging forest management activities. This article reports on selected results of a comparative analysis of program enrollment, landowner characteristics, and management accomplishments. The analysis was based on data from a survey of 2,230 nonindustrial private forestland (NIPF) owners who were members of the Michigan Forest Association (MFA) or were enrolled in the Commercial Forest Program (CF), the Forest Stewardship Program (FSP), or the Two-Hearted River Watershed (TRW) landowner program in 2000. With a 55% overall response rate, landowners reported on present and past management activities and program enrollment. To address the question of the effectiveness of incentive programs, this comparative analysis tested the hypotheses that forest management activity reported by Michigan NIPF landowners who were enrolled in several types of incentive programs did not differ significantly by program and that management activity was not significantly explained by landowner demographics and parcel characteristics. Landowner program enrollment was compared with respect to tree-planting, timber harvesting, timber stand improvement, wildlife habitat improvement, and soil and water protection. To examine the differences, if any, between landowners who practice forest management and those who do not, explanatory demographic and parcel characteristic variables also were tested for their effect on management activity levels. © 2005 by the Society of American Foresters.
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920. Current and future red-cockaded woodpecker habitat availability on non-industrial private forestland in North Carolina.

Drake, D. and Jones, E. J.

Wildlife Society Bulletin 31(3): 661-669. (2003)

NAL Call #: SK357.A1W5; ISSN: 00917648

Descriptors: endangered species/ forest management/ habitat/ non-industrial private forests/ North Carolina/ *Picoides borealis*/ red-cockaded woodpecker/ conservation management/ forest management/ habitat availability/ private land/ United States/ *Picoides borealis*

Abstract: We conducted a mail survey of 2,000 non-industrial private forest landowners (NIPFLs) in the Sandhills and lower Coastal Plain regions of North Carolina to determine the current condition and predict future availability of habitat for the endangered red-cockaded woodpecker (*Picoides borealis*, RCW) on non-industrial private forestland. Concern has been raised that the legal penalties under Section 9 of the Endangered Species Act (ESA) create a disincentive among private landowners to provide habitat and manage RCW on their property. Section 9 prohibits the physical harming or killing of an endangered or threatened species as well as any modification or destruction of habitat that supports a federally listed species. We found that current habitat availability in terms of combined tract size and stand age was low, and shrinks considerably when the nominal level of habitat management occurring on these lands is factored in. The amount of RCW habitat that may be provided on private lands in the future has the potential to improve moderately due to an increasing level of habitat management that is currently occurring and a relatively stable outlook regarding respondents' forest management objectives for the next 25 years. However, stand age and habitat management should be increased in order to increase the amount of RCW habitat provided on private lands. Private lands, through the Safe Harbor Program and other incentives, could play an integral role in RCW recovery efforts by providing additional landmass as well as movement corridors among public lands.

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921. Dead wood all around us: Think regionally to manage locally.

Duncan, Sally

PNW Science Findings (42): 1-5. (2002).

<http://www.fs.fed.us/pnw/science/scifi42.pdf>

Descriptors: ecosystem management/ ecosystems/ forestry practices/ forests/ habitat management/ habitat surveys/ land use/ modeling/ snags/ study methods/ succession/ wildlife/ wildlife-habitat relationships/ Washington/ Oregon

Abstract: The author discusses the relevance of dead wood, which acts as a crucial component of healthy, biologically diverse forests. The basic information about the distribution and characteristics of snags and down trees in the forests of the Pacific Northwest is lacking. Dead wood is home to invertebrates and microorganisms and is important habitat for wildlife. Initially, dead wood data were collected to address wildlife habitat issues. However, recently, the study of dead wood is used to study the issues of forest health, site productivity, fuels, and carbon stores as well. A recent study by the Pacific Northwest Research Station delved into existing resource inventories to create new information estimating density, volume, and percentage

cover for dead wood across 49 million acres of upland forests in Oregon and Washington. The aim was to provide basic information about ecological patterns as well as analyzing forest policies at regional and national levels. At the forest policy level, the data will act as indicators of biodiversity and global carbon cycles for the conservation and sustainable management of temperate and boreal forests. Over the last 100 years, timber management and wildlife suppression have significantly altered forest succession and the distribution of dead wood. Researchers analyzed plots that estimated the natural range of variability in snags and down wood in upland forest habitats. The findings are being used in dead wood management models and to provide information about wildlife habitat and ecosystem health.

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922. Decay dynamics and avian use of artificially created snags.

Hallett, J. G.; Lopez, T.; O'Connell, M. A.; and Borysewicz, M. A.

Northwest Science 75(4): 378-386. (2001)

NAL Call #: 470 N81; ISSN: 0029344X

Descriptors: avifauna/ cavity/ decomposition/ foraging behavior/ habitat use/ nest site/ snag/ United States

Abstract: The loss of standing dead trees (snags) from logging has led to artificial creation of snags to help maintain cavity-nesting species. We compared two methods of snag creation: cutting tops and girdling. A total of 1,189 trees of 10 coniferous species was treated between 1991 and 1997 on timber sales in northeastern Washington. We monitored 1,108 trees at approximately 2-yr intervals to determine degree of decay (on a nine-point scale), signs of foraging, and presence of cavities. Nearly 7% of the girdled trees were still alive after 4-7 yr, whereas all but one topped tree died. Initial decline (i.e., reaching decay class 2) was faster for ponderosa pine and western larch than for Douglas-fir. Western larch lost bark (decay class 4) earlier than other species. Topped trees declined more quickly than girdled trees, but girdled trees reached decay class 4 faster. The proportion of trees with evidence of foraging and cavities increased with decay class.

Western larch was used more for foraging than other species, and there was no effect of treatment on foraging use. In contrast, topped Douglas-fir and grand fir were used more for foraging than girdled trees at later decay classes. Cavities were observed only in trees that were topped. Interspecific differences in presence of cavities were not observed before decay class 4; western larch had the lowest frequency of cavities, whereas grand fir had the highest. The use of specific treatments for creating snags and selection of species may make these habitat elements available over long time periods.

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923. Decaying wood in Pacific Northwest forests: Concepts and tools for habitat management.

Rose, C. L.; Marcot, B. G.; Mellen, T. K.; Ohmann, J. L.; Waddell, K. L.; Lindley, D. L.; and Schreiber, B.

Wildlife habitat relationships in Oregon and Washington/ Johnson, D. H. and O'Neill, T. A.

Corvallis, OR: Oregon State University Press, 2001; pp. 580-623.

http://www.fs.fed.us/wildecology/decad/decad_background/chapter24cwb.pdf

Descriptors: vertebrates/ silviculture/ habitat management/ dead wood/ Washington/ Oregon

Abstract: This chapter provides a synthesis of knowledge on processes and functions of wood decay in forest productivity and wildlife habitat, and summarizes available information on the current regional status of decaying wood. It then offers managers a stepwise assessment process to set goals and objectives, and select silvicultural tools to manage wood decay for desired results.

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924. Defining quality of red-cockaded woodpecker foraging habitat based on habitat use and fitness.

Walters, Jeffrey R.; Daniels, Susan J.; Carter, Jay H.; Doerr, Phillip D.; and Carter J. H.

Journal of Wildlife Management 66(4): 1064-1082. (2002)
NAL Call #: 410 J827; ISSN: 0022-541X

Descriptors: Picoides borealis/ Piciformes/ Picidae/ red-cockaded woodpecker/ Picidae/ forestry practices/ habitat alterations/ wildlife management/ bird group size/ fitness/ foraging habitat quality/ forest stands/ habitat features/ habitat management/ habitat patches/ habitat use/ midstory/ pine density/ resource selection/ sandhills/ conservation/ wildlife management/ foods-feeding/ forests/ ecosystems/ group size/ home range-territory/ North Carolina/ status/ resource selection and habitat use/ Sandhills/ behavior/ land zones/ nutrition/ population ecology/ woodpeckers/ extermination-endanger/ food/ habitat/ habitat evaluation/ ecological requirements/ reproduction/ fertility-recruitment/ forest/ silviculture/ red-cockaded woodpecker/ Pinus spp.

Abstract: Accurate understanding of habitat quality is a critical component of wildlife management. We developed a definition of high-quality foraging habitat for the red-cockaded woodpecker (*Picoides borealis*), a federally endangered, cooperatively breeding bird species, from analyses of resource selection and habitat use, relationships between fitness measures and habitat features, and an extensive literature review. In the North Carolina Sandhills, use of foraging habitat at the level of individual trees, habitat patches, and forest stands was strongly and positively related to age and size of pines (*Pinus* spp.). Use of habitat patches and forest stands was greatest at intermediate densities of medium-sized and large pines and was negatively associated with hardwood and pine midstory. Size of red-cockaded woodpecker groups, an important fitness measure for this species, was positively related to density of old-growth pines within the home range and negatively related to density of medium-sized pines and height of hardwood midstory. Similar results were reported by 2 other studies. High-quality foraging habitat for red-cockaded woodpeckers, therefore, contains sparse or no midstory, intermediate densities of medium-sized and large pines, and oldgrowth pines in at least low densities. Although we documented a relationship between group size and the amount of habitat meeting our definition of "high quality," we were unable to identify the optimum amount of high-quality habitat to provide per group because most study groups had relatively little high-quality foraging habitat. Both fitness and habitat selection in our study population may be constrained by quality and quantity of foraging habitat. James et al. (2001) recommended, and we strongly agree, that foraging habitat be managed for abundant herbaceous ground cover, low densities of small and medium-sized pines, and moderate

densities of large pines. We also stress the importance of old-growth pines in foraging habitat. Because the structure of high-quality foraging habitat is similar to that of high-quality nesting habitat, we recommend that management of these 2 be increasingly integrated.

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925. Demographic effects of habitat selection by hermit thrushes wintering in a pine plantation landscape.

Brown, David R.; Strong, Cheryl M.; and Stouffer, Philip C.
Journal of Wildlife Management 66(2): 407-416. (2002)
NAL Call #: 410 J827; ISSN: 0022-541X

Descriptors: Catharus guttatus/ Passeriformes/ Turdidae/ hermit thrush/ population studies/ terrestrial ecology/ arrival patterns/ between-winter site fidelity/ body condition/ body size/ demographic effects/ habitat quality/ habitat selection/ hardwood forest/ overwinter survivorship/ territory size/ wintering/ forests/ ecosystems/ forestry practices/ habitat alterations/ habitat management/ habitat use/ Louisiana/ pine plantation and hardwood forests/ Tangipahoa Parish/ wildlife-human relationships/ commercial enterprises/ conservation/ wildlife management/ disturbances/ land zones/ hermit thrush/ Pinus taeda/ Louisiana

Abstract: Many species of migratory songbirds use silvicultural landscapes during the nonbreeding season. However, variation in habitat quality (i.e., the differential relative fitness value of habitats) resulting from different silvicultural management strategies and different age classes of these habitats is poorly understood. We studied the patterns of winter habitat selection by hermit thrushes (*Catharus guttatus*) among pine and hardwood habitats within a pine plantation landscape in southeastern Louisiana. We compared arrival patterns, relative abundance, territory size, body condition (mass, fat, and feather regrowth), between-winter site fidelity, and overwinter survivorship among birds in 3 age classes of even-aged loblolly pine (*Pinus taeda*) plantation and hardwood forest. We considered these demographic and condition measures as proximate estimates of relative fitness, and thus as indicators of habitat quality. Hermit thrushes in pole-stage (13-16 yr old) pine habitat had smaller territories, higher relative abundance, stayed leaner, and regrew feathers faster than birds in the other habitats, which suggests that this is the best habitat for wintering hermit thrushes among those we studied. Among other habitats, hardwood forest appears to be the lowest quality, but some measures (fat, territory size, and overwinter survivorship) indicate that the sapling-stage pine habitat is the lowest quality. Early arriving birds, disproportionately adults, avoid hardwoods, but beyond this we could find no evidence of segregation by age, sex, or body size among habitats. Our findings suggest that relatively small differences in habitat type and within-season changes in habitat quality can have important effects on the overwinter success of hermit thrushes. Pine plantations that differ in age by less than 10 years differentially affect the condition and demographics of wintering hermit thrushes. For conservation strategies to be successful, the dynamic spatial and temporal variation in habitat quality must be incorporated into models of population processes. Although pine plantation managers should consider multiple wildlife species, they also must be aware that individual species may have differential success among suitable habitats.

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926. Demographic responses by birds to forest fragmentation.

Lampila, P.; Monkkonen, M.; and Desrochers, A. *Conservation Biology* 19(5): 1537-1546. (2005)
 NAL Call #: QH75.A1C5; ISSN: 08888892.

Notes: doi: 10.1111/j.1523-1739.2005.00201.x.

Descriptors: bird demography/ edge effects patch size/ habitat loss/ meta-analysis/ patch isolation/ avifauna/ demography/ forest ecosystem/ habitat fragmentation/ habitat loss/ Aves

Abstract: Despite intensive recent research on the effects of habitat loss and fragmentation on bird populations, our understanding of underlying demographic causes of population declines is limited. We reviewed avian demography in relation to habitat fragmentation. Then, through a meta-analysis, we compared specific demographic responses by forest birds to habitat fragmentation, providing a general perspective of factors that make some species and populations more vulnerable to fragmentation than others. We obtained data from the scientific literature on dispersal, survival, fecundity, and nesting success of birds. Birds were divided into sub-groups on the basis of region, nest site, biogeographical history, and migration strategy. Species most sensitive to fragmentation were ground- or open-nesters nesting in shrubs or trees. Residents were equally sensitive to fragmentation in the Nearctic and Palearctic regions, but Nearctic migrants were more sensitive than Palearctic migrants. Old World species were less sensitive than New World species, which was predicted based on the history of forest fragmentation on these two continents. Pairing success was the variable most associated with fragmentation, suggesting an important role of dispersal. Fledgling number or condition, timing of nesting, and clutch size were not associated with sensitivity to fragmentation, suggesting that negative fragmentation effects on birds do not generally result from diminished food resources with increasing level of fragmentation. Future studies on demographic responses of birds to habitat fragmentation would be more effective if based on a combination of measures that can distinguish among the demographic mechanisms underlying population changes related to habitat fragmentation. ©2005 Society for Conservation Biology.

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927. Demography of northern flying squirrels informs ecosystem management of western interior forests.

Lehmkuhl, J. F.; Kistler, K. D.; Begley, J. S.; and Boulanger, J.

Ecological Applications 16(2): 584-600. (2006)

NAL Call #: QH540.E23; ISSN: 10510761.

<http://www.treesearch.fs.fed.us/pubs/27220>

Descriptors: Cascade Range/ demography/ density/ Douglas-fir/ fuel management/ *Glaucomys sabrinus*/ home range/ Mycophagy/ northern flying squirrel/ ponderosa pine

Abstract: We studied northern flying squirrel (*Glaucomys sabrinus*) demography in the eastern Washington Cascade Range to test hypotheses about regional and local abundance patterns and to inform managers of the possible effects of fire and fuels management on flying squirrels. We quantified habitat characteristics and squirrel density, population trends, and demography in three typical forest cover types over a four-year period. We had 2034 captures of flying squirrels over 41 000 trap nights from 1997 through

2000 and marked 879 squirrels for mark-recapture population analysis. Ponderosa pine (*Pinus ponderosa*) forest appeared to be poorer habitat for flying squirrels than young or mature mixed-conifer forest. About 35% fewer individuals were captured in open pine forest than in dry mixed-conifer Douglas-fir (*Pseudotsuga menziesii*) and grand fir (*Abies grandis*) forests. Home ranges were 85% larger in pine forest (4.6 ha) than in mixed-conifer forests (2.5 ha). Similarly, population density (Huggins estimator) in ponderosa pine forest was half (1.1 squirrels/ha) that of mixed-conifer forest (2.2 squirrels/ha). Tree canopy cover was the single best correlate of squirrel density ($r=0.77$), with an apparent threshold of 55% canopy cover separating stands with low- from high-density populations. Pradel estimates of annual recruitment were lower in open pine (0.28) than in young (0.35) and mature (0.37) forest. High recruitment was most strongly associated with high understory plant species richness and truffle biomass. Annual survival rates ranged from 45% to 59% and did not vary among cover types. Survival was most strongly associated with understory species richness and forage lichen biomass. Maximum snow depth had a strong negative effect on survival. Rate of per capita increase showed a density-dependent response. Thinning and prescribed burning in ponderosa pine and dry mixed conifer forests to restore stable fire regimes and forest structure might reduce flying squirrel densities at stand levels by reducing forest canopy, woody debris, and the diversity or biomass of understory plants, truffles, and lichens. Those impacts might be ameliorated by patchy harvesting and the retention of large trees, woody debris, and mistletoe brooms. Negative stand-level impacts would be traded for increased resistance and resilience of dry-forest landscapes to now-common, large-scale stand replacement fires. © 2006 by the Ecological Society of America. © 2008 Elsevier B.V. All rights reserved.

928. A density-dependent matrix model for bottomland hardwood stands in the Lower Mississippi Alluvial Valley.

Zhao, Dehai; Borders, Bruce; and Wilson, Mabelle

Ecological Modelling 184(2-4): 381-395. (2005)

NAL Call #: QH541.15.M3E25; ISSN: 0304-3800

Descriptors: density dependent matrix model: mathematical and computer techniques/ wildlife habitat/ biodiversity/ timber production/ Lower Mississippi Alluvial Valley/ water quality protection

Abstract: Bottomland hardwoods in the Lower Mississippi Alluvial Valley (LMAV) have become one of the most endangered ecosystems in the United States. This ecosystem is an important ecological resource providing many functions and values such as wildlife habitat, water quality protection, biodiversity, and timber production. Active management and restoration of bottomland hardwoods stress the need for tools to support decision-making, but no reliable quantitative information, such as developed growth and yield models, is available for such forests with high species diversity. A density-dependent matrix model, which recognizes differences in tree species and size, was developed for these bottomland mixed-species hardwoods in LMAV. The model was calibrated using data from continuous forest inventory plots. Trees were placed in one of 13 diameter classes of soft hardwoods or hard hardwoods, or four diameter classes of non-commercial species. Five-year predictions show good

agreement between the actual and predicted diameter distributions. In terms of value of stand basal area, the model predicted well for stands with densities ranging from 13.8 to 41.3 m²/ha (60-180 ft²/acre). The model will be useful for short-term inventory projections and simulation studies of the development of these stands using different management regimes. © 2004 Elsevier B.V. All rights reserved.

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929. A density management diagram for longleaf pine stands with application to red-cockaded woodpecker habitat.

Shaw, J. D. and Long, J. N.

Southern Journal of Applied Forestry 31(1): 28-38. (2007)

NAL Call #: SD1.S63; ISSN: 01484419

Descriptors: *Picoides borealis/ Pinus palustris/ silviculture/ stand density index/ stocking diagram*

Abstract: We developed a density management diagram (DMD) for longleaf pine (*Pinus palustris* P. Mill.) using data from Forest Inventory and Analysis plots. Selection criteria were for purity, defined as longleaf pine basal area (BA) that is 90% or more of plot BA, and even-agedness, as defined by a ratio between two calculations of stand density index. The diagram predicts stand top height (mean of tallest 40 trees/ac) and volume (ft³/ac) as a function of quadratic mean diameter and stem density (trees/ac). In this DMD we introduce a "mature stand boundary" that, as a model of stand dynamics, restricts the size-density relationship in large-diameter stands more than the expected self-thinning trajectory. The DMD is unbiased by geographic area and therefore should be applicable throughout the range of longleaf pine. The DMD is intended for use in even-aged stands, but may be used for uneven-aged management where a large-group selection system is used. Use of the diagram is illustrated by development of density management regimes intended to create and maintain stand structure desirable for the endangered red-cockaded woodpecker (*Picoides borealis*).

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930. Diameters and heights of trees with cavities: Their implications to management.

Bunnell, Fred L.; Wind, Elke; Boyland, Mark; and Houde, Isabelle

In: Proceedings of the Symposium on the Ecology and Management of Dead Wood in Western Forests, General Technical Report-PSW 181/ Laudenslayer, W. F.; Shea, P. J.; Valentine, B. E.; Weatherspoon, C. P.; and Lisle, T. E.; Albany, CA: Pacific Southwest Research Station, Forest Service, U.S. Department of Agriculture, 2002. pp. 717-737.

Notes: 0196-2094 (ISSN); Symposium held November 2-4, 1999 in Reno, NV.

<http://www.fs.fed.us/psw/publications/documents/gtr-181/>

Descriptors: *commercial activities/ conservation measures/ ecology/ habitat utilization/ terrestrial habitat/ land zones/ Aves/ Mammalia: forestry/ tree cavity use in relation to tree diameter and height significance/ habitat management/ habitat utilization/ tree cavity use/ influence of tree diameter and height/ management implications/ forest/ habitat preference/ forest and woodland/ North America/ Pacific Northwest/ tree cavity use in relation to tree diameter and*

height/ forest management significance/ Aves/ birds/ chordates/ mammals/ vertebrates

Abstract: Primary cavity nesters select larger trees when nesting in conifers than when nesting in hardwoods. Larger birds use larger nest trees, but the trend is more weakly expressed in hardwoods, as is expected if rot governs nest tree selection. Birds select larger nest trees in more productive coastal forests than in inland forests. Actual nest heights are much shorter than nest tree heights, but species-specific averages are rarely below 5 meters. Larger mammals require older, larger trees where rot is advanced. Bats also use larger trees, particularly when roosting in conifers. Sustaining all cavity users requires sustained provision of a range of diameters of decaying and dead trees, including some trees at least 50 cm dbh (smaller in less productive forests).

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931. The disruption of an ant-aphid mutualism increases the effects of birds on pine herbivores.

Mooney, K. A.

Ecology 87(7): 1805-1815. (2006)

NAL Call #: 410 Ec7; ISSN: 00129658

Descriptors: *ant-aphid mutualism/ canopy arthropod community/ Cinara/ emergent multiple-predator effect/ Essigella/ insect community ecology/ intraguild predation/ mutualism/ Pinus ponderosa/ Schizolachnus/ trait-mediated indirect interaction*

Abstract: Predators affect herbivores directly and indirectly, by consumptive and nonconsumptive effects, and the combined influence of multiple predators is shaped by interactions among predators. I documented the individual and combined effects of birds (chickadees, nuthatches, warblers) and ants (*Formica podzolica*) on arthropods residing in pine (*Pinus ponderosa*) canopies in a factorial field experiment. Birds and ants removed herbivores but simultaneously benefited them by removing predatory arthropods. Birds and ants had net negative and positive effects, respectively, on the abundance of herbivore prey, supporting the notion that vertebrate predators have stronger negative effects on herbivores than do arthropod predators. Aphids (ant-tended and untended species) constituted three-quarters of herbivore biomass. The effect of birds on ant-tended aphids was twice that on untended aphid species or tended aphid species without ants. This was not due to there being more ant-tended aphids for birds to prey on; tended and untended aphid species were in similar abundances in the absence of birds. Instead, the effects of birds were strengthened by attributes of the mutualism that rendered tended aphids susceptible to predation. These dynamics led to nonadditive effects of birds and ants: birds only reduced tended aphid species and total herbivore abundances on trees with ants, while ants only increased tended aphid species and total herbivore abundances in the absence of birds. Consequently, top predators in this system only influenced total herbivore abundance when they disrupted an ant-aphid mutualism. © 2006 by the Ecological Society of America.

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932. Distribution patterns of birds associated with snags in natural and managed eastern boreal forests.

Drapeau, Pierre; Nappi, Antoine; Giroux, Jean Francois; Leduc, Alain; and Savard, Jean Pierre

In: Proceedings of the Symposium on the Ecology and Management of Dead Wood in Western Forests, General Technical Report-PSW 181/ Laudenslayer, W. F.; Shea, P. J.; Valentine, B. E.; Weatherspoon, C. P.; and Lisle, T. E.; Albany, CA: Pacific Southwest Research Station, Forest Service, U.S. Department of Agriculture, 2002. pp. 193-205.

Notes: 0196-2094 (ISSN); Symposium held November 2-4, 1999 in Reno, NV.

<http://www.fs.fed.us/psw/publications/documents/gtr-181/>
Descriptors: commercial activities/ conservation measures/ ecology/ terrestrial habitat/ land zones/ North America/ Canada/ Aves: forestry/ forest/ Ontario and Quebec/ habitat management/ species distribution/ dead trees/ natural vs managed forest significance/ distribution within habitat/ natural vs managed forest/ habitat utilization/ forest and woodland/ Ontario/ Abitibi Lake model Forest/ Quebec/ Abitibi region/ Aves/ birds/ chordates/ vertebrates

Abstract: In boreal forests, several bird species use standing dead trees for feeding or nesting and depend on them for their survival. Studies on wildlife use of snags have shown that their availability is greatly influenced by the age of the forest and the type of perturbation (natural versus anthropogenic). Accordingly, cavity-nesting birds seem largely affected by these changes in availability of snags. In North American boreal forests, relationships between birds and dead wood availability have predominantly been documented in western forests. The dynamics of dead wood and the distribution patterns of birds associated with this habitat feature remain largely unknown in eastern black spruce forests. Distribution patterns of birds associated with dead wood were documented in the eastern black spruce forest of northwestern Quebec, Canada. Study areas were composed of four forest landscapes (50-100 km²) that were naturally disturbed by different fire events (1 year, 20 years, 100 years and > 200 years) and two logged landscapes (20 years, 80 years). Birds were surveyed by point counts. Overall, 348 point counts were distributed over the six forest landscapes. Vegetation plots centered at each point count were used to sample live trees and dead wood. In naturally disturbed forest landscapes, species richness and abundance cavity-nesting birds reached a peak in early post-fire and in mature forest landscapes. Standing dead wood availability and abundance patterns of cavity-nesting birds were significantly less in 20-year-old managed forests landscapes than in those of naturally disturbed forests landscapes. This pattern was persistent in mature forests comparisons between 80-year-old horse-logged second-growth forests and mature forests of post-fire origin. Our results suggest that old-growth forests in this portion of the eastern black-spruce forest ecosystem do not play a key role for cavity-nesting birds. Mature and over-mature stands are, however, key habitats for many species of secondary cavity nesters, whereas early post-fire stands are key habitats for primary cavity-nesting birds and represent the main source of recruitment for standing dead wood in this ecosystem. Changes in silvicultural practices designed to maintain specific structure of over-mature stands (increased partial cutting) may provide a means for maintaining cavity-nesting birds at the landscape scale. Intensification of salvage cutting in early post-fire

landscapes is another serious concern in black spruce forests. Reduction in the overall availability of dead wood through such forest practice may affect populations of some primary cavity nesters that are restricted to this specific forest type.

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933. Disturbance effects on small mammal species in a managed Appalachian forest.

Kaminski, J. A.; Davis, M. L.; Kelly, M.; and Keyser, P. D. *American Midland Naturalist* 157(2): 385-397. (2007)
 NAL Call #: 410 M58; ISSN: 0003-0031

Descriptors: ecological disturbance/ forestry practices/ forests/ habitat selection/ habitats/ harvesting/ logging/ microhabitats/ mountain areas/ mountain forests/ small mammals/ wild animals/ wildlife conservation/ *Acer rubrum*/ *Acer saccharum*/ *Betula alleghaniensis*/ *Blarina brevicauda*/ *Clethrionomys gapperi*/ *Dipodidae*/ *Fagus grandifolia*/ *Liriodendron tulipifera*/ *Magnolia*/ *Peromyscus leucopus*/ *Peromyscus maniculatus*/ *Prunus serotina*/ *Tamias striatus*
Abstract: Forestry practices result in a range of levels of disturbance to forest ecosystems, from clearcutting and deferment (high disturbance) to single-tree selection cutting and unharvested forests (low disturbance). We investigated the effects of timber harvest and disturbance on small mammal species in the Allegheny Mountains of West Virginia. In 2003 and 2004, mammals were captured using Sherman box traps, individually marked, and released. We collected habitat data in 2004 to characterize macrohabitat at the stand level and microhabitat surrounding each trap. Trap success was significantly higher in disturbed habitats than undisturbed habitats for red-backed vole *Myodes (Clethrionomys) gapperi* (P=0.0012) and woodland jumping mouse *Napaeozapus insignis* (P=0.0221). Abundance estimated using the Jolly-Seber method was significantly higher in disturbed habitats for red-backed voles (P=0.0001). Adult northern short-tailed shrews *Blarina brevicauda* (P=0.0001) and white-footed and deer mice *Peromyscus* spp. (P=0.0254) weighed more in disturbed habitats. Small mammal distribution was strongly influenced by microhabitat factors, which differed substantially within stands. Leaf litter depth was a significant microhabitat factor for four of the five species analyzed, with red-backed voles (P=0.0001), woodland jumping mice (P=0.0001), *Peromyscus* spp. (P=0.0055), and eastern chipmunks *Tamias striatus* (P=0.0007) all preferring shallow leaf litter. These small mammal species responded neutrally or favorably to disturbance, and identified favorable microhabitat features regardless of stand type.

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934. Diversity and abundance of breeding birds in a managed loblolly pine forest in Louisiana.

Legrand, H. G.; Chamberlain, M. J.; and Moser, E. B. *American Midland Naturalist* 157(2): 329-344. (2007)
 NAL Call #: 410 M58; ISSN: 00030031.

Notes: doi: 10.1674/0003-0031(2007)157

[329:DAAOBB]2.0.CO;2.

Descriptors: *Pinus taeda*/ loblolly pine/ birds/ breeding/ wildlife habitat/ Louisiana

Abstract: Declines of numerous Neotropical migrant birds have been attributed to habitat destruction and alteration. Forest management activities may promote changes to habitat components and, with the increase in commercial forestry in the South, information on Neotropical migrants in

managed forests is needed. We examined the avian communities and habitat characteristics of four forest age classes at Ben's Creek Wildlife Management Area, a managed loblolly pine (*Pinus taeda*) forest in eastern Louisiana during the 2003 and 2004 summer breeding seasons. Mean species richness and relative diversity in 4-5 and 13-23 y stands were similar and greater than 7-9 y stands, and similar in 1 y stands to other age classes. Of 17 guilds (habitat, foraging and nesting) examined, relative abundance was similar across stand age only for second growth inhabitants and ground gleaning foragers. Frequency of occurrence varied across stand age for 17 of 19 species analyzed. Late-successional bird species occurred with greater frequency in 13-23 y stands, whereas occurrence of early-successional bird species was greater in 1 y and 4-5 y stands. Birds of conservation concern detected included both early- and late-successional species. Mean bird community conservation value was similar across stand age. Effects of stand age appear to benefit certain species, but are potentially costly for others. Efforts to combine management of timber and conservation of songbirds must consider both species habitat requirements and the distribution of these requirements in the landscape.

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935. Diversity in ponderosa pine forest structure following ecological restoration treatments.

Waltz, A. E. M.; Fule, P. Z.; Covington, W. W.; and Moore, M. M.

Forest Science 49: 885-900. (Dec. 2003)

NAL Call #: 99.8 F7632

Descriptors: *Pinus ponderosa*/ forest trees/ coniferous forests/ *Populus tremuloides*/ *Pinus edulis*/ *Juniperus osteosperma*/ *Artemisia tridentata*/ *Bromus tectorum*/ ecological restoration/ natural regeneration/ stand structure/ stand density/ history/ canopy/ basal area/ stems/ prescribed burning/ wildlife habitats/ fire behavior/ forest litter/ forest thinning/ dendrochronology/ *Quercus gambelii*/ *Robinia*/ Arizona/ *Robinia neomexicana*/ forest mensuration and description/ forestry production natural regeneration/ forest fire management/ natural resources, environment, general ecology, and wildlife conservation/ forestry related

Abstract: We tested the effectiveness of ponderosa pine forest restoration by comparing forest restoration treatments to untreated forest and to reconstructed forest structure in 1870 (date of Euro-American settlement) using an experimental block design at the Grand Canyon-Parashant National Monument in northwestern Arizona. Forest tree density averaged more than 20 times the historical tree density, and basal area was 4 to 6 times higher in contemporary forests than in historical forests. Restoration treatments consisted of thinning young trees to emulate the forest density, tree composition, and spatial distribution in 1870, followed by prescribed burning. Following restoration treatment, tree density was significantly reduced but remained 6 times higher than historical forests. Basal area in restored forests was still 2.5 times greater than reconstructed basal area values. Ponderosa pine dominance changed little from pretreatment data across the four blocks, averaging 60% of stems and 87% of the basal area prior to treatment and 56% of stems and 85% of the basal area following treatment. Ninety-eight percent of contemporary forest trees were less than 100 yr old prior to restoration

treatment; this proportion was reduced to 82% following treatment. Restoration treatment also significantly reduced canopy cover and increased total tree regeneration. However, treatment effects on forest fuels were highly variable. Litter and duff fuel layers were significantly reduced by prescribed fire but woody debris increased. Overall forest structural diversity following treatment implies that fire behavior, wildlife habitats, and other ecological attributes will vary relatively widely in the future landscape. This citation is from AGRICOLA.

936. Diversity of the beetle (Coleoptera) community captured at artificially-created snags of Douglas-fir and Grand fir.

Sandoval, S. J.; Cook, S. P.; Merickel, F. W.; and Osborne, H. L.

Pan-Pacific Entomologist 83(1): 41-49. (2007);

ISSN: 00310603

Descriptors: Buprestidae/ Cerambycidae/ Curculionidae/ Scolytinae/ snags/ species diversity/ species richness

Abstract: Snags are dead standing trees that have been killed by such forces as fire, wind, lightning, insects/disease, drought and/or flooding. Snag management includes such practices as protecting/maintaining existing snags and artificially creating additional snags. Snags can be used by the insect community that occurs on a site. The objective of the current study was to describe and compare the abundance, species composition and diversity of the beetle community captured adjacent to artificially created snags of Douglas-fir, *Pseudotsuga menziesii* var. *glauca* Franco, and Grand fir, *Abies grandis* (Douglas) Lindley. Beetle populations directly adjacent to the artificially created snags were monitored throughout the season using Lindgren-funnel traps placed directly adjacent to snags. A total of 27,428 beetles from 28 families were captured from May through September, 2002. Significantly more beetles were captured adjacent to the Douglas-fir snags than the Grand fir snags. Beetle capture was highest in late May and lowest in early August. Family richness of the captured beetle community was similar at traps adjacent to the Douglas-fir and Grand fir snags but family diversity was lower at traps adjacent to the Douglas-fir snags. A single species, *Hylastes nigrinus* (Mannerheim) (Curculionidae: Scolytinae), dominated the early capture peak. Ten genera of scolytids and at least 14 species were captured. An additional 10 genera (16 species) of other curculionids were captured. The population of these other curculionids was similar in abundance, richness and diversity at both the Douglas-fir and Grand fir snags. There were 12 species (7 genera) of Buprestidae captured and the total population was also similar adjacent to both snag species. The Cerambycidae captured during the study represented 26 species, with species richness and diversity being higher adjacent to the Grand fir snags.

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937. Dying and dead hardwoods: Their implications to management.

Bunnell, Fred L.; Wind, Elke; and Wells, Ralph

In: Proceedings of the Symposium on the Ecology and Management of Dead Wood in Western Forests, General Technical Report-PSW 181/ Laudenslayer, W. F.; Shea, P. J.; Valentine, B. E.; Weatherspoon, C. P.; and Lisle, T. E.; Albany, CA: Pacific Southwest Research

Station, Forest Service, U.S. Department of Agriculture, 2002. pp. 695-716.

Notes: 0196-2094 (ISSN); Symposium held November 2-4, 1999 in Reno, NV.

<http://www.fs.fed.us/psw/publications/documents/gtr-181/>
Descriptors: conservation measures/ nutrition/ feeding behavior/ reproduction/ reproductive behavior/ ecology/ community structure/ terrestrial habitat/ land zones/ comprehensive zoology: habitat management/ ecological importance of presence of hardwoods significance/ forest/ foraging/ site preferences/ presence of hardwood trees relationship/ parental care/ rearing location/ species diversity/ forest and woodland/ ecological importance of presence of hardwoods and habitat management implications/ North America/ Pacific Northwest
Abstract: Although they usually comprise less than 10 percent of forest cover in western forests, hardwoods contribute greatly to sustaining biological richness. Hardwoods are highly preferred as cavity sites, are preferred foraging sites for several bird species, encourage insectivorous mammals and amphibians, and provide preferred substrate for many cryptogams and invertebrates. In the Pacific Northwest, two cavity-nesting species choose hardwoods for 70 percent or more of their nest sites, while many prefer hardwoods, even in coastal forests where hardwoods are scarce. Because many forest-dwelling species in the Pacific Northwest show strong preferences for hardwoods, hardwoods should be retained and managed as desired trees.

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938. Ecological impacts of deer overabundance.

Cote, S. D.; Rooney, T. P.; Tremblay, J. P.; Dussault, C.; and Waller, D. M.

Annual Review of Ecology, Evolution, and Systematics 35: 113-147. (2004); ISSN: 00664162.

Notes: doi: 10.1146/annurev.ecolsys.35.021103.105725.

Descriptors: browsing/ Cervidae/ forest regeneration/ herbivory/ plant-herbivore interactions/ browsing/ ecological impact/ plant-herbivore interaction/ ungulate/ Animalia/ Aves/ Cervidae/ Hexapoda/ Insecta/ Mammalia

Abstract: Deer have expanded their range and increased dramatically in abundance worldwide in recent decades. They inflict major economic losses in forestry, agriculture, and transportation and contribute to the transmission of several animal and human diseases. Their impact on natural ecosystems is also dramatic but less quantified. By foraging selectively, deer affect the growth and survival of many herb, shrub, and tree species, modifying patterns of relative abundance and vegetation dynamics. Cascading effects on other species extend to insects, birds, and other mammals. In forests, sustained overbrowsing reduces plant cover and diversity, alters nutrient and carbon cycling, and redirects succession to shift future overstory composition. Many of these simplified alternative states appear to be stable and difficult to reverse. Given the influence of deer on other organisms and natural processes, ecologists should actively participate in efforts to understand, monitor, and reduce the impact of deer on ecosystems.

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939. Ecological management and restoration of bat trees.

Brown, Timothy K.

Bat Research News 41(4): 111. (2000)

NAL Call #: QL737.C5 B328; ISSN: 0005-6227

Descriptors: bats/ habits-behavior/ ecosystems/ foods-feeding/ forestry practices/ forests/ habitat management/ habitat use/ mammals/ management/ restoration/ roosts/ roosting/ techniques/ wildlife/ Washington

Abstract: The author presented information on techniques for modifying tree structure and function in younger forests and maintenance of existing trees in more mature forests. A variety of techniques utilizing chain saws, fire, and logging are used to create special bat roosting and foraging features in Washington forests.

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940. Ecological relationships of terrestrial small mammals in western coniferous forests.

Hallett, James G.; O'Connell, Margaret A.; and Maguire, Chris C.

In: *Mammal community dynamics: Management and conservation in the coniferous forests of western North America*/ Zabel, C. J. and Anthony, R. G., 2003; pp. 120-156.

Notes: Literature review; 0511057903 (ISBN).

Descriptors: commercial activities/ conservation measures/ ecology/ land zones/ Mammalia: forestry/ coniferous forest management/ ecological relationships/ small terrestrial fauna/ habitat management/ North America/ Mammalia/ chordates/ mammals/ vertebrates

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941. Ecological research at the Goosenest Adaptive Management Area in northeastern California.

Ritchie, Martin W.

Albany, CA: Pacific Southwest Research Station, Forest Service, U.S. Department of Agriculture; General Technical Report-PSW 192, 2005. 121 p.

Notes: 0196-2094 (ISSN).

Descriptors: commercial activities/ conservation measures/ terrestrial habitat/ abiotic factors/ physical factors/ land zones/ Aves/ Mammalia: forestry/ establishment and activities/ forest/ habitat management/ ecology/ large scale ecological research project/ Establishment and activities/ fire/ California/ Klamath National Park/ Goosenest Ranger District/ birds/ chordates/ mammals/ vertebrates

Abstract: This paper describes the establishment of an interdisciplinary, large-scale ecological research project on the Goosenest Adaptive Management Area of the Klamath National Forest in northeastern California. This project is a companion to the Blacks Mountain Ecological Research Project described by Oliver (2000). The genesis for this project was the Northwest Forest Plan (USDA and USDI 1994a). As a part of the Northwest Forest Plan, a network of Adaptive Management Areas was created in Oregon, Washington, and northern California. One of the primary goals of the Goosenest Adaptive Management Area was to investigate means of accelerating the development of late-successional forest properties. Led by researchers from the

Pacific Southwest Research Station in Redding, California, an interdisciplinary team of scientists designed an experiment to evaluate the use of mechanical treatments and prescribed fire to accelerate late-successional conditions in the Gooseneck Adaptive Management Area. The experimental design features four treatments, each replicated five times. The treatment units are 100 acres (40.5 hectares), plus a buffer area of varying size, but generally close to 328 feet (100 meters) in width. The first of the four treatments features a thinning favoring the reestablishment of pine dominance in the forest (Pine-Emphasis Treatment). In this treatment the prescription favors the retention of dominant and codominant pine trees. The second treatment employs the same mechanical treatment as the Pine Emphasis, with the additional application of prescribed fire (Pine-Emphasis With Fire). A third treatment is a mechanical treatment intended to redistribute growth to the largest diameter trees without regard for species distribution (Large Tree Treatment). The fourth, and final, treatment is a control of no active management (Control Treatment), permitting the vegetation to continue along its current trajectory. The last of the mechanical treatments were completed in 2000. The initial prescribed burn treatment was completed on the five Pine-Emphasis-with-Fire Treatments in fall 2001; these same five units will be reburned 5-10 years after the initial burn. The first post-treatment measurements of vegetation and wildlife were taken in summer 2002. Remeasurements are planned for a 5-year cycle for most forest attributes. Currently, however, birds and small mammals are observed yearly due to year-to-year variation in abundance common to these species.

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942. **Ecological restoration of southwestern ponderosa pine ecosystems: A broad perspective.**

Allen, C. D.; Savage, M.; Falk, D. A.; Suckling, K. F.; Swetnam, T. W.; Schulke, T.; Stacey, P. B.; Morgan, P.; Hoffman, M.; and Klingel, J. T.

Ecological Applications 12(5): 1418-1433. (2002)

NAL Call #: QH540.E23; ISSN: 10510761

Descriptors: anthropogenic change/ ecological restoration/ ecosystem management/ fire suppression effects/ forest restoration programs/ natural range of variation/ ponderosa pine forests/ reference conditions/ United States, southwestern region/ ecosystem management/ forest ecosystem/ prescribed burning/ restoration ecology/ thinning/ *Pinus ponderosa*

Abstract: The purpose of this paper is to promote a broad and flexible perspective on ecological restoration of Southwestern (U.S.) ponderosa pine forests. Ponderosa pine forests in the region have been radically altered by Euro-American land uses, including livestock grazing, fire suppression, and logging. Dense thickets of young trees now abound, old-growth and biodiversity have declined, and human and ecological communities are increasingly vulnerable to destructive crown fires. A consensus has emerged that it is urgent to restore more natural conditions to these forests. Efforts to restore Southwestern forests will require extensive projects employing varying combinations of young-tree thinning and reintroduction of low-intensity fires. Treatments must be flexible enough to recognize and accommodate: high levels of natural heterogeneity; dynamic ecosystems; wildlife and other biodiversity considerations; scientific uncertainty; and the challenges of

on-the-ground implementation. Ecological restoration should reset ecosystem trends toward an envelope of "natural variability," including the reestablishment of natural processes. Reconstructed historic reference conditions are best used as general guides rather than rigid restoration prescriptions. In the long term, the best way to align forest conditions to track ongoing climate changes is to restore fire, which naturally correlates with current climate. Some stands need substantial structural manipulation (thinning) before fire can safely be reintroduced. In other areas, such as large wilderness and roadless areas, fire alone may suffice as the main tool of ecological restoration, recreating the natural interaction of structure and process. Impatience, overreaction to crown fire risks, extractive economics, or hubris could lead to widespread application of highly intrusive treatments that may further damage forest ecosystems. Investments in research and monitoring of restoration treatments are essential to refine restoration methods. We support the development and implementation of a diverse range of scientifically viable restoration approaches in these forests, suggest principles for ecologically sound restoration that immediately reduce crown fire risk and incrementally return natural variability and resilience to Southwestern forests, and present ecological perspectives on several forest restoration approaches.

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943. **An ecological simulation framework integrating forest dynamics and red-cockaded woodpecker habitat management.**

Rewerts, Chris C.; Doresky, John K.; Swiderek, Peter K.; Barron, Michael G.; and Sydelko, Pamela J.

In: 89th Annual Meeting of the Ecological Society of America: Lessons of Lewis and Clark: Ecological Exploration of Inhabited Landscapes. Portland, OR.; p. 424; 2004.

Descriptors: biogeography: population studies/ forestry/ wildlife management: conservation/ forest dynamics/ forest management/ habitat management/ population recovery

Abstract: The red-cockaded woodpecker (*Picoides borealis*) (RCW) is a federally listed endangered species endemic to open, mature and old growth pine ecosystems in the southeastern United States. At Fort Benning, Georgia, the RCW population recovery is inarguably the most central and critical land management issue. Over the course of the last several years, a number of management actions have resulted in an increase in the installation's RCW population. Longer term goals for the installation RCW recovery have focused on developing restoration strategies designed to reestablish a dominant upland canopy structure of longleaf pine (*Pinus palustris*), which were likely present as the primary upland forest type in pre-settlement conditions. Currently, older stands of loblolly pines (*Pinus taeda*) dominate these areas, and thus are the critical source of habitat for the RCW. The loblolly species are considered "off-site" for these areas; being not well adapted to the local conditions, they are showing signs of a combination of stress and disease known as "pine decline syndrome" and ultimately premature mortality. The combination of having a large proportion of the RCW population dependant upon senescing stands of loblolly pines presents the possibility that the installation will be facing a potential of significant population declines. Responding to this, the installation organized a workshop in

February 2004 to explore strategies for RCW management, longleaf restoration, and components of pine decline syndrome. The goal is to represent these strategies in a simulation framework that combines the dynamics of forest management, growth, and mortality with a spatially-explicit, individual based model of the population dynamics of the RCW. This simulation framework needs to be able to help prioritize short-term management actions as well as to project longer-term outcomes of management plans. This paper gives the status of the understanding of the situation, the management actions proposed, and the strategies developed to use simulation tools to focus the management actions and project their outcomes.

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944. Economic and biological compatibility of timber and wildlife production: An illustrative use of production possibilities frontier.

Rohweder, Mark R.; McKetta, Charles W.; and Riggs, Robert A.

Wildlife Society Bulletin 28(2): 435-447. (2000)

NAL Call #: SK357.A1W5; ISSN: 0091-7648.

Descriptors: commercial activities/ conservation measures/ terrestrial habitat/ comprehensive zoology: forestry/ habitat management/ forest and woodland/ timber and wildlife resource compatibility analysis

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945. Edge effect on nesting success of ground nesting birds near regenerating clearcuts in a forest-dominated landscape.

Manolis, J. C.; Andersen, D. E.; and Cuthbert, F. J.

Auk 119(4): 955-970. (2002)

NAL Call #: 413.8 AU4 ; ISSN: 00048038

Descriptors: avifauna/ clearcutting/ ecological impact/ edge effect/ forest edge/ nesting success/ population ecology/ silviculture/ United States/ *Catharus guttatus*/ *Molothrus ater*/ *Seiurus aurocapillus*

Abstract: Forest fragmentation has been implicated as a cause of population declines of several Neotropical migrant bird species. Fragmentation increases the amount of habitat edge, and reduced nesting success rates near forest edges are well documented in agricultural landscapes ("edge effects"). However, edge effects in predominantly forested landscapes, particularly those related to timber harvest, are poorly understood. This study examines nesting success of ground nesting birds in relation to clearcut edges in a forest-dominated landscape in north-central Minnesota. A total of 383 nests of seven species of ground nesting birds were found and monitored during 1992-1998. Ovenbird (*Seiurus aurocapillus*; n = 318) and Hermit Thrush (*Catharus guttatus*; n = 44) nests composed the majority of the sample. Predation accounted for 94% of all nest failures. Brown-headed Cowbird (*Molothrus ater*) parasitism was low (1.8% for all ground nests). Using proportional hazards regression, distance to nearest clearcut edge was the best predictor of nest failure. For all ground nests, nesting success was 0.18 at 0-100 m, 0.39 at 101-500 m, and 0.52 at 501-954 m from nearest clearcut edge. Source-sink modeling indicated that distances ≤ 100 m from clearcut edges were sink habitats for Ovenbirds (i.e. recruitment was lower than survival).

These results provide strong evidence of a negative edge effect on ground nests, extending 100 m or more from clearcut edges in a forest-dominated area of north-central Minnesota.

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946. Edge effects on nesting dickcissels (*Spiza americana*) in relation to edge type of remnant tallgrass prairie in Kansas.

Jensen, W. E. and Finck, E. J.

American Midland Naturalist 151(1): 192-199. (2004)

NAL Call #: 410 M58; ISSN: 00030031

Descriptors: bird/ brood parasitism/ edge effect/ grassland/ nest predation/ Kansas/ *Spiza americana*

Abstract: Edge effects on grassland-nesting birds should be less pronounced or absent near cropland edges of grasslands that lack wooded-edge habitat often used by nest predators and brood parasites. We compared nest predation, brood parasitism and densities of dickcissel (*Spiza americana*) nests in relation to distance from woodland and cropland edges of Kansas tallgrass prairie. Daily nest predation rates did not differ ($P > 0.25$) among distance intervals (≤ 50 m, 51-100 m, ≤ 100 m and > 100 m) from either edge type or among 50-m intervals adjacent to each edge type. Brood parasitism rates by the brown-headed cowbird (*Molothrus ater*) were higher ≤ 100 m vs. > 100 m from woodland edges ($P = 0.04$), being highest ≤ 50 m from woodland edges ($P = 0.09$). Parasitism rates were not related to distance from cropland edges, although parasitism rates ≤ 50 m from woodland and cropland edges were statistically similar ($P = 0.16$). Dickcissel nest densities were lower ≤ 50 m from woodland edges relative to farther distance intervals ($P = 0.004$), indicating dickcissel avoidance of this edge type. There was no similar pattern of nest density on cropland-edged sites, but nest densities ≤ 50 m from woodland and cropland edges were statistically similar ($P = 0.17$). Thus, some woodland edge effects on this grassland bird species were apparent but might vary geographically.

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947. Effect of cattle stocking rate on the nutritional ecology of white-tailed deer in managed forests of southeastern Oklahoma and southwestern Arkansas.

Jenks, Jonathan. Oklahoma State University, 1992.

Descriptors: *Odocoileus virginianus*/ livestock/ food supply/ feeding behavior/ nutrition/ grazing/ habitat alterations/ wildlife-livestock relationships/ Arkansas: Pike County/ Arkansas: Howard County/ Oklahoma: McCurtain County
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948. Effect of domestic cattle on the condition of female white-tailed deer in southern pine-bluestem forests, USA.

Jenks, Jonathan A.; Leslie, David M.; and Leslie, D. M.

Acta Theriologica 48(1): 131-144. (2003)

NAL Call #: 410 AC88; ISSN: 0001-7051

Descriptors: Arkansas/ carcass weight/ cattle stocking/ commercial enterprises/ disturbances/ ecosystems/ farming and agriculture/ fat/ femur/ food competition/ food supply/ forest management/ forests/ globulin/ glucose/ habitat use/ Howard and Pike Counties/ interspecies relationships/ interspecies relationships or intraspecies relationships/ kidneys/ land zones/ McCurtain County/ nutrition/ nutritional condition/ Oklahoma/ physical condition/ physiological

indices/ physiology/ productivity/ reproduction/ soils/ southern pine bluestem forests/ stocking intensity/ vegetation/ wildlife management/ wildlife-human relationships/ white-tailed deer/ cattle/ agriculture/ condition/ weight/ competition/ food/ pregnancy/ blood
Abstract: Effect of domestic cattle stocking on the nutritional condition of white-tailed deer *Odocoileus virginianus* (Zimmermann, 1780) was assessed using physiological indices of collected specimens. Three study areas were delineated in McCurtain County, Oklahoma (heavy cattle stocking), and Howard (moderate to light cattle stocking) and Pike (no cattle stocking) counties, Arkansas that were similar with respect to soils and vegetation but differed with respect to cattle stocking rate. Female white-tailed deer were collected from study areas in February and August 1987-1988 to assess nutritional condition. Deer collected from study areas exposed to cattle grazing in February had lower carcass weights, fat attributes (femur marrow and kidney fat), and reproductive rates (fetuses/doe) than deer that were not exposed to cattle grazing. In August, deer collected from the moderate cattle area had heavier eviscerated carcass weights, serum glucose, albumin, and albumin/globulin ratios than deer collected from the heavy cattle area. Results suggest that if cattle are removed from managed forests in winter, nutritional condition of deer would be improved because of reduced competition for food.
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949. The effect of forest roads on the reproductive success of forest-dwelling passerine birds.

King, D. I. and DeGraaf, R. M.

Forest Science 48(2): 391-396. (2002)

NAL Call #: 99.8 F7632; ISSN: 0015749X

Descriptors: edges/ habitat/ microclimate/ nest success/ *Seiurus aurocapillus*/ biodiversity/ microclimate/ forestry/ *Seiurus aurocapillus*

Abstract: Recent studies indicate that forest roads may affect the distribution of forest-dwelling birds. However, previous studies have not demonstrated any significant effects of forest roads on avian productivity. We studied the effect of maintained and unmaintained forest roads on (1) forest bird nest survival, (2) reproductive parameters of ovenbirds (*Seiurus aurocapillus*) potentially associated with food abundance, and (3) habitat and microclimate at six sites on the White Mountain National Forest, New Hampshire, during two breeding seasons. Nest survival did not differ between areas near (0-150 m) and far (>150 m) from maintained forest roads, and was marginally ($P=0.08$) higher in areas near (0-150 m) unmaintained roads. When the 0-150 m distance class was subdivided, however, nest survival was significantly higher within 0-75 m of maintained roads than >75-150 m away. Ovenbird nest initiation dates, clutch size, and fledging success did not differ between areas near (0-150 m) and far (>150 m) from maintained and unmaintained forest roads, and this result did not change when the distance class 0-150 m from roads was subdivided. There were no relationships between habitat or microclimate and distance from maintained roads. We conclude that small, unsurfaced forest roads at low road density do not result in decreases in forest passerine bird productivity in extensively forested areas in New England.
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950. The effect of shelterwood harvesting and site preparation on eastern red-backed salamanders in white pine stands.

Morneault, Andree E.; Naylor, Brian J.; Schaeffer, Lee S.; and Othmer, Dianne C.

Forest Ecology and Management 199(1): 1-10. (2004)

NAL Call #: SD1.F73; ISSN: 0378-1127

Descriptors: commercial activities/ conservation measures/ ecology/ population dynamics/ terrestrial habitat/ land zones/ North America/ Canada/ *Plethodon cinereus*: forestry/ habitat management/ population size/ forest shelterwood harvesting and site preparation effects/ forest and woodland/ White pine forest/ Ontario/ Central/ Amphibia, Lissamphibia, Caudata, Plethodontidae/ amphibians/ chordates/ vertebrates

Abstract: We studied the effects of the regeneration cut of the shelterwood system and four site preparation options on populations of eastern red-backed salamanders in 90-100-year-old white pine forests in central Ontario, Canada. We established the study in 1994 using a randomized complete block design with three replicates and five treatments: (1) no harvest, no site preparation; (2) harvest, no site preparation; (3) harvest, mechanical site preparation; (4) harvest, chemical site preparation; (5) harvest, mechanical and chemical site preparation. We applied harvest and site preparation treatments from fall 1995 to fall 1997. We collected pre-treatment data in spring and summer of 1995 and post-treatment data from 1998 to 2002. We monitored salamander abundance using a grid of 20 cover boards surveyed 10 times per year within each of the 15 treatment plots. We also quantified changes in overstory and understory cover, supply of downed woody debris, and disturbance to the forest floor. Our data suggest that shelterwood cutting and site preparation can have immediate negative effects on the abundance of red-backed salamander populations in pine forest. However, effects are relatively short lived (5 years). Changes in abundance appeared to be related to overstory and understory cover, and forest floor disturbance. © 2004 Elsevier B.V. All rights reserved.

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951. Effect of vegetation maintenance of an electric transmission right-of-way on reptile and amphibian populations.

Yahner, R. H.; Bramble, W. C.; and Byrnes, W. R.

Journal of Arboriculture 27(1): 24-29. (2001)

NAL Call #: SB436.J6; ISSN: 02785226

Descriptors: amphibians/ herbicides/ reptiles/ right-of-way/ salamanders/ snakes/ tree control/ relative abundance/ species diversity/ United States/ *Diadophis punctatus*/ *Plethodon cinereus*/ *Storeria occipitomaculata*

Abstract: A 2-year study of reptile and amphibian populations was conducted on a 230-kV transmission line right-of-way (ROW) of GPU Energy in the Allegheny Mountain Physiographic Province, Centre County, Pennsylvania, U.S., from June through October 1998 and March through October 1999. The objective was to compare the diversity and relative abundance of reptiles and amphibians between the ROW versus the adjacent forest, among five treatment units on the ROW, and between wire and borders zones on treatments on the ROW. Nine species were recorded during the study, with the three most common species being redback salamanders (*Plethodon cinereus*), northern redbelly

snakes (*Storeria occipitomaculata occipitomaculata*), and northern ringneck snakes (*Diadophis punctatus edwardsii*). All nine species occurred on the ROW, but only redback salamanders and Jefferson salamanders (*Ambystoma jeffersonianum*) were found in the adjacent forest. The diversity and relative abundance ranged from six species in the stem-foliage unit to three species in the handcutting unit. Eight and six species, respectively, were noted in the wire and border zones of the ROW. However, 81% of the observations in wire zones were those of snakes, whereas 85% of the observations in border zones were salamanders. The ROW contained a much more diverse community of reptiles and amphibians than the adjacent forest. Forest-management practices can have negative impacts on populations of amphibians and reptiles. Thus, this study provides important information on forest-management practices required for the conservation of reptiles and amphibians.

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952. Effects of burning and thinning on lodgepole chipmunks (*Neotamias speciosus*) in the Sierra Nevada, California.

Meyer, Marc D.; Kelt, Douglas A.; and North, Malcolm P. *Northeastern Naturalist* 88(2): 61-72. (2007)

NAL Call #: QH105.M2M36; ISSN: 1051-1733

Descriptors: commercial activities/ biometrics/ ecology/ population dynamics/ terrestrial habitat/ land zones/ *Neotamias speciosus*: forestry/ forest burning and thinning/ Effect on population structure and body mass/ weight/ body mass/ forest burning and thinning effects/ population structure/ forest and woodland/ mixed conifer forest/ burning and thinning/ California/ Sierra Nevada/ Teakettle Experimental Forest/ Mammalia, Rodentia, Sciuridae/ chordates/ mammals/ rodents/ vertebrates

Abstract: Prescribed burning and mechanical thinning are widely used to manage fuels in North American forests, but few studies have examined the relative impacts of these treatments on wildlife. Using a fully factorial and completely randomized design, we examined the short-term effects of prescribed burning (no burn vs. burn), mechanical thinning (no thin, light thin, and heavy thin), and combinations of these treatments on the capture rate and demographic parameters of Lodgepole Chipmunks (*Neotamias speciosus*) in mixed-conifer forests in the southern Sierra Nevada of California. Chipmunks were sampled in eighteen 4-ha treatment plots during the summer of 1999 and 2000 (pre-treatment) and 2002 and 2003 (post-treatment). Although burning and thinning caused significant changes in forest structure, neither treatment had a significant effect on the capture rate or most demographic parameters of *N. speciosus*. Body mass of males (2002 and 2003) and the ratio of males to females (2003) decreased following burning. Body mass and percentage reproductive females were positively correlated with the total number of White Fir (*Abies concolor*) cones produced across treatments and years, possibly reflecting a positive association between chipmunk reproduction and food availability. These results suggest that prescribed burning and mechanical thinning may have minor or no short-term effects on the capture rate and demography of *N. speciosus* in mixed-conifer forests of the Sierra Nevada, but effects over longer periods have not been investigated.

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953. Effects of clearcutting with corridor retention on abundance, richness, and diversity of small mammals in the Coastal Plain of South Carolina, USA.

Constantine, N. L.; Campbell, T. A.; Baughman, W. M.; Harrington, T. B.; Chapman, B. R.; and Miller, K. V.

Forest Ecology and Management 202(1-3): 293-300. (2004)
NAL Call #: SD1.F73; ISSN: 03781127.

Notes: doi: 10.1016/j.foreco.2004.07.036.

Descriptors: clearcutting/ pine plantations/ Pinus/ small mammals/ agricultural products/ coastal zones/ ecosystems/ forestry/ harvesting/ corridor retention/ habitat diversity/ pine plantation management/ biodiversity/ abundance/ forest management/ habitat corridors/ plantation/ species diversity/ species richness/ biodiversity/ rice/ South Carolina/ *Gossypium hirsutum*/ Mammalia/ *Oryzomys palustris*/ Rodentia/ *Sigmodon hispidus*

Abstract: We studied six pine plantations in coastal South Carolina to determine the influence of clearcutting with corridor retention on small mammal abundance, richness, and diversity. Small mammals were live-trapped in recently clearcut stands that retained pine corridors 100 m in width and in adjacent pine plantations, 20-23-years-old. We compared small mammal communities between harvested stands with corridors and non-harvested pine stands. We captured 1158 small mammals, representing 844 unique individuals and seven different species in 94,080 trap nights. Rodent abundance, richness, and diversity indices were greater in harvested stands with corridors than in non-harvested pine stands. The early successional habitat created by clearcutting was used by many small mammal species, including cotton rats (*Sigmodon hispidus*) and marsh rice rats (*Oryzomys palustris*). Species composition of small mammals within the corridor habitats was similar to that in the non-harvested pine stands. The inclusion of corridors in pine plantation management enhances habitat diversity and ecosystem maintenance and contributes to local diversity of the small mammal community.

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954. Effects of commercial thinning on home-range and habitat use patterns of a male northern spotted owl: A case study.

Meiman, Susan; Anthony, Robert; Glenn, Elizabeth; Bayless, Todd; Ellingson, Amy; Hansen, Michael C.; and Smith, Clint

Wildlife Society Bulletin 31(4): 1254-1262. (2003)

NAL Call #: SK357.A1W5; ISSN: 0091-7648

Descriptors: *Strix occidentalis caurina*/ Strigiformes/ Strigidae/ northern spotted owl/ *Strix occidentalis*/ habitat use patterns/ *strix occidentalis caurina*/ core use area/ home range patterns/ second-growth forests/ northern spotted owl/ old-growth forests/ wildlife-human relationships/ home range-territory/ habitat management/ habitat alterations/ habitat change/ habitat use/ commercial enterprises/ forestry practices/ commercial thinning/ terrestrial ecology/ land zones/ home-range/ disturbances/ behavior/ conservation/ male/ distribution/ ecosystems/ silviculture/ wildlife/ dispersion/ forests/ Oregon

Abstract: Presents a case study that examined the effects of commercial thinning on home-range and habitat-use patterns of spotted owls in second-growth forests in the Oregon Coast Ranges. Information on site history and radiotelemetry monitoring; Data analysis; Implications of the study on wildlife management.

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955. The effects of corridors on herpetofauna assemblages in intensively managed forests.

Baughman, William Mckelvey. Clemson University, 2000.

Notes: Degree: PhD; Advisor: Guynn, David C.

Descriptors: corridors/ habitat fragmentation/ species diversity/ forest management/ monitoring/ pine plantations/ survival/ coarse woody debris/ coastal plain/ South Carolina/ *Pinus taeda*

Abstract: Long-term studies have indicated major declines in herpetofauna communities in the United States. One activity that has drawn particular attention is forest management. While some studies have suggested that timber harvesting is a major factor contributing to this decline, others indicate that negative impacts are temporary, as buffer zones or corridors may maintain species richness within herpetofaunal communities. The objective of our study was to determine the value of corridors to herpetofauna in managed forest landscapes in the Coastal Plain of South Carolina. A 100-m wide unharvested corridor was left across each of three 20-ha harvest sites. A 1-ha enclosure was placed in each of the three corridors and within an unharvested 20-ha control area. Two standard drift fence arrays were located in the harvested areas on each site as well as in the unharvest control. Pre-harvest (January 1997 through December 1997) monitoring from the four intensively managed *Pinus taeda* plantations found 49 species and 4,147 individuals. Chi-square analysis revealed no significant difference in the number of species captured between sites. Analysis of variance detected no difference for the number of Anura, Testudines, Lacertilia, and Serpentes captured between treatments. The number of Caudata bordered on significance between sites ($F = 15.79$, $P = 0.057$), with the control site harboring more individuals. No significant differences were detected in habitat variables between sites. Pearson's correlation analysis revealed that the number of Caudata was positively correlated with coarse woody debris ($r = 0.98$, $P = 0.01$). Post-harvest monitoring (May 1998 through December 1999) identified 59 species and 15,747 individuals using these sites. Analysis of variance detected no difference for the number of Anura, Cau data, Lacertilia, Testudines, and Serpentes moving into or along corridors. No significant differences were detected in pre- and post-treatment species diversity and evenness indices for corridor habitats. No significant differences were detected in recruitment for Anura and Testudines. There was an increase in recruitment of Caudata on the treatment sites ($F = 13.49$, $P = 0.05$). Estimates of survival indicate no significant differences between the control and treatment sites.

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956. Effects of disturbance on birds of conservation concern in eastern Oregon and Washington.

Bull, E. L. and Wales, B. C.

Northwest Science 75([supplement]): 166-173. (2001)

NAL Call #: 470 N81; ISSN: 0029-344X.

Notes: Literature review.

Descriptors: rare species/ fires/ roads/ human impact/ forest management/ Aves/ *Haliaeetus leucocephalus*/ *Falco peregrinus*/ *Histrionicus histrionicus*/ *Bartramia longicauda*/ *Accipiter gentilis*/ *Buteo regalis*/ *Leucosticte atrata*/ *Pinus ponderosa*/ birds/ bald eagle/ peregrine falcon/ harlequin duck/ upland sandpiper/ northern goshawk/ ferruginous hawk/ black rosy finch/ ponderosa pine

Abstract: The effects on birds of forest insects, tree diseases, wildfire, and management strategies designed to improve forest health (e.g., thinning, prescribed burns, road removal, and spraying with pesticides or biological microbial agents) are discussed. Those bird species of concern that occur in forested habitats in eastern Oregon and Washington include the bald eagle (*Haliaeetus leucocephalus*), peregrine falcon (*Falco peregrinus*), harlequin duck (*Histrionicus histrionicus*), upland sandpiper (*Bartramia longicauda*), northern goshawk (*Accipiter gentilis*), ferruginous hawk (*Buteo regalis*), and black rosy finch (*Leucosticte arctoa*). In addition, seven species of woodpeckers and nuthatches were considered because of their rare status. Forest disturbances that create dead trees and logs are critical to cavity-nesting birds because the dead trees with their subsequent decay provide nesting and roosting habitat. The insects associated with outbreaks or dead trees provide prey for the woodpeckers and nuthatches. The loss of nest or roost trees as a result of disturbance could be detrimental to bald eagles, goshawks, or ferruginous hawks, while the loss of canopy cover could be detrimental to harlequin ducks and goshawks or to prey of some of the raptors. The more open canopies created by thinning may be beneficial to a species like the black rosy finch, yet detrimental to some woodpeckers due to a decrease in cover. Prescribed burning may be beneficial to those woodpeckers primarily associated with ponderosa pine (*Pinus ponderosa*) stands and detrimental to other woodpeckers because of the loss of coarse woody debris. Removal of roads is likely to benefit most of these species because of the subsequent decrease in human activity. Recovery plans for bald eagles and peregrine falcons are available for managers to use in managing habitat for these species.

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957. Effects of edge contrast on redback salamander distribution in even-aged northern hardwoods.

Degraaf, Richard M. and Yamasaki, Mariko

Forest Science 48(2): 351-363. (2002)

NAL Call #: 99.8 F7632; ISSN: 0015-749X

Descriptors: *Plethodon cinereus*/ Caudata/ Lissamphibia/ Plethodontidae/ climatology/ clearcut harvesting/ coverboard clusters/ edge contrast types/ clear cutting/ conservation/ distribution/ forests/ ecosystems/ forestry practices/ habitat alterations/ New Hampshire/ status/ White Mountain National Forest/ wildlife-human relationships/ commercial enterprises/ disturbances/ habitat use/ land zones/ population ecology/ redback salamanders

Abstract: Terrestrial salamanders are sensitive to forest disturbance associated with even-aged management. We studied the distribution of redback salamanders (*Plethodon cinereus*) for 4 yr at edges between even-aged northern hardwood stands along three replicate transects in each of three edge contrast types: regeneration/mature, sapling/mature, and poletimber/mature in northern New Hampshire. We used 2 m² coverboard clusters at the edge, and at 5, 10, 20, and 40 m into the younger and mature stands. Salamanders were surveyed 12 times per year from May to October, approximately once every 2 wk, usually within 24 hr of a rain event. Habitat variables included board station soil temperature, litter depth, organic layer depth, depth to soil mottling, herbaceous cover, down log cover, three classes of understory hardwood stem density

(0.5-1m tall, 1-2 m tall and <10 cm dbh, and > 2 m tall), softwood stem density, Rubus/other stem density, and overstory basal area (ba) and mean dbh. A total of 4,038 redback salamanders were detected during 432 transect counts. The mean salamander density was 0.41/ m² across regenerating stand transects, 0.47 m² across sapling transects, and 0.69 m² across poletimber transects. We analyzed salamander distribution by edge type, replicate, year, station (distance from edge), and their interactions. There were significant differences in salamander detections among edge types, replicates, station, and years for both counts across entire younger forest/mature forest transects and across the younger forest transect sections. There were significant interactions between edge type and distance from edge. Salamander detections were greater ($P < 0.001$) in pole/mature edges than in sapling/mature and regeneration/mature edges in all years. Counts in sapling and regeneration stands were not different. The pattern of salamander abundance was similar across all edge types: low abundance 40 m out in the younger stand, increased abundance near or at the edge, a decrease just inside the edge, peak abundance in the mature stand (20 m inside the edge), and decline at 40 m in the mature stand. Salamander counts differed among years across all transects, tracking yearly precipitation differences. Counts also varied seasonally; early spring and late summer counts were higher ($P < 0.001$) than counts in early to mid-summer and fall. Salamander counts were negatively related to total understory stem density, density of hardwood stems > 2 cm tall and < 10 cm dbh, and percent herb cover, and positively related to soil organic layer depth (P values 0.10). A stepwise regression model included percent herbaceous ground cover, number of hardwood stems > 2 m tall and < 10 cm dbh, and organic soil layer depth, and explained 29% of the variation in redback salamander counts. Our findings are consistent with reported recovery times for redback salamanders after clearcut harvesting; recovery rates even along edges may take about 30 yr. Seasonal and yearly variation must be taken into account if terrestrial salamanders are used in monitoring programs.
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958. Effects of experimental forestry treatments on a Maine amphibian community.

Patrick, David A.; Hunter, Malcolm L.; and Calhoun, Aram J. K.
Forest Ecology and Management 234(1-3): 323-332. (2006)
NAL Call #: SD1.F73; ISSN: 0378-1127
Descriptors: Anura/ Lissamphibia/ Ranidae/ Rana sylvatica/ wildlife-human relationships/ clearcutting/ commercial enterprises/ distribution/ disturbances/ habitat use/ experimental forestry treatment/ forests/ ecosystems/ forestry practices/ habitat alterations/ forestry treatments/ habitat quality/ habitat selection/ land zones/ Maine/ movements during dispersal/ Orono, Dwight B. Demeritt and Penobscot Forests/ terrestrial ecology
Abstract: Predicting how timber harvesting will influence sensitive taxa such as Amphibians is of critical importance for sustainable management of forests. In 2004 and 2005, we studied the effects of four forestry treatments (clearcut with coarse woody debris (CWD) removed, clearcut with CWD retained, partial-cut of 50% of canopy cover, and an uncut control) on movement, habitat selection, and abundance of Amphibians in Maine. Four landscape-scale replicates of these four forestry treatments were created

with each replicate centered on a breeding pool. A total of 8632 emerging juvenile wood frogs were captured and marked at drift fences encircling breeding pools, with 1166 marked wood frogs (*Rana sylvatica*), and 13,727 unmarked Amphibians captured in drift fence/pitfall arrays at 16, 50, 100, and 150 m from the pools. Our capture results in the different treatments were consistent with previous studies in showing that adult abundance and habitat use differed among species, with wood frogs, spotted salamanders (*Ambystoma maculatum*), and eastern red-backed salamanders (*Plethodon cinereus*) preferring uncut and partial-cut habitat, and adult green frogs (*Rana clamitans*) and American bullfrogs (*Rana catesbeiana*) being more tolerant of clearcutting. Spotted salamanders also showed reduced captures with partial canopy removal and increased captures with the retention of CWD. Our results for juvenile Amphibians differed from previous research, with lower captures of all study species (statistically significant for seven of nine species) in clearcuts compared to uncut and partial-cut treatments. Clearcuts did not reduce habitat permeability for the low number of marked wood frogs that entered these treatments. Data from marked wood frogs also suggest that both density of conspecifics and habitat quality can influence habitat selection, and potentially dispersal of juvenile Amphibians. The avoidance of clearcuts by juveniles of all study species suggests that this silvicultural technique may reduce both abundance and dispersal of many species, rather than just species where adults are known to be forest-dependent. Species may also be affected by partial as well as full canopy removal, and the retention of CWD may play a role in mitigating some of the effects of clearcutting. © 2006 Elsevier B.V. All rights reserved.
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959. Effects of experimentally reduced prey abundance on the breeding ecology of the red-eyed vireo.

Marshall, M. R.; Cooper, R. J.; DeCecco, J. A.; Strazanac, J.; and Butler, L.
Ecological Applications 12(1): 261-280. (2002)
NAL Call #: QH540.E23; ISSN: 10510761
Descriptors: Appalachia/ avian breeding productivity/ Bacillus thuringiensis/ deciduous forest anthropods/ food limitation/ gypsy moth/ indirect pesticide effects/ Lepidoptera/ neotropical migrant birds/ red-eyed vireo/ timing of breeding/ Vireo olivaceus/ clutch size/ hatching/ mortality/ prey availability/ reproduction/ United States/ Aves/ bacteria (microorganisms)/ Galliformes/ Lepidoptera/ Lymantria/ Lymantria dispar/ Lymantriidae/ Passeri/ Phacelia congesta/ Vertebrata/ Vireonidae
Abstract: Given the demonstrated importance of caterpillars in the breeding-season diet of many neotropical-nearctic migratory forest songbirds, a large-scale manipulative experiment was conducted to examine how variation in caterpillar abundance influenced the breeding ecology of the Red-eyed Vireo (*Vireo olivaceus*). The Red-eyed Vireo is a canopy-forager that consumes and feeds its young a large proportion of caterpillars during the breeding season. Caterpillar abundance was experimentally reduced in May of 1997 and 1998 on nine replicate 30-ha study plots (three treated, six untreated) in the Monongahela National Forest, West Virginia, through the application of *Bacillus thuringiensis* according to gypsy moth (*Lymantria dispar*) management protocols. Each annual application significantly reduced the abundance of

Lepidoptera larvae on the Bacillus-treated plots relative to the nontreated plots for five and six weeks after spraying, respectively. This time period coincided with the nest initiation, incubation, and nestling stages of the Red-eyed Vireo. However, there was minimal evidence that this reduction in Lepidoptera larvae had a concurrent negative effect on the Red-eyed Vireos' ability to successfully rear nestlings. There were no differences in clutch size, hatching success, nestling mortality, overall nest success, or annual adult survival between the treated and untreated plots in any year of the study. It did appear, however, that Red-eyed Vireos waited 3-5 d longer to initiate nests in years when caterpillar abundance was low, due to either natural or experimental causes. Because of a relatively short breeding season, this delay could reduce the seasonal productivity of this species by 0.15-0.25 young per female per year. Even though the effects of Bacillus-induced caterpillar reduction on Red-eyed Vireo reproduction were minimal, we urge caution when considering the application of Bacillus over larger spatial scales, repeatedly in the same area, or in locations of endangered species where even a modest reduction in seasonal productivity could be detrimental.

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960. Effects of fire management practices on butterfly diversity in the forested western United States.

Huntzinger, M.

Biological Conservation 113(1): 1-12. (2003)

NAL Call #: S900.B5; ISSN: 00063207.

Notes: doi: 10.1016/S0006-3207(02)00356-7.

Descriptors: fire/ forest management/ fuel break/ Lepidoptera/ prescribed burn/ riparian/ species diversity/ butterfly/ community composition/ community structure/ fire management/ forest management/ species diversity/ United States/ Lepidoptera

Abstract: In response to a policy of fire suppression since early in the 20th century, forest managers have recently initiated emergency programs of prescribed burning to reduce readily combustible fuel loads in many forests of the western United States. The effects of burning on woody plant composition and structure are relatively well understood; however, little is known about the impact of burning on other taxa. I tested the response of butterflies to fire reintroduction in the Rogue River National Forest and Yosemite National Park. I established replicated transects on three different types of prescribed burn treatment (forest burns, fuel breaks, and riparian burns), as well as control sites, to monitor adult butterfly richness and diversity. Two to three times as many butterfly species occur in forest burns as controls, 13 times as many in fuel breaks as controls, and twice as many in riparian burns as controls. The results of this study suggest that the reintroduction of diverse fire management methods, especially riparian burning, will benefit butterfly diversity in coniferous forests. Further study is required to examine potential proscriptions against riparian burning, including erosion and invasive species encroachment. Both area and density of gaps in the forest canopy were found to explain large amounts of the variation in butterfly richness ($R^2 = 0.64$ and $R^2 = 0.80$, respectively). This study demonstrates that using non-traditional taxa (e.g., butterflies instead of trees) to study ecosystem processes may help to provide valuable insights into alternative management strategies.

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961. The effects of forest clearcut harvesting and thinning on terrestrial salamanders.

Grialou, Julie A.; West, Stephen D.; and Wilkins, R. Neal

Journal of Wildlife Management 64(1): 105-113. (2000)

NAL Call #: 410 J827; ISSN: 0022-541X

Descriptors: commercial activities/ conservation measures/ community structure/ population dynamics/ population structure/ terrestrial habitat/ land and freshwater zones/ Caudata: forestry/ habitat management/ forest clearcuts/ harvesting/ thinning/ species diversity/ species presence/ population size/ age-class distribution/ forest and woodland/ Washington/ Willapa Hills/ abundance/ Lissamphibia, Amphibia/ amphibians/ chordates/ vertebrates
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962. Effects of forest edges on ovenbird demography in a managed forest landscape.

Flaspohler, D. J.; Temple, S. A.; and Rosenfield, R. N.

Conservation Biology 15(1): 173-183. (2001)

NAL Call #: QH75.A1C5 ; ISSN: 08888892.

Notes: doi: 10.1046/j.1523-1739.2001.99397.x.

Descriptors: edge effect/ forest ecosystem/ forest management/ population ecology/ reproduction/ United States/ Seiurus aurocapillus

Abstract: We studied the reproductive ecology of Ovenbirds (*Seiurus aurocapillus*) for 3 years in a primarily forested landscape in northern Wisconsin. We searched for and monitored nests in large, closed-canopy northern hardwood forests adjacent to recent clearcuts (<6 years old) and measured the effect of proximity to edge on nest success, clutch size, and breeding pair density. Mayfield nest success was lower near the forest edge (0.44, $N_{\text{nests}} = 42$; <300 m) than in the forest interior (0.69, $N_{\text{nests}} = 47$.. >300 m; $\chi^2 = 4.43$, $df = 1$, $p \leq 0.04$), and mean clutch size was higher (4.93) near the forest edge than in the forest interior (4.27; $t = -3.83$, $df = 59$, $p \leq 0.0003$). Edge effects on nest success and clutch size extended farther (300 m) into intact forest than has been documented previously. Using habitat-specific demographic parameters, we found that annual productivity per pair was similar in edge (3.37 fledglings) and interior (3.85 fledglings) habitat. We used our estimates of per capita annual productivity and published estimates of adult and juvenile survival to approximate the finite rate of growth (λ) for birds breeding in edge and interior locations. Based on published estimates of age-specific survival, both edge and interior habitats appear to be source habitats (where $\lambda > 1$) for Ovenbirds in the landscape we studied. Our assessment of population status, however, was extremely sensitive to variation in survival estimates. We used geographic information system data from the Nicolet National Forest to estimate population size in northern and mixed-hardwood forests in this region and to quantify annual productivity in this landscape. Ovenbirds near forest edges faced higher predation pressure but laid more eggs on average than birds in the forest interior. Our data suggest that Ovenbirds may make tradeoffs between the probability of nest success and the per-nest productivity as measured by clutch size. Our findings are consistent with the equilibrium state of the ideal free distribution model in that although individual demographic characteristics (nest success and clutch size) varied with distance from edge, an important correlate of fitness, finite rate of increase (λ) remained relatively similar.

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963. Effects of forest management on density, survival, and population growth of wood thrushes.

Powell, L. A.; Lang, J. D.; Conroy, M. J.; and Krementz, D. G.

Journal of Wildlife Management 64(1): 11-23. (2000)

NAL Call #: 410 J827; ISSN: 0022541X

Descriptors: forest management/ *Hylocichla mustelina*/ neotropical migrant songbird/ radiotelemetry/ survival/ transect surveys/ wood thrush/ forest management/ passerines/ population density/ population growth/ survival/ United States/ *Hylocichla mustelina*/ *Picoides borealis*

Abstract: Loss and alteration of breeding habitat have been proposed as causes of declines in several Neotropical migrant bird populations. We conducted a 4-year study to determine the effects of winter prescribed burning and forest thinning on breeding wood thrush (*Hylocichla mustelina*) populations at the Piedmont National Wildlife Refuge (PNWR) in Georgia. We estimated density, adult and juvenile survival rates, and apparent annual survival using transect surveys, radiotelemetry, and mist netting. Burning and thinning did not cause lower densities ($P = 0.25$); wood thrush density, ranged from 0.15 to 1.30 pairs/10 ha. No radiomarked male wood thrushes ($n = 68$) died during the 4 years, but female weekly survival was 0.981 ± 0.014 (SE) for females ($n = 63$) and 0.976 ± 0.010 for juveniles ($n = 38$). Apparent annual adult survival was 0.579 (SE = 0.173). Thinning and prescribed burning did not reduce adult or juvenile survival during the breeding season or apparent annual adult survival. Annual population growth (λ) at PNWR was 1.00 (95% confidence interval [CI] = 0.32-1.63), and the considerable uncertainty in this prediction underscores the need for long-term monitoring to effectively manage Neotropical migrants. Population growth increased on experimental compartments after the burn and thin (95% CI before = 0.91-0.97, after = 0.98-1.05), while control compartment λ declined (before = 0.98-1.05, after = 0.87-0.92). We found no evidence that the current management regime at PNWR, designed to improve red-cockaded woodpecker (*Picoides borealis*) habitat, negatively affected wood thrushes.

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964. Effects of forest management practices on red-shouldered hawks in Ontario.

Naylor, B. J.; Baker, J. A.; and Szuba, K. J.

Forestry Chronicle 80(1): 54-60. (2004)

NAL Call #: 99.8 F7623; ISSN: 00157546

Descriptors: *Buteo lineatus*/ effectiveness monitoring/ forest management/ habitat guidelines/ nest success/ Ontario/ red-shouldered hawk/ selection/ shelterwood/ tolerant hardwoods/ *Buteo lineatus*

Abstract: The red-shouldered hawk (*Buteo lineatus*) is a species of special concern throughout its northern range. It is considered to be sensitive to forest management practices because it requires dense mature hardwood forest for nesting. In Ontario, guidelines that prescribe spatial and temporal buffers were developed in about 1990 to mitigate the potential impacts of harvesting. We monitored 84 nesting areas of red-shouldered hawks in central and southeastern Ontario from 1988 to 1995 to describe the effects of forest management practices on the occupancy and productivity of nesting areas, to evaluate the effectiveness of the guidelines, and recommend modifications as appropriate. The number of years nesting

areas had been used previously had a significant negative effect on activity status, but not on nest success. Nesting areas harvested with application of the guidelines had a similar probability of being active to those in uncut forest but nesting areas harvested without application of the guidelines did not. Neither the area nor proximity of selection cuts with a moderate to high residual basal area ($\geq 18 \text{ m}^2/\text{ha}$) affected the activity status of nesting areas. In contrast, the area and proximity of heavy cuts (shelterwood cuts or selection cuts with a residual basal area of 14-16 m^2/ha) appeared to have a negative effect on activity status. When nesting areas were active, the proximity and amount of harvesting did not influence nest success. We concluded that the impact of harvesting on the activity status of nesting areas could be mitigated by prohibiting heavy cuts within 300 m of active nests and retaining ≥ 20 ha of forest dominated by tolerant and mid-tolerant hardwood trees, ≥ 18 m tall, with $\geq 70\%$ canopy closure around nests.

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965. Effects of forest management practices on the diversity of ground-occurring beetles in mixed northern hardwood forests of the Great Lakes region.

Werner, Shahla M. and Raffa, Kenneth F.

Forest Ecology and Management 139(1-3): 135-155. (2000)

NAL Call #: SD1.F73; ISSN: 0378-1127

Descriptors: commercial activities/ conservation measures/ ecology/ habitat utilization/ terrestrial habitat/ land and freshwater zones/ Coleoptera: forestry/ forest management practices/ ground dwelling community/ community structure/ habitat preference/ ground dwelling taxa/ forest and woodland/ hardwood forests/ Michigan/ Wisconsin/ Great Lakes region/ Coleoptera/ Insecta/ arthropods/ coleopterans/ beetles/ insects/ invertebrates

Abstract: Ground-occurring Coleoptera were sampled over 2 years using pitfall traps in 23 northern hardwood or eastern hemlock-dominated sites representing even-aged, uneven-aged, or old growth forests. Overall, 65,586 individuals were obtained, representing 33 families and 192 species. Carabids comprised 54% of the total catch in 1996, when all the families were tallied. There was little variation in the number and relative abundance of carabid species caught between seasons. No differences in overall species richness or abundance were observed among forest management regimes or habitat types. However, there were substantial differences in species composition. Thirteen species showed significant habitat associations among the five forest management regimes, and 21 species were associated with specific habitat features of the sites, such as dominant tree species or canopy structure. More species (16) were affected by the presence of forest management than by tree species dominance (6) or canopy structure (5). *Harpalus fulvibrans*, *Pterostichus coracinus*, *Carabus nemoralis*, *Glischochilus siepmanni*, *Nicrophorus orbicollis*, and *Nicrophorus sayi* were more commonly caught in managed than in old growth forest sites, while *Carabus sylvosus*, *Platynus decentis* and *Oiceoptoma novaboracensis* were more commonly associated with old growth sites. *Calosoma frigidum* and *Necrophila americana* were associated with northern hardwood sites, while *Platynus decentis* was significantly associated with sites dominated by eastern hemlock. *Calosoma frigidum*, *Necrophila americana*, and *Nicrophorus vespilloides* were more common in even-aged

sites, while a lampyrid and a leiodid morphospecies were more common in sites with an uneven-aged canopy structure. The importance of microsite features was reflected in the high variability observed among sites and among traps within sites. Results indicate that conservation of a range of forest types is required in order to maintain the diversity of ground-occurring beetles on a regional scale. This will be quite challenging, since forest types such as old growth hemlock-hardwood are rare across the landscape due to habitat fragmentation and logging.
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966. Effects of forest roads on macroinvertebrate soil fauna of the southern Appalachian Mountains.

Haskell, D. G.

Conservation Biology 14(1): 57-63. (2000)

NAL Call #: QH75.A1C5; ISSN: 08888892.

Notes: doi: 10.1046/j.1523-1739.2000.99232.x.

Descriptors: fauna/ invertebrate/ forest ecosystem/ macroinvertebrate/ road/ soil fauna/ United States

Abstract: Many forested landscapes are fragmented by roads, but our understanding of the effects of these roads on the function and diversity of the surrounding forest is in its infancy. I investigated the effect of roads in otherwise continuous forests on the macroinvertebrate fauna of the soil. I took soil samples along transects leading away from the edges of unpaved roads in the Cherokee National Forest in the Southern Appalachian mountains of the United States. Roads significantly depressed both the abundance and the richness of the macroinvertebrate soil fauna. Roads also significantly reduced the depth of the leaf-litter layer. These effects persisted up to 100 m into the forest. Wider roads and roads with more open canopies tended to produce steeper declines in abundance, richness, and leaf-litter depth, but these effects were significant only for canopy cover and litter depth. The macroinvertebrate fauna of the leaf litter plays a pivotal role in the ability of the soil to process energy and nutrients. These macroinvertebrates also provide prey for vertebrate species such as salamanders and ground-foraging birds. The effect of roads on the surrounding forest is compounded by the sprawling nature of the road system in this and many other forests. My data suggest that even relatively narrow roads through forests can produce marked edge effects that may have negative consequences for the function and diversity of the forest ecosystem.
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967. Effects of forest thinning and prescribed burning on bat activity in the Piedmont of South Carolina.

Loeb, Susan C.; Waldrop, Thomas A.; and Leput, David W. *Bat Research News* 43(4): 164. (2002)

NAL Call #: QL737.C5 B328; ISSN: 0005-6227.

Notes: Conference paper: 32nd Annual North American Symposium on Bat Research, Burlington, VT, November 06-09, 2002.

Descriptors: Eptesicus fuscus/ Lasiurus borealis/ Nycticeius humeralis/ Pipistrellus subflavus/ Vespertilionidae/ Chiroptera/ forestry practices/ habitat alterations/ wildlife management/ bat detector/ Piedmont regions/ bat activity/ habitat suitability/ snags/ stand density/ tree growth/ big brown bat/ silver-haired bat/ Seminole bat/ red bat/ evening bat/ eastern pipistrelle/ Pinus spp.

Abstract: Based on morphological and acoustical

considerations, several investigators have predicted that structurally complex environments, such as dense forests, will not be used by many species of bats. Thus, forest management practices that decrease clutter may increase the suitability of many forested stands for bats. We tested this hypothesis using two common forest management practices that decrease stand density: thinning and prescribed burning. The study was conducted on 12 14-ha plots on the Clemson Experimental Forest in the Upper Piedmont of South Carolina. The plots were located in 17-50 year-old pine-hardwood stands. The study design consisted of three replicates of four treatments: Control, Thin, Burn, Thin+Burn. From May-August 2002 we mist-netted in the vicinity of the plots to determine the composition of the bat community. We used Anabat II bat detectors to sample bat activity on each plot during two night each month from May through August 2001 and 2002. Bat detectors were placed at two random grid points for the first night and moved to new points on the second night. One detector was placed at the top of a 10 m extendable pole and the other was placed at approximately 1 m above ground. Red bats (*Lasiurus borealis*), big brown bats (*Eptesicus fuscus*), eastern pipistrelles (*Pipistrellus subflavus*), and evening bats (*Nycticeius humeralis*) were the most common bats captured; we also captured one silver-haired bat (*Lasiurus noctivagans*) and one seminole bat (*L. seminolus*). Bat activity was significantly lower in 2002 than in 2001, and in both years, we recorded significantly higher activity from detectors mounted on 10-m poles than from detectors close to the ground. Bat activity also varied significantly among treatments. In 2001, bat activity was significantly higher in Thin and Thin-Burn plots than in Control or Burn plots. In 2002, bat activity was significantly higher in Thin, Burn, and Thin-Burn plots than in Control plots. Thus, in the short-term, forest management practices that decrease tree density increase habitat suitability for bats. Other benefits of these practices, such as increased tree growth resulting in larger trees and snags, should favor bats in the long-term.

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968. Effects of group-selection opening size on breeding bird habitat use in a bottomland forest.

Moorman, C. E. and Guynn, D. C.

Ecological Applications 11(6): 1680-1691. (2001)

NAL Call #: QH540.E23 ; ISSN: 10510761

Descriptors: bottomland forest/ breeding birds/ gap size/ gap vegetation/ group selection/ habitat use/ neotropical migrant/ silviculture/ South Carolina/ succession/ avifauna/ breeding population/ group selection/ habitat use/ United States/ Aves/ Empidonax virescens/ Geothlypis trichas/ Impleta/ Indigofera/ Molothrus ater/ Parula americana/ Passerina cyanea/ Vireo griseus

Abstract: An increase in timber removals from southern bottomland forests of the United States has been predicted, warranting investigations of the effects of silvicultural alternatives on avian breeding habitat. We studied the effects of creating group-selection openings (man-made canopy gaps) of various sizes on breeding bird habitat use in a bottomland hardwood forest in the Upper Coastal Plain of South Carolina, USA. We used spot mapping and mist netting to estimate bird abundance at 0.06-, 0.13-, 0.26-, and 0.5-ha gaps and at uncut control areas during the 1996, 1997, and 1998 breeding seasons (1 May-1 August). There were significant increases in the number of species

mapped ($P = 0.0001$) and netted ($P = 0.0001$) with successive increases in gap size. The greatest number of total spot-map detections ($P = 0.0002$) and mist net captures ($P = 0.0004$) also occurred in and around the large gaps. These patterns were the result of increased use of larger gaps by field-edge species, primarily Brown-headed Cowbird (*Molothrus ater*), Common Yellow-throat (*Geothlypis trichas*), and Indigo Bunting (*Passerina cyanea*), and some forest-edge species, such as White-eyed Vireo (*Vireo griseus*) and Northern Parula (*Parula americana*). Conversely, Acadian Flycatcher (*Empidonax virens*) was less abundant in and adjacent to gaps. Because there were few differences in vegetation among gaps of different sizes, it is likely that birds that were detected more frequently in and adjacent to larger gaps selected those gaps based on other factors correlated with size. Creation of 0.5-ha group-selection openings in southern bottomland forests should provide breeding habitat for some field-edge species in gaps and habitat for forest-interior species and canopy-dwelling forest-edge species between gaps, provided that sufficient mature forest is maintained.

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969. Effects of group-selection opening size on the distribution and reproductive success of an early-successional shrubland bird.

King, David I. and Degraaf, Richard M.
Forest Ecology and Management 190(2-3): 179-185. (2004)
NAL Call #: SD1.F73; ISSN: 0378-1127

Descriptors: forestry/ terrestrial ecology: ecology, environmental sciences/ wildlife management: conservation/ group selection forestry method/ applied and field techniques/ clearcut/ group selection opening size effects/ habitat quality/ opening shape/ opening size/ patch area/ reproductive success/ silviculture

Abstract: Group-selection is a widely used silvicultural technique, and although recent studies have compared the ecology of birds inhabiting patches of regenerating forest created by group-selection with that of birds in clearcuts, little is known about the effect of opening size and shape on the ecology of early-successional shrubland birds within stands treated with group-selection. We studied chestnut-sided warblers (*Dendroica pensylvanica*), which are an early-successional shrubland bird, nesting in 29 patches of regenerating (4-5 years old) northern hardwoods forest 0.15-0.69 ha in area to determine whether the ecology of this species is affected by patch size or shape. Chestnut-sided warbler density decreased with patch size, however nests were initiated earlier in larger patches. There were no relationships between patch area and number of young fledged per territory or nest predation rates. Similarly, there were no relationships between patch shape (defined as the ratio of the patch perimeter to the perimeter of a circle of the same area) and territory density, date of initiation of first nests, number of young fledged per territory, or nest predation rates. These results contrast with the results of studies of area sensitivity of mature forest and grassland birds, in which bird density is negatively related to patch area. However, later nest initiation in smaller patches suggests that smaller patches are lower quality habitat, which is consistent with the negative relationships between patch area and habitat quality reported in studies of birds nesting in patches of mature forest.

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970. Effects of group selection silviculture in bottomland hardwoods on the spatial activity patterns of bats.

Menzel, M. A.; Carter, T. C.; Menzel, J. M.; Mark Ford, W.; and Chapman, B. R.
Forest Ecology and Management 162(2-3): 209-218. (2002)
NAL Call #: SD1.F73; ISSN: 03781127.

Notes: doi: 10.1016/S0378-1127(01)00516-3.

Descriptors: anabat/ bottomland hardwoods/ foraging/ group selection silviculture/ habitat use/ hardwoods/ harvesting/ timber/ bat activity/ forestry/ activity patterns/ bats/ ecological impact/ foraging behavior/ habitat use/ harvesting/ silviculture/ United States

Abstract: The effects of forest management practices on the spatial activity patterns of bats are poorly understood. We determined the effect of group selection timber harvests on the spatial activity patterns of bats below the forest canopy at the Savannah River Site, Aiken, SC, using the Anabat system. We monitored the effect of group selection timber harvests on feeding and foraging activity of bats at three spatial scales: among habitats within a landscape, among harvested and unharvested areas in the stand where patches were harvested, and within an individual gap. Habitats examined included Carolina bays, unharvested bottomland hardwoods, bottomland hardwoods in which a group selection harvest occurred, and upland stands containing a hardwood/pine mix. Within the harvested stand, we compared the level of foraging and feeding activity among large patch cuts (gaps), small gaps, skidder trails, and forested areas. Within the large gaps, we compared activity among the center of the gap, the edge of the gap, and the forest surrounding the gap. Levels of bat activity differed among stands. More activity occurred in the bottomland stand in which patches had been harvested and around Carolina bays than in unharvested stands of bottomland hardwoods and upland hardwoods and pines. Levels of bat activity also differed among harvested and unharvested areas within the stand and among different positions within gaps and the surrounding forest. Activity was concentrated in forest gaps and along skidder trails. Within gaps, activity was concentrated along the edge between the gap and forest. Spatial activity patterns also depended on the species of bat. These results suggest that the inclusion of gaps in bottomland hardwoods increases the total level of foraging and feeding activity of bats below the canopy. They also suggest differences in the size and shape of the harvest affect the total amount of bat activity recorded in the gap and that these effects may be species specific.

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971. Effects of group-selection timber harvest in bottomland hardwoods on fall migrant birds.

Kilgo, John C.; Miller, Karl V.; and Smith, Winston P.
Journal of Field Ornithology 70(3): 404-413. (1999)
NAL Call #: 413.8 B534; ISSN: 0273-8570

Descriptors: commercial activities/ behavior/ ecology/ terrestrial habitat/ land and freshwater zones/ Aves: forestry/ bottomland hardwood group selected timber harvest/ migration/ community structure/ migrant communities/ forestry practices/ distribution within habitat/ habitat utilization/ forest and woodland/ South Carolina/ Aiken/ Barnwell and Allendale Counties/ birds/ chordates/ vertebrates

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972. Effects of gypsy moth defoliation on forest birds: An assessment using breeding bird census data.

Gale, G. A.; DeCecco, J. A.; Marshall, M. R.;

Russ McClain, W.; and Cooper, R. J.

Journal of Field Ornithology 72(2): 291-304. (2001)

NAL Call #: 413.8 B534; ISSN: 02738570

Descriptors: Lymantria dispar/ gypsy moth/ birds/ species richness/ species density/ forest management

Abstract: Although the gypsy moth (*Lymantria dispar*) is a significant insect pest of eastern deciduous forests in the United States, relatively little is known about its effects on forest bird communities. We used six Breeding Bird Census sites from Connecticut, Pennsylvania, and Virginia to assess changes in bird species richness and individual species density in the years surrounding a gypsy moth outbreak. Individual species' responses were variable among states, and only a few species showed consistent responses to outbreaks across sites. Yellow-billed Cuckoos (*Coccyzus americanus*) and Black-billed Cuckoos (*C. erythrophthalmus*) appeared two years prior to an outbreak and then disappeared immediately after an outbreak on four of the sites and increased in numbers on another site. Indigo Buntings (*Passerina cyanea*), which are usually associated with open habitat, increased temporarily after outbreaks and then returned to pre-outbreak densities within 5 yrs after the outbreak. At the community or guild level, there was a significant reduction in species associated with closed-canopy forests during the outbreak year(s) compared with the average of all other years (before and after the outbreak). There were no other general responses by the avian communities to the outbreaks, including associations with habitat preference, foraging guild, or nesting substrate. This study suggests that the effects of gypsy moth defoliation on the avian community are likely to be short-term (assuming that tree mortality is not severe) and spatially variable. The minimal nature of these effects also suggests that compared with pesticide options for gypsy moth control, allowing the gypsy moth to defoliate, when feasible, is preferable when managing for forest birds.

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973. Effects of hardwood reduction on winter birds in northwest Florida longleaf pine sandhill forests.

Provencher, L.; Gobris, N. M.; and Brennan, L. A.

Auk 119(1): 71-87. (2002)

NAL Call #: 413.8 AU4 ; ISSN: 00048038

Descriptors: avifauna/ conservation management/ habitat management/ herbicide/ prescribed burning/ thinning/ United States/ *Baeolophus bicolor*/ *Dendroica pinus*/ *Picoides borealis*/ *Pinus palustris*/ *Poecile carolinensis*/ *Sitta pusilla*/ *Spizella passerina*

Abstract: Reversing decades of fire exclusion by hardwood midstory reduction is now used to recover populations of the federally endangered Red-cockaded Woodpecker (*Picoides borealis*) in longleaf pine (*Pinus palustris*) forest ecosystems. The effects of Red-cockaded Woodpecker management on winter birds in longleaf pine sandhill forests are largely unknown. Examining habitat use of winter migrants, some of which are declining, may influence the selection of habitat management techniques used for Red-cockaded Woodpeckers to benefit overwintering migrants. During the winters (December-February) of 1997-1998 and 1998-1999, we tested experimentally the effects of hardwood reduction treatments applied in 1995 on winter

birds at Eglin Air Force Base in fire-excluded northwest Florida longleaf pine sandhills. Treatments were (1) prescribed spring burning, (2) herbicide application, (3) mechanical felling and girdling, and (4) a control where decades of fire exclusion was maintained. We also sampled winter bird flocks in frequently burned, nonexperimental reference plots to measure management success.

Hardwood reduction techniques had no effect on flock species richness, which averaged 7.9 and 7.2, respectively, during 1997-1998 and 1998-1999. Larger flocks in felling and girdling and in herbicide plots were primarily due to significantly higher numbers of overwintering Chipping Sparrows (*Spizella passerina*), as well as resident Red-cockaded Woodpeckers and an influx of temperate migrant Pine Warblers (*Dendroica pinus*). In contrast, flocks in control plots were smaller (flock size and species composition in spring burn plots were intermediate) and composed of hardwood-associated species, such as Tufted Titmouse (*Baeolophus bicolor*) and Carolina Chickadee (*Poecile carolinensis*). The relative uses of longleaf pines and hardwoods by Red-cockaded Woodpeckers, Pine Warblers, and Brown-headed Nuthatches (*Sitta pusilla*) during both winters best explained that winter birds present in herbicide, felling and girdling, and reference plots were more likely to forage on the same tree species and substrates than birds in spring-burned plots, and least likely to forage on the same species and substrates as birds in the control plots. Those differences corresponded to the following increasing order of hardwood stem mortality among treatments: control, spring burn (41%), felling and girdling (62%), and herbicide (92%). Repeated burning is recommended to restore the reference foraging condition because it was eight times less expensive than other techniques, which favored mostly Chipping Sparrows. © 2008 Elsevier B.V. All rights reserved.

974. Effects of jack pine plantation management on barrens flora and potential Kirtland's warbler nest habitat.

Houseman, G. R. and Anderson, R. C.

Restoration Ecology 10(1): 27-36. (2002)

NAL Call #: QH541.15.R45R515; ISSN: 10612971.

Notes: doi: 10.1046/j.1526-100X.2002.10103.x.

Descriptors: barrens restoration/ *Carex pensylvanica*/ endangered species/ jack pine/ Kirtland's warbler/ plantations/ *Vaccinium angustifolium*/ endangered species/ forest management/ passerines/ plantation/ United States/ *Carex*/ Passeriformes/ *Pinus banksiana*

Abstract: Jack pine barrens, once common in northern lower Michigan, mostly have been converted to managed jack pine plantations. Management of the disturbances associated with logging provides the opportunity to maintain the unique plant assemblages of jack pine barrens and nest habitat of the federally endangered Kirtland's warbler. Studies indicate that *Carex pensylvanica* can develop into dense mats and strongly compete with other barrens species such as *Vaccinium angustifolium*, which seem to be important species for Kirtland's warbler nest locations. According to forest managers, the most important factors facilitating high cover of *V. angustifolium* and reducing cover of *C. pensylvanica* are the amount of shade produced by tree crowns before harvest (pre-harvest shade), the length of time between harvest and planting (planting delay), and fire. We found that high or low levels of pre-harvest shade had no effect on cover of either *V.*

angustifolium or *C. pensylvanica*. Planting delays of at least three years following prescribed burns generally increased cover of *V. angustifolium* in forest plots, which are important for warbler nesting. Analysis of community composition in openings indicated that burning enhanced the growth of barrens species. We found only weak evidence for a negative correlation between the cover of *V. angustifolium* and *C. pensylvanica* on our study sites. The openings created in the jack pine plantation are important refugia for barrens flora that would likely be lost under forests managed strictly for jack pine. Maintenance of jack pine barrens flora and Kirtland's warbler nest habitat is possible within the context of a heavily managed forest plantation system.

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975. Effects of livestock grazing on forest habitats.

Dennis, Ann

In: Conservation in highly fragmented landscapes/
Schwartz, Mark W.

New York: Chapman and Hall, 1997; pp. 313-341.

Notes: ISBN 0412070316.

NAL Call #: QH76.5.M53C66 1997

Descriptors: forest habitats/ livestock grazing effects/
long term conservation/ book chapter

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976. Effects of long-term forest management on a regional avifauna.

Kilgo, John C.; Franzreb, Kathleen E.; Miller, Karl V.;
Chapman, Brian R.; and Gauthreaux, Sidney A.

Studies in Avian Biology (21): 81-86. (2000)

NAL Call #: QL671.S8; ISSN: 0197-9922

Descriptors: birds/ communities/ density/ distribution/
ecosystem management/ ecosystems/ forestry practices/
forests/ habitat management/ land use/ species diversity/
wildlife/ South Carolina, Western/ Savannah River Site

Abstract: We compared breeding bird populations on and off of the Savannah River Site (SRS), South Carolina, to determine whether management practices on SRS have affected abundance and composition of the resident avifauna. We assessed relative abundance by comparing Breeding Bird Survey (BBS) data from six routes off SRS with three surrogate routes generated using point-count data from four research projects on SRS. Total number of species per route did not differ on-and off-site. Total number of birds per route was greater off SRS than on. Twenty-three species were more abundant on than off SRS, and 33 species were more abundant off than on SRS. Species more abundant off SRS primarily were those that prefer agricultural or urban habitats, whereas those more abundant on SRS primarily prefer mature forest habitat. We conclude that management practices on SRS have resulted in a landscape that supports many species not otherwise common in the region.

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977. Effects of long-term grazing by big game and livestock in the Blue Mountains forest ecosystems.

Irwin, L. L. and Cook, J. G.

Portland, Ore.: U.S. Department of Agriculture, Pacific Northwest Research Station; PNW-GTR-325, 1994. 49 p.

NAL Call #: aSD11.A46 no. 325

<http://www.fs.fed.us/pnw/pubs/pnw%5Fgtr325.pdf>

Descriptors: Ungulata/ *Bos taurus*/ *Equus caballus*/ *Ovis*

aries/ ungulates/ cattle/ horse/ domestic sheep/ vegetation/
food/ agriculture/ forest grazing land/ damage [forest]/
silviculture/ regeneration/ change in vegetation/ fertility-
recruitment/ population dynamics

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978. Effects of new forest management strategies on squirrel populations.

Carey, A. B.

Ecological Applications 10(1): 248-257. (2000)

NAL Call #: QH540.E23 ; ISSN: 10510761.

<http://www.treearch.fs.fed.us/pubs/5531>

Descriptors: biodiversity/ Douglas-fir/ ecosystem management/ forest ecology/ forest management/ *Glaucomys sabrinus*/ managed forest/ old growth restoration/ Pacific Northwest/ silviculture/ Squirrels/ *Tamias townsendii*/ *Tamiasciurus douglasii*/ thinning/ forest management/ management practices/ population size/ rodent/ rotation/ thinning/ United States/ *Glaucomys sabrinus*/ *Pseudotsuga menziesii*/ *Tamias townsendii*/ *Tamiasciurus douglasii*/ *Tsuga heterophylla*

Abstract: Two strategies for managing forests for multiple values have achieved prominence in debates in the Pacific Northwest: (1) legacy retention with passive management and long rotations, and (2) intensive management for timber with commercial thinnings and long rotations. Northern flying squirrels (*Glaucomys sabrinus*), Townsend's chipmunks (*Tamias townsendii*), and Douglas' squirrels (*Tamiasciurus douglasii*) were studied retrospectively in Douglas-fir (*Pseudotsuga menziesii*) forests managed under the alternative strategies in the Puget Trough of Washington. Flying squirrels were twice as abundant under legacy retention as under intensive management for timber, almost as abundant as in old-growth western hemlock (*Tsuga heterophylla*) forests on the Olympic Peninsula of Washington, but <50% as abundant as in old-growth Douglas-fir forests in western Oregon. Chipmunks were four times as abundant under intensive timber management, as under legacy retention, but less abundant than in old-growth forests. Abundance of Douglas' squirrels did not differ between strategies. Neither strategy produced the increased abundance of all three species that is an emergent property of late-seral forests. A third strategy holds promise: active, intentional ecosystem management that incorporates legacy retention, variable-density thinning, and management for decadence.

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979. The effects of partial cutting on the rose-breasted grosbeak: Abundance, food availability, and nest survival.

Smith, Lyndsay A.; Burke, Dawn M; Nol, Erica; and Elliott, Ken A.

Canadian Journal of Forest Research 36(5):

1087-1096. (2006)

NAL Call #: SD13.C35; ISSN: 0045-5067

Descriptors: terrestrial ecology: ecology, environmental sciences/ forestry/ biogeography: population studies/ wildlife management: conservation/ partial cutting/ applied and field techniques/ population density/ food availability/ nest survival

Abstract: Periodic partial harvesting of trees is an important economic activity within the highly fragmented woodlands of southern Ontario. We studied the population density, age structure, food abundance, productivity, and nest survival of

Rose-breasted Grosbeaks (*Pheucticus ludovicianus*) nesting in 35 deciduous woodlots with varying intensities of harvest. Heavily cut woodlots contained higher densities of territorial males and greater abundances of fruit-bearing shrubs compared with standard cut and reference sites (uncut for > 13 years). Results based on insect sampling were mixed, depending on the sampling technique and sample date. All treatments were demographic sinks, with populations in this landscape showing annual declines of 19%-24%. Though the proportion of parasitized nests tended to be higher in heavily cut sites, harvesting had little effect on nest survival, nest initiation dates, clutch size, age structure, or the number of young fledged from a successful nest. Our results indicate that within the fragmented woodlots of southern Ontario, partial harvesting does not further degrade breeding habitat for Rose-breasted Grosbeaks. However, further research is needed to determine the underlying causes of population declines.
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980. Effects of postfire snag removal on breeding birds of western Labrador.

Schwab, Francis E.; Simon, Neal P. P.; Stryde, Steven W.; and Forbes, Graham J.
Journal of Wildlife Management 70(5): 1464-1469. (2006)
NAL Call #: 410 J827; ISSN: 0022-541X
Descriptors: Passeriformes/ Piciformes/ Aves/ wildlife-human relationships/ bird-vegetation relationship/ Canada/ commercial enterprises/ conservation/ disturbances/ habitat use/ ecosystems/ forestry practices/ habitat alterations/ generalized linear mixed model/ habitat management/ Labrador, Churchill Falls/ land zones/ methods and techniques/ Newfoundland/ North America/ snag-forest/ wildlife management/ birds/ fire/ Labrador/ salvage logging/ snags/ subarctic forest/ diversity/ biocenosis/ brood-egg/ silviculture/ dead wood/ Newfoundland
Abstract: The article presents a study on the effects of postfire snag removal on breeding birds of Western Labrador, Canada. A before and after experiment with three intensities of postfire snag removal was conducted in the area. There were 231 and 221 breeding territories of 17 and 12 species in 2000 and 2002, respectively, have been recorded. Total bird abundance has been reduced by 50 percent due to 100 percent snag removal treatment, but total bird abundance was similar between years on other treatments.
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981. Effects of precommercial thinning on snowshoe hare habitat use during winter in low-elevation montane forests.

Ausband, David E. and Baty, G. Ross
Canadian Journal of Forest Research 35(1): 206-210. (2005)
NAL Call #: SD13.C35; ISSN: 0045-5067
Descriptors: Lagomorpha/ Leporidae/ *Lepus americanus*/ forests/ ecosystems/ forestry practices/ habitat alterations/ habitat management/ habitat use/ Montana/ montane forest/ montane forest management/ precommercial tree thinning/ Stillwater State Forest/ winter habitat use/ wildlife-human relationships/ commercial enterprises/ conservation/ wildlife management/ disturbances/ land zones/ snowshoe hare/ habitat/ winter/ silviculture/ field technique/ signs/ snow/ feces/ dispersion/ Montana
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982. Effects of precommercial thinning on snowshoe hares, small mammals, and forest structure in northern Maine.

Homyack, J. A.
Orono, ME: University of Maine, 2003.
Notes: Degree: MSc
<http://www.library.umaine.edu/theses/theses.asp?Cmd=abstract&ID=WLE2003-001>
Descriptors: *Lepus americanus*/ abundance/ capturing methods/ cutting/ forest practices/ habitat changes/ habitat management/ hare, varying/ mammals/ mice, deer/ population density/ sampling/ shrews/ statistics/ transect survey/ Trapping/ voles/ Maine, northern region/ Piscataquis County
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983. The effects of prescribed burning and thinning on herpetofauna and small mammals in the upper piedmont of South Carolina: Preliminary results of the national fire and fire surrogate study.

Kilpatrick, Eran S.; Kubacz, Dean B.; Guynn, David C.; Lanham, J. Drew; and Waldrop, Thomas A.
In: Proceedings of the 12th Biennial Southern Silvicultural Research Conference, General Technical Report-SRS 71/ Connor, Kristina F.; Asheville, NC: Southern Research Station, Forest Service, U.S. Department of Agriculture, 2004. pp. 18-22.
<http://www.treesearch.fs.fed.us/pubs/6304>
Descriptors: commercial activities/ ecology/ terrestrial habitat/ abiotic factors/ physical factors/ land zones/ Amphibia/ Reptilia: forestry/ prescribed burning and thinning/ community structure effects/ forest habitats/ preliminary results/ community structure/ prescribed burning and thinning effects/ forest and woodland/ mixed and pine forest habitats/ fire/ prescribed burning/ South Carolina/ upper piedmont/ Amphibia/ amphibians/ chordates/ mammals/ reptiles/ vertebrates
Abstract: Due to heavy fuel loads resulting from years of fire suppression, upland pine and mixed pine hardwood forests in the Upper Piedmont of South Carolina are at risk of severe wildfire. The National Fire and Fire Surrogate Study (NFFS) was conducted on the Clemson Experimental Forest to study the effects of prescribed burning and thinning on a multitude of factors, including herpetofauna and small mammals. Drift fence/pitfall arrays, modified pitfalls, unmodified pitfalls, and hand captures were used to sample herpetofauna. We captured 1,317 reptiles and amphibians representing 40 species from September 9, 2000 to January 9, 2002. There were no significant treatment effects on abundance within five major taxa (frogs/toads, salamanders, turtles, lizards, and snakes). However, there were treatment effects on two lizard species. When comparing richness, the thin treatment had a significantly higher number of snake species than the burn treatment. Live traps, snap traps, and herpetofauna traps were used to sample small mammals. No small mammals were caught in live traps for 9,600 trap nights. Snap trap success was 0.10 percent for 27,000 trap nights. Small mammals were captured at low levels in herpetofauna traps (0.06 percent trap success) for 163,968 trap nights. Treatment effects could not be determined for small mammals due to the low number of captures.

Although treatment effects were limited, prescribed burning and thinning have been found to alter herpetofauna and small mammal communities.

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984. Effects of prescribed burning on distribution and abundance of birds in a closed-canopy oak-dominated forest, Missouri, USA.

Blake, J. G.

Biological Conservation 121(4): 519-531. (2005)

NAL Call #: S900.B5; ISSN: 00063207.

Notes: doi: 10.1016/j.biocon.2004.06.021.

Descriptors: birds/ fire/ oak/ prescribed burning/ restoration/ abundance/ avifauna/ prescribed burning/ restoration ecology/ spatial distribution/ Cuivre River State Park/ Missouri/ Aves/ Empidonax/ Empidonax virescens/ Helmitheros/ Helmitheros vermivorus/ Hylocichla mustelina/ Impleta/ Indigofera/ Oporornis/ Oporornis formosus/ Passerina cyanea/ Picidae/ Quercus/ Seiurus/ Seiurus aurocapillus

Abstract: Prescribed, biennial burning in forest understory started in Cuivre River State Park, Missouri, USA, in the late 1980s to help restore the forest to conditions that existed prior to European settlement. Bird surveys were started in 1996 on two burned and two unburned sections of the park to determine what effects the burning and subsequent changes in vegetation were having on bird populations. Birds were sampled at 17 60-m radius point counts on each study area; each point was sampled twice per year during the main breeding period from 1996 through 2002. Total abundance and species richness differed among the four areas but no differences could be attributed to burning. Some individual species, however, differed in abundance and frequency of occurrence between burned and unburned areas. For example, Indigo Bunting (*Passerina cyanea*), Kentucky Warbler (*Oporornis formosus*), and several species of woodpeckers were more abundant on burned areas; Ovenbird (*Seiurus aurocapillus*), Worm-eating Warbler (*Helmitheros vermivorus*), Wood Thrush (*Hylocichla mustelina*) and Acadian Flycatcher (*Empidonax virescens*) were among the species more abundant on unburned areas. As a consequence, overall community composition differed significantly between burned and unburned areas of the park, but did not differ between burned areas or between unburned areas. Prescribed burning was instituted to restore vegetation to presettlement conditions and has started to achieve that objective. Restoration also has affected and likely will continue to affect bird populations. Future maintenance of a full complement of bird species, including a number of neotropical migrants, will be dependent on presence of both burned and unburned forest habitat.

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985. Effects of prescribed burns on wintering cavity-nesting birds.

Bateman, Heather L. and O'Connell, Margaret A.

Northwest Science 80(4): 283-291. (2006)

NAL Call #: 470 N81; ISSN: 0029-344X

Descriptors: Passeriformes/ Piciformes/ environmental factors/ cavity nesting/ Columbia Basin, Turnbull National Wildlife Refuge/ conservation/ wildlife management/ habitat use/ fires-burns/ forests/ ecosystems/ habitat management/ land zones/ pine woodland/ population ecology/ prescribed

burning/ species abundance/ terrestrial ecology/

Washington/ Pinus spp./ ponderosa pine

Abstract: Primary cavity-nesting birds play a critical role in forest ecosystems by excavating cavities later used by other birds and mammals as nesting or roosting sites. Several species of cavity-nesting birds are non-migratory residents and consequently subject to winter conditions. We conducted winter bird counts from 1998 to 2000 to examine the abundance and habitat association of cavity-nesting birds in prescribed burned and unburned ponderosa pine (*Pinus ponderosa*) stands. Even though bird diversity indices did not differ between burned and unburned stands, species-specific bird abundance was associated with habitat variables in three burned and four unburned stands. Total cavity-nesting bird abundance was greater in burned stands. Most cavity-nesting birds were observed in mixed-species flocks. Individual species of these flocks were associated with different habitat variables within stands. Numbers of woodpeckers were significantly greater in burned stands and numbers of chickadees were significantly greater in unburned stands. Bark foragers such as woodpeckers (*Picoides* spp.) and pygmy nuthatches (*Sitta pygmaea*) were associated with fewer small trees and recently decayed snags and logs. Foliage gleaners such as the chickadees (*Poecile* spp.) were associated with small diameter snags. The juxtaposition of burned and unburned stands is important for individual birds reliant upon other members of a mixed-species flock and habitat heterogeneity within stands is important for maintaining a diverse cavity-nesting bird assemblage.

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986. Effects of prescribed fire and fire surrogates on floral visiting insects of the Blue Ridge province in North Carolina.

Campbell, J. W.; Hanula, J. L.; and Waldrop, T. A.

Biological Conservation 134(3): 393-404. (2007)

NAL Call #: S900.B5; ISSN: 0006-3207

Descriptors: associations/ mutualism/ ecology/ population dynamics/ terrestrial habitat/ abiotic factors/ physical factors/ land zones/ Insecta: pollination/ effects of prescribed fire and fire surrogates on floral visiting taxa/ community structure/ population size/ forest and woodland/ fire/ prescribed fire and fire surrogates/ effects on floral visiting taxa/ North Carolina/ Hendersonville/ Green River Game Management Area/ Insecta/ arthropods/ insects/ invertebrates

Abstract: Pollination by insects in forests is an extremely important process that should be conserved. Not only do pollinating insects help to maintain a diversity of plants within forests, but they also aid in pollinating crops found near forested land. Currently, the effects of various forest management practices on floral visiting insect abundance or diversity is unknown, so we investigated how prescribed burning, mechanical shrub control, and combination of the two affected abundance of floral visiting insects. We caught 7921 floral visitors from four orders and 21 families. Hymenoptera was the most abundant and diverse order, with Halictidae being the most abundant family. A total of 45 species of Hymenoptera representing six families were captured. We caught seven families and 35 species of Lepidoptera, six families and 33 species of Coleoptera, and two families and 13 species of Diptera. Most floral visitors were captured in the mechanical shrub control plus prescribed burn treatments, while lower numbers were

caught on the mechanical shrub control only, prescribed burn only and control treatments. Overall species richness was also higher on mechanical plus burn treatments. Total pollinator abundance and the abundance of most orders and families was correlated with decreased tree basal area and increased percent herbaceous plant cover. Our study shows that floral visitors increased in abundance and species richness most from forest disturbance that reduced the density of overstory trees and increased the amount of herbaceous plant growth.

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987. Effects of prescribed fire on habitat of beaver (*Castor canadensis*) in Elk Island National Park, Canada.

Hood, G. A.; Bayley, S. E.; and Olson, W.
Forest Ecology and Management 239(1-3): 200-209.
 (Feb. 2007)
 NAL Call #: SD1.F73

Descriptors: *Castor canadensis*/ habitats/ habitat preferences/ wildlife habitats/ prescribed burning/ forest ecology/ animal ecology/ fire ecology/ mixed forests/ boreal forests/ wetlands/ drought/ fires/ frequency/ ungulates/ herbivores/ statistical models/ Saskatchewan/ beaver lodges/ plant ecology/ aquaculture/ mathematics and statistics

This citation is from AGRICOLA.

988. The effects of prescribed fires in different seasons on small mammals in a Sierra Nevada mixed conifer forest.

Monroe, Michelle Erin
 Davis, CA: University of California, Davis, 2006.
Notes: Degree: PhD; Advisor: Elliott-Fisk, Debbie
Descriptors: prescribed fire/ small mammals/ conifer forest/ Sierra Nevada Mountains/ lodgepole chipmunk/ *Neotamias speciosus*/ deer mouse/ *Peromyscus maniculatus*/ population density/ habitat management
Abstract: Prescribed fire is an important management practice used to restore natural fire regimes in Sierra Nevada mixed conifer forests where fire has been suppressed over the last century. It is not well known, however, how the timing of prescribed fire affects wildlife species. I compared the effects of prescribed fires during the early season (spring and early summer) with those during the late season (late summer and fall) on small mammal populations using model selection and inference methods. In Chapter 1, I examined the effects of prescribed fire treatments on small mammal movements. In Chapter 2, I evaluated the effects of prescribed fire treatments on small mammal population demographics. In Chapter 3, I explored small mammal habitat relationships following prescribed fire treatments. Lodgepole chipmunk (*Neotamias speciosus*) movements differed between years, but there was no effect of prescribed fires on their movements (Chapter 1). Deer mouse (*Peromyscus maniculatus*) movements differed between age groups within years. Prescribed fire treatments did not affect deer mouse movements, except when only adult female deer mouse movements were analyzed. Year effects were more important than fire effects on lodgepole chipmunk densities, total small mammal biomass, deer mouse densities, and deer mouse age ratios (Chapter 2). Prescribed burning had a positive effect on deer mouse pregnancy ratios, and there was only limited support for an effect of year on these

ratios. There was essentially no support for different effects of fire depending on the season of fire on total small mammal biomass and deer mouse densities, and only limited support for these effects on lodgepole chipmunk densities, deer mouse age ratios, and deer mouse pregnancy ratios. The prescribed fire treatments differentially impacted small mammal habitat components depending on the season of the fire (Chapter 3). However, there were few significant relationships between these habitat components and deer mouse densities, lodgepole chipmunk densities or small mammal species richness. Overall, year effects often had the greatest influence on the small mammal populations examined, and there were few strong differences between the effects of early season fires and late season fires on these populations.

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989. Effects of prescribed surface fires on ground- and shrub-nesting Neotropical migratory birds in a mature Indiana oak forest, USA.

Aquilani, S. M.; LeBlanc, D. C.; and Morrell, T. E.
Natural Areas Journal 20(4): 317-324. (2000)
 NAL Call #: QH76.N37; ISSN: 08858608
Descriptors: abundance/ neotropical migrants/ nesting success/ oak-hickory forest/ prescribed burning/ avifauna/ ecological impact/ forest management/ nesting/ prescribed burning/ reproductive success/ United States/ *Molothrus ater*/ *Quercus*/ *Seiurus aurocapillus*
Abstract: Prescribed fires have been used as a forest vegetation management tool in the eastern United States during the past decade, but concerns have been raised about direct or indirect adverse effects on Neotropical migrant bird species that nest in forest interior habitats. Prescribed fires were set in 1993 and 1995 in a mature hardwood forest in southern Indiana, USA, to reduce shade-tolerant understory woody vegetation and thereby increase the abundance and diversity of ground layer vegetation and seedlings of tree species that require moderate light levels (e.g., *Quercus* L. spp.). The objective of this study was to determine if prescribed fires reduced the abundance or reproductive success of ground- and shrub-nesting Neotropical migrant bird species. The burned area and an adjacent unburned area were studied during the summers of 1996 and 1997. An unlimited-radius point count method was used to determine relative abundance. Nests were monitored to determine fledging success. Vegetation structure was quantified at nest sites and at random points to assess fire effects and bird nest-site selection. Abundance of birds in this nesting guild was greater in the unburned area during both years. The greatest difference in abundance was for ovenbird (*Seiurus aurocapillus* Linnaeus). The probability of nest success for all bird species in this nesting guild combined, determined by the Mayfield method, was significantly lower in the burned area (0.125) than in the unburned area (0.291). Abundance of the brood parasite brown-headed cowbird (*Molothrus ater* Boddaert) did not differ between burned and unburned areas. However, the probability of nest success for parasitized nests (0.140) was lower than that of unparasitized nests (0.735). The mean number of host young fledged from successful nests was significantly lower in parasitized nests (1.3) than from unparasitized nests (3.0). Prescribed fires significantly reduced vegetative cover in the burned area. Nest sites in the burned area had higher vegetative cover than random points, indicating that birds

may have selected nest sites that were less affected by the fire. While prescribed fires that burn in a 'natural' hit-or-miss pattern may retain nesting habitat for bird species in this nesting guild, lower nest success in the burned area indicates that management for desirable vegetation and for this nesting guild may not be compatible within the same forest stand at the same time. This argues for planning at a landscape level to attain objectives for both vegetation composition and maintenance of bird species diversity.

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990. Effects of prickly pear control on survival and nest success of northern bobwhite in Texas.

Hernandez, F.; Henke, S. E.; Silvy, N. J.; and Rollins, D. *Wildlife Society Bulletin* 31(2): 521-527. (2003)

NAL Call #: SK357.A1W5; ISSN: 00917648

Descriptors: bobwhite/ brush control/ *Colinus virginianus*/ *Opuntia*/ Quail/ birds/ cactus/ nesting success/ survival/ wildlife management/ Texas

Abstract: Control of prickly pear cactus (*Opuntia* spp.) with a tandem of prescribed fire and picloram (4-amino-3,5,6-trichloropicolinic acid) is a common practice in the Rolling Plains of Texas. The effects of such a practice on the northern bobwhite (*Colinus virginianus*) have not been documented. We evaluated the effect that prickly pear control (2-3 years post-treatment) has on survival and nest success of northern bobwhites. We captured and radiomarked 217 bobwhites (n=66 males, n=151 females) within 2 treated (burned and sprayed) and 2 nontreated pastures during spring and summer of 1997-1998 in Shackelford County, Texas. Treated pastures were burned in February 1995 and subsequently sprayed in April 1995 with 0.27 kg/ha of picloram. Season survival (15 Mar-15 Aug) did not differ between treated (0.17) and nontreated pastures (0.36) in 1997 (P=0.12) or 1998 (0.58 vs. 0.61, respectively; P=0.72). Eighty-one nests were located, 48 in treated pastures and 33 in nontreated pastures. Nest success did not differ between treated (46%) and nontreated (46%) sites (P=0.96). Prickly pear control did not affect seasonal survival or nest success of northern bobwhites 2-3 years post-treatment.

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991. Effects of restoration techniques on breeding birds in a thermally-impacted bottomland hardwood forest.

Buffington, J. M.; Kilgo, J. C.; Sargent, R. A.; Miller, K. V.; and Chapman, B. R.

Ecological Engineering 15(Suppl 1): S115-S120. (Sept. 2000)

NAL Call #: TD1.E26

Descriptors: breeding/ burning/ ecosystem disturbance/ ecosystem management/ environmental impact/ environmental restoration/ forests/ habitat improvement (biological)/ herbicides/ nuclear power plants/ revegetation/ vegetation cover/ water temperature/ Aves/ South Carolina/ Savannah R.

Abstract: We evaluated the effects of revegetation techniques on breeding bird communities in a bottomland hardwood forest impacted by thermal effluent. In 1993, sections of the Pen Branch bottomland on the Savannah River Site, South Carolina, were herbicide-treated (glyphosate), burned, and planted; other sections were planted only while others were unaltered and served as controls. Few differences in the avian community occurred

at 1 and 2 years post-treatment among treatments. Plots that were herbicide-treated, burned, and planted had greater species richness in 1994 and abundance in 1995 than sections that were planted only (P < 0.05). Bird species composition differed slightly among treatments and White-eyed Vireos (*Vireo griseus*), Common Yellowthroats (*Geothlypis trichas*), Indigo Buntings (*Passerina cyanea*), and Red-winged Blackbirds (*Agelaius phoeniceus*) were the most abundant species in the corridor. Revegetation techniques used to restore this thermally-impacted bottomland had little effect on the avian communities 1 and 2 years post-treatment.

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992. Effects of selection cutting and landscape-scale harvesting on the reproductive success of two neotropical migrant bird species.

Bourque, Julie. and Villard, Marc Andre *Conservation Biology* 15(1): 184-195. (2001)

NAL Call #: QH75.A1C5; ISSN: 0888-8892

Descriptors: commercial activities/ conservation measures/ reproduction/ terrestrial habitat/ land and freshwater zones/ North America/ Canada/ *Dendroica caerulescens*/ *Seiurus aurocapillus* (Parulidae): forestry/ harvesting intensity/ habitat management/ forest harvesting intensity/ reproductive productivity/ forest and woodland/ New Brunswick/ Riley Brook area/ reproductive success/ forest harvesting intensity effects/ Parulidae/ Passeriformes, Aves/ birds/ chordates/ vertebrates

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993. Effects of selective logging on breeding bird communities in bottomland hardwood forests in Louisiana.

Heltzel, Jeannie M. and Leberg, Paul L. *Journal of Wildlife Management* 70(5): 1416-1424. (2006)

NAL Call #: 410 J827; ISSN: 0022-541X

Descriptors: Passeriformes/ Fringillidae/ Tyrannidae/ Vireonidae/ Acadian flycatcher/ *Empidonax virescens*/ hooded warbler/ Kentucky warbler/ *Limnothlypis swainsonii*/ *Oporornis formosus*/ prothonotary warbler/ *Protonotaria citrea*/ Swainson's warbler/ *Vireo griseus*/ white-eyed vireo/ *Wilsonia citrina*/ Aves/ wildlife-human relationships/ bird abundance/ bottomland hardwood forests/ breeding productivity/ commercial enterprises/ communities/ disturbances/ habitat use/ ecosystems/ forestry practices/ habitat alterations/ habitat quality/ land zones/ logging/ Louisiana/ methods and techniques/ selective logging/ wildlife management/ canopy gaps/ forestry/ point counts/ silviculture/ songbirds/ success/ timber harvest/ birds/ biocenosis/ habitat/ forest/ vegetation/ field techniques

Abstract: Bottomland hardwood forests of the southeastern United States support a rich avifauna, including > 20 species of conservation concern; understanding the impact of land use practices on these communities is critical to their conservation. Selective timber harvesting is a common management practice in southern bottomland hardwood forests, but little research has examined impacts > 5 years after harvesting. We studied breeding bird communities in selectively harvested bottomland forests in northeastern Louisiana during 2003-2004. We conducted point counts in recently harvested stands (1-5 yr postharvest) and older harvests (1218 yr postharvest); we paired each with a reference stand that had not been harvested for > 30 years. Of 35 species with sufficient detections for analysis, we

found evidence that abundances of 17 species differed among treatments. Three species were sensitive to creation of canopy openings by timber harvests, including 2 species of concern in the Mississippi Alluvial Valley, USA, prothonotary warbler (*Protonotaria citrea*) and Acadian flycatcher (*Empidonax virescens*). However, 4 species of concern often associated with densely vegetated canopy gaps were more abundant in older harvests than in reference stands: Swainson's warbler (*Limnithlypis swainsonii*), hooded warbler (*Wilsonia citrina*), white-eyed vireo (*Vireo griseus*), and Kentucky warbler (*Oporomis formosus*). As expected, a suite of species typically associated with shrub and forest-edge habitats was more abundant in recent harvests than in reference stands. We conclude that selective logging has a strong influence on bird abundances in both recent and older harvests in bottomland forests. With the exception of Acadian flycatcher, older harvests and reference stands supported similar abundances of the species typically found in closed-canopy bottomland forests. In addition, older harvests supported substantially higher abundances of gap-dependent species than other treatments. Our results should be useful to land managers and conservation planners evaluating short- and long-term effects of timber management practices on breeding birds in the Mississippi Alluvial Valley. However, measures of breeding productivity are necessary to evaluate more fully the habitat quality of harvested forests.

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994. The effects of selective logging on nest-site selection and productivity of hooded warblers (*Wilsonia citrina*) in Canada.

Whittam, Rebecca M.; McCracken, Jon D.; Francis, Charles M.; and Gartshore, Mary E.
Canadian Journal of Zoology 80(4): 644-654. (2002)
 NAL Call #: 470 C16D; ISSN: 0008-4301
Descriptors: *Wilsonia citrina*/ Passeriformes/ Parulidae/ behavior/ forestry practices/ habitat alterations/ reproduction/ wildlife management/ canopy height/ daily survival rate/ deciduous forest/ forest gaps/ forest management/ ground vegetation density/ nest basal area/ nest parasitism/ nest-site selection/ pine plantation/ productivity/ selective logging/ stump number/ tree stem number/ breeding grounds/ forests/ ecosystems/ habitat management/ habitat use/ nesting site selection/ Ontario/ selective forest logging/ Canada/ conservation/ wildlife management/ land zones/ North America/ breeding/ hooded warbler

Abstract: We examined nest-site selection by hooded warblers (*Wilsonia citrina*) in two forests differing in composition (extensive pine plantation versus largely deciduous) and management (recent selective logging versus minimal logging). We measured habitat at 52 nests and 66 controls in one forest and 57 nests and 41 controls in the second. Nests had denser ground vegetation, fewer tree stems, less basal area due to small trees and greater basal area due to large trees than controls in both forests. In the managed forest with extensive pine plantations, hooded warblers were in coniferous and logged stands more often than expected by chance, nests had more stumps and greater canopy height than controls, and 91% (52/57) of all nests were found in gaps, 84% of which were created by harvest. Gap age was 6.2 ± 0.9 years (mean \pm SE) in 1999, and 7.6 ± 0.6 years in 2000. In the managed

forest, 52% of 24 nests were parasitized in 1999 and 39% of 33 nests were parasitized in 2000. The daily survival rate was 0.936 ± 0.019 in 1999 and 0.944 ± 0.014 in 2000. Successful nests did not differ from unsuccessful nests in any habitat variable. To benefit hooded warblers, forest managers should mimic natural gap creation by using selective logging to create gaps no larger than 0.05 ha, and should leave a residual basal area of mature trees (>38 cm diameter at breast height) of at least 12 m²/ha.

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995. The effects of shelterwood logging on bird community composition in the Black Hills, Wyoming.

Anderson, Stanley H. and Crompton, Bradley J.
Forest Science 48(2): 365-372. (2002)
 NAL Call #: 99.8 F7632; ISSN: 0015-749X
Descriptors: *Certhia americana*/ *Seiurus aurocapillus*/ *Sitta canadensis*/ Passeriformes/ forestry practices/ habitat alterations/ terrestrial ecology/ shelterwood logging/ complex history/ frequent cool ground fires/ human disturbance/ intensive fire suppression/ natural disturbance/ open even-aged stands/ Black Hills National Forest/ forests/ ecosystems/ habitat management/ harvested forest/ status/ species diversity/ Wyoming/ wildlife-human relationships/ commercial enterprises/ communities/ conservation/ wildlife management/ disturbances/ habitat use/ land zones/ brown creeper/ ovenbird/ red-breasted nuthatch/ *Pinus ponderosa*/ ponderosa pine/ South Dakota
Abstract: The Black Hills of Wyoming and South Dakota are characterized by a complex history of both natural and human disturbance regimes. Historically, ponderosa pine (*Pinus ponderosa*) communities were characterized by frequent, cool ground fires. Intensive fire suppression and timber harvest throughout the past century have drastically altered the structure of existing forests. Today, much of the area has been harvested using shelterwood logging resulting in open even-aged stands. The goal of this study was to compare bird communities in treated (areas that have recently been harvested) and untreated (areas receiving minimal silvicultural treatment) in the past 40 yr. Of the 20 commonly observed bird species, 3 species [red-breasted nuthatch (*Sitta Canadensis*), brown creeper (*Certhia Americana*), and ovenbird (*Seiurus aurocapillus*)] were conspicuously less abundant in treated than in untreated stands. Eleven other species were more abundant in treated stands, while six species showed no response to treatment. Although bird species diversity and the abundance of birds were highest in treated stands, this does not imply that logging is beneficial to the entire bird community. The abundance of particular bird species may appear to have increased, but the composition of the bird community has been altered. As more of the forested areas are harvested, the bird community will shift from one with birds typical of both open pine and dense pine forest to one dominated by ground foraging species.

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996. Effects of silvicultural activity on ecological processes in floodplain forests of the southern United States: A review of existing reports.

Lockaby, B. G.; Stanturf, J. A.; and Messina, M. G.
Forest Ecology and Management 90(2-3): 93-100. (1997)
 NAL Call #: SD1.F73; ISSN: 0378-1127
Descriptors: functions/ harvests/ wetland forests

Abstract: Activities associated with timber harvesting have occurred within floodplain forests in the southern United States for nearly two hundred years. However, it is only in the last ten years that any information has become available about the effects of harvesting on the ecological functions of this valuable resource. Hydrology is the driving influence behind all ecological processes in floodplains, and timber harvesting alone usually has little long-term effect on hydroperiod. However, logging roads, built in association with harvest sites, can sometimes alter hydroperiod to the extent that vegetation productivity is raised or lowered. There is no evidence that harvesting followed by natural regeneration represents a threat to ground or surface water quality on flood plain sites, as long as 'best management practices' are followed. Harvested floodplains may increase or have little effect on decomposition rates of surface organic matter. The nature of the effect seems to be controlled by site wetness. Data from recently harvested sites (i.e. within the last ten years) suggest that vegetation productivity is maintained at levels similar to those observed prior to harvests. During the early stages of stand development, tree species composition is heavily influenced by harvest method. Similarly, amphibian populations (monitored as bioindicators of ecosystem recovery) seem to rebound rapidly following harvests, although species composition may be different from that of unharvested stands.

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997. The effects of stand age on avian communities in aspen-dominated forests of central Saskatchewan, Canada.

Hobson, K. A. and Bayne, E.
Forest Ecology and Management 136(1-3): 121-134. (2000)
NAL Call #: SD1.F73; ISSN: 0378-1127

Descriptors: commercial activities/ conservation measures/ ecology/ terrestrial habitat/ land and freshwater zones/ Canada/ Aves: forestry/ aspen dominated forest/ forest management/ habitat management/ stand age/ breeding communities/ community structure/ forest and woodland/ Saskatchewan/ Prince Albert Model Forest Area/ Aves/ birds/ chordates/ vertebrates

Abstract: Timber harvest projections for aspen-dominated forests in the prairie region of Canada include a truncation of the current age distribution, whereby old stands of fire origin will become rarer on the landscape, while young, post-harvest stands will increase in abundance. To determine the effects this harvesting strategy might have on communities of breeding forest birds, we conducted point counts in young forests regenerated from clear-cutting (15-25 years), and mature (50-60 years), and old (80-110 years) forests regenerated from fire. Avian species richness was highest in old stands at the point-count station, forest stand, and landscape level. Increased species richness with forest age was associated with increases in the relative abundance of canopy- and cavity-nesting species. At local scales (station and stand), species richness of ground- and shrub-nesting birds was similar among forest age-classes. However, as determined by rarefaction analyses appropriate at the landscape scale, ground-nesting species were more common in young and old forests, while shrub-nesting species were more common in young and mature forests. Density of deciduous shrubs was an important factor influencing the abundance of species like American redstart, Canada warbler, and chestnut-sided warbler. An

increase in conifer in old stands resulted in greater use by conifer- or mixedwood associated species such as bay-breasted warbler, magnolia warbler, and ruby-crowned kinglet. Our data indicate that vegetation and structural characteristics such as shrub density should be considered when prescribing sustainable forestry objectives.

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998. Effects of stand-replacement fire and salvage logging on a cavity-nesting bird community in eastern Cascades, Washington.

Haggard, M. and Gaines, W. L.
Northwest Science 75(4): 387-396. (2001)
NAL Call #: 470 N81; ISSN: 0029344X

Descriptors: avifauna/ cavity/ fire/ foraging behavior/ forest management/ logging (timber)/ nest site/ snag/ United States

Abstract: We monitored the response of cavity-nesting species to three snag density treatments (high = 37-80 snags/ha, medium = 15-35 snags/ha, and low = 0-12 snags/ha) during two breeding seasons 4-5 yr post-fire and logging in Douglas-fir- ponderosa pine forests in the eastern Cascades, Washington. Snag surveys were used to describe habitat, and both breeding bird surveys and nest surveys were used to characterize the bird community. Stands with the medium snag density treatment had the highest abundance, species richness, and nesting population of cavity nesters. The reasons for this may be: 1) snags were not evenly distributed within a stand such that both clumped and dispersed snag density habitats were interspersed in this treatment, and 2) a greater proportion of ponderosa pine snags in medium density treatments may have attracted species that prefer ponderosa pine for nesting and foraging. Ponderosa pine was preferred for nest sites and large snags (> 48 cm dbh) provided nesting habitat for more species than smaller snags. However, smaller snags were used for nesting and foraging by some species.

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999. Effects of strip and single-tree selection cutting on birds and their habitat in a southwestern Quebec northern hardwood forest.

Doyon, F.; Gagnon, D.; and Giroux, J. F.
Forest Ecology and Management 209(1-2): 101-116. (2005)
NAL Call #: SD1.F73; ISSN: 03781127.
Notes: doi: 10.1016/j.foreco.2005.01.005.

Descriptors: biodiversity/ coarse woody debris/ forest management/ low-impact silviculture/ passerines/ vertical and horizontal habitat structure/ cutting/ hardwoods/ forest habitats/ single-tree selection cutting/ woody debris/ forestry/ avifauna/ coarse woody debris/ ecological impact/ habitat structure/ harvesting/ selective logging/ silviculture/ birds/ forest strip/ forests/ hardwoods/ North America/ trees/ Canada/ North America/ Quebec [Canada]/ Aves/ Catharus ustulatus/ Dendroica pensylvanica/ Dendroica virens/ Galliformes/ Pheucticus ludovicianus/ Seiurus aurocapillus

Abstract: In the northern hardwood forest of northeastern North America, ecological and social perceptions call for forest management systems using reduced-impact silviculture such as single-tree selection cutting and small clearcuts. When applied over large areas, single-tree selection cut and small clearcut systems are likely to generate different local habitat structures and spatio-temporal habitat distribution in the landscape. This study

assessed the effects of strip cutting and single-tree selection cutting on forest breeding birds when extensively applied in a northern hardwood forest in southwestern Quebec, a decade after timber harvest. Birds were surveyed twice during two consecutive breeding seasons by 270 point counts, equally distributed in a single-tree selection cut forest, a strip cut forest, and an untreated forest. At each point count, habitat features and horizontal heterogeneity of these features were measured. Managed forest habitats had a much more developed understory, fewer snags and more downed woody debris. Horizontal heterogeneity was higher in the strip cut forest and lower in the single-tree selection cut forest. Of the 20 bird species analyzed, 13 showed a difference in abundance between at least two of the three treatments. *Dendroica pensylvanica* was mostly seen in the treated forests while *Dendroica virens* and *Seiurus aurocapillus* were more abundant in the untreated forest. *Pheucticus ludovicianus* was twice as abundant in the strip cut forest, while *Catharus ustulatus* was more frequently observed in the single-tree selection cut forest. Habitat vertical structure variables that differed among the three treatments were the most correlated with bird abundance. The results of this study support the use of a mix of silvicultural systems within the same forest in order to sustain habitat diversity for maintaining the regional avian cortege.

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1000. Effects of structural complexity enhancement on eastern red-backed salamander (*Plethodon cinereus*) populations in northern hardwood forests.

McKenny, Heather C.; Keeton, William S.; and Donovan, Therese M.

Forest Ecology and Management 230(1-3): 186-196. (2006)
NAL Call #: SD1.F73; ISSN: 0378-1127

Descriptors: Caudata/ Lissamphibia/ Plethodontidae/ *Plethodon cinereus*/ abundance estimate/ wildlife-human relationships/ commercial enterprises/ wildlife management/ coarse woody debris/ disturbances/ habitat use/ forests/ ecosystems/ forest management/ forestry practices/ habitat alterations/ Green mountain range/ habitat conservation/ habitat management/ habitat size/ hardwood forest/ Hardwood forest structural complexity enhancement/ land zones/ density/ population ecology/ status/ silviculture/ structural complexity/ structural complexity enhancement/ structural habitat attribute/ Vermont

Abstract: Managing for stand structural complexity in northern hardwood forests has been proposed as a method for promoting microhabitat characteristics important to eastern red-backed salamanders (*Plethodon cinereus*). We evaluated the effects of alternate, structure-based silvicultural systems on red-backed salamander populations at two research sites in northwestern Vermont. Treatments included two uneven-aged approaches (single-tree selection and group-selection) and one unconventional approach, termed "structural complexity enhancement" (SCE), that promotes development of late-successional structure, including elevated levels of coarse woody debris (CWD). Treatments were applied to 2 ha units and were replicated two to four times depending on treatment. We surveyed red-backed salamanders with a natural cover search method of transects nested within vegetation plots 1 year after logging. Abundance estimates corrected for detection probability were calculated from survey data with a binomial mixture model. Abundance estimates differed

between study areas and were influenced by forest structural characteristics. Model selection was conducted using Akaike Information Criteria, corrected for over-dispersed data and small sample size (QAICc). We found no difference in abundance as a response to treatment as a whole, suggesting that all of the uneven-aged silvicultural systems evaluated can maintain salamander populations after harvest. However, abundance was tied to specific structural habitat attributes associated with study plots within treatments. The most parsimonious model of habitat covariates included site, relative density of overstory trees, and density of more-decayed and less-decayed downed CWD. Abundance responded positively to the density of downed, well-decayed CWD and negatively to the density of poorly decayed CWD and to overstory relative density. CWD volume was not a strong predictor of salamander abundance. We conclude that structural complexity enhancement and the two uneven-aged approaches maintained important microhabitat characteristics for red-backed salamander populations in the short term. Over the long-term, given decay processes as a determinant of biological availability, forestry practices such as SCE that enhance CWD availability and recruitment may result in associated population responses. © 2006 Elsevier B.V. All rights reserved.

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1001. The effects of thinning and prescribed fire on foraging patterns of bark-gleaning birds.

Wolf, Jennifer C.

Intermountain Journal of Sciences 9(4): 145-146. (2003);
ISSN: 1081-3519

Descriptors: birds/ forest management/ forest restoration/ *Pinus ponderosa*/ ponderosa pine/ snags/ cavity nesting/ woodpeckers/ nuthatches/ chickadees

Abstract: Fire suppression in western forests has changed the mosaic of successional stage of forest that once existed. In the western United States, recent large-scale, high-intensity fires have been attributed to the lack of fire in forest systems for the past century. The Montana Department of Natural Resources (DNRC) is integrating ponderosa pine forest restoration into their timber harvest program with a commercial thin that is combined with a selective cut and followed by a prescribed burn. Many studies have considered the effects of forest management practices on nest availability for cavity nesters, but little published information exists on how thinning combined with prescribed fire affects their foraging patterns. Snags can provide important nesting habitat for cavity nesters, but it has been suggested that food availability may be the limiting factor for woodpeckers. In this project, I examined the foraging patterns of bark-gleaning birds on sites treated by the DNRC versus untreated sites. I determined which tree characteristics are important in the selection of forage trees for five different species: red-breasted nuthatches, white-breasted nuthatches, mountain chickadees, hairy woodpeckers, and black-backed woodpeckers. Treated and untreated sites were analyzed separately to determine if the same tree characteristics were important on both sites. Selection of forage trees with certain characteristics occurred on both sites for most species.

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1002. The effects of timber harvesting on neotropical migrants in cove hardwood forests in the southern Appalachian Mountains.

Franzreb, Kathleen E.

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. 301-311.

Notes: 0196-2094 (ISSN).

Descriptors: commercial activities/ conservation measures/ ecology/ community structure/ population dynamics/ terrestrial habitat/ land zones/ Aves: forestry/ timber harvesting/ species diversity/ breeding densities/ neotropical migrants/ cove hardwood forest/ habitat management/ population density/ forest and woodland/ North Carolina/ Southern Appalachian Mountains/ birds/ chordates/ vertebrates

Abstract: I compared avian species richness, density, and diversity for neotropical migrants, short distance migrants, and permanent residents following timber harvesting in cove hardwood forests in the Southern Appalachian Mountains of North Carolina. The forest stands were 4- 103 years old, had undergone a clearcut or selective tree removal, and represented four successional stages (early, sapling/pole, mid, and late). Neotropical migrants constituted 60.5 to 69.0 percent of species richness. Mean breeding bird density for all species was 225.1 pairs/40 ha \pm 16.3 SE) with an overall mean density for neotropical migrants of 186.2 pairs/40 ha \pm 5.4 SE). Late successional cove hardwood forest habitats provide for a significantly more diverse avifauna with respect to the entire avifauna, and, specifically the neotropical migrants, than does sapling/pole or midsuccessional forests. Neotropical migrants are the most substantial avian component of the highly diverse cove hardwood forest habitat, accounting for a minimum of 70 percent of the individual birds in each successional class. Therefore, their needs must not be overlooked in considering the consequences of habitat alterations and management activities.

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1003. Effects of timber harvests on invertebrate biomass and avian nest success.

Duguay, J. P.; Wood, P. B.; and Miller, G. W.

Wildlife Society Bulletin 28(4): 1123-1131. (2000)

NAL Call #: SK357.A1W5; ISSN: 00917648

Descriptors: Insect biomass/ nest predation/ nest survival/ silviculture/ timber management/ avifauna/ biomass/ invertebrate/ management practices/ nesting success/ population decline/ timber harvesting/ United States/ *Hylochichla mustelina*

Abstract: Concerns over declining songbird populations have led to investigations of effects of various timber management practices on breeding songbirds. We assessed the influence of 2 types of practices, two-age and clearcutting, on invertebrate biomass and avian daily nest survival in the Monongahela National Forest of West Virginia during summers of 1995 and 1996. We also examined relationships between invertebrate biomass, avian daily nest survival, and wood thrush (*Hylochichla mustelina*) nestling growth rates. Mean total invertebrate biomass collected per sample day and litter-dwelling invertebrates collected per sample day were 0.0614 g and 0.0254 g greater ($P \leq 0.10$), respectively, in the unharvested

than clearcut treatment late in the season (2 Jun to 12 Jul) when most birds had young in the nest; whereas invertebrates that hide under tree bark during the day had greatest biomass ($P=0.003$) in the two-age treatment during this same time period (0.1355 g greater than clearcut and 0.0616 g greater than unharvested). In addition, daily nest survival rates (216 nests) were greater in the unharvested than two-age treatment ($P \leq 0.05$). The lesser daily nest survival rates of birds breeding in the harvested treatments may be due to increased predator activity within these areas and/or reduced food supplies. Significant positive correlations between invertebrate biomass and daily nest survival rates of breeding birds and faster growth rates of wood thrush nestlings in stands with a greater invertebrate biomass suggest that changes in invertebrate biomass caused by silvicultural practices have an influence on breeding birds within these areas.

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1004. Effects of uneven-aged timber harvest on forest floor vertebrates in the Cascade Mountains of southern Washington.

MacCracken, James G.

Forest Ecology and Management 208(1-3): 123-135. (2005)

NAL Call #: SD1.F73; ISSN: 0378-1127

Descriptors: biogeography/ uneven-aged timber harvest/ species abundance/ air temperature/ precipitation/ tree cover/ body condition/ tree density/ breeding pond/ capture rate/ wetland buffer width/ *Tsuga* spp.

Abstract: I sampled amphibians and small mammals in noble fir-western hemlock (*Abies procera*-*Tsuga heterophylla*) stands following selective timber harvest and in reference stands from 1997 to 2001 in the Cascade Mountains of Washington. Forest stands surrounded a 25 ha wetland. Selective harvest had large, negative effects on tree density and cover and shrub cover, but large positive effects on herbaceous cover. Harvest effects on the abundance of all forest floor vertebrates (FFVs) were small, negative for most amphibians, and positive for most small mammals. Indices of body condition for species with adequate captures were also similar between harvested and reference stands. Annual changes in abundance of forest floor vertebrates in relation to trends in precipitation and air temperature, however, were much larger than those attributed to timber harvest. In addition, the distance of a trap site to breeding ponds had a moderate effect on capture rates of pond-breeding amphibians. Incomplete descriptions of timber harvest techniques in most studies complicated comparisons among studies and formulating generalizations about the effects of uneven-aged harvest on forest floor vertebrates. Wetland buffer width in this study (congruent to 61 m) maintained wetland associated species, but longer term (> 5 years) trends need study.

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1005. Effects of wildfire on recruitment of *Fraxinus pennsylvanica* in eastern Montana woodlands.

Lesica, P.

American Midland Naturalist 149(2): 258-267. (2003)

NAL Call #: 410 M58; ISSN: 00030031

Descriptors: habitat management/ prescribed burning/ recruitment/ regeneration/ restoration ecology/ wildfire/ woodland/ North America/ *Fraxinus pennsylvanica*

Abstract: *Fraxinus pennsylvanica* woodlands are an important component of the Northern Great Plains ecosystem and critical habitat for many species of birds, mammals and plants. Many *F. pennsylvanica* woodlands are decadent, declining from closed-canopy to open-canopy stands with few tall shrubs and a ground layer dominated by Eurasian meadow grasses. Fire has been suggested to facilitate regeneration of these woodlands. Understanding the effects of fire on tree recruitment is essential if controlled burning is to be used for regenerating *F. pennsylvanica* woodlands. In 2001 I subjectively chose one stand with evidence of ground fire and a similar unburned stand at each of seven sites where *F. pennsylvanica* woodlands had experienced warm-season wildfire between 1988 and 1998. I measured density of *F. pennsylvanica* seedlings and number and size of crown sprouts for each tree in 3-4 sample plots in each stand. Fire had a significant negative effect on *Fraxinus pennsylvanica* regeneration at most sites. Trees in burned stands had three times as many crown sprouts ($P = 0.02$) that were nearly twice as large in diameter ($P = 0.09$) than in unburned stands. However, seedlings averaged 75% fewer in burn plots compared to unburned ($P = 0.06$). Burn plots with live mature *F. pennsylvanica* trees remaining had twice as many seedlings compared to those in which all mature trees were top-killed ($P = 0.08$). A large number of *F. pennsylvanica* trees were apparently killed by fire at several of the study sites. This study did not support using fire to restore *F. pennsylvanica* woodlands in eastern Montana. © 2008 Elsevier B.V. All rights reserved.

1006. Effects of wildlife stand improvements and prescribed burning on bat communities on the Buffalo Ranger District, Ozark National Forest.

Jackson, Jeremy L.; Prescott, Shane R.; Whilhide, J. D.; and Whilhide, J. D.

Bat Research News 43(4): 155-156. (2002)

NAL Call #: QL737.C5 B328; ISSN: 0005-6227.

Notes: Conference: 32nd Annual North American Symposium on Bat Research, Burlington, VT, USA, November 06-09, 2002.

Descriptors: Chiroptera/ terrestrial ecology/ mist netting/ community ecology/ foraging areas/ forest management strategies/ movement areas/ open woodlands/ wildlife habitat/ forest stands

Abstract: Beginning in the year of 2001 managers of the Buffalo Ranger District (BRD) in the Ozark National Forest, Arkansas (Boston Mountains, of north central Arkansas) began using wildlife stand improvements (WSI) and prescribed burning (PB) as part of their management strategy in selected portions of the forest. One result of these management procedures is to alter the forest stands, from forests that contain many crowded, similarly aged trees to a considerably more open forest. We predicted that both the abundance of bats and the number of bat species would increase after a WSI that included PBs, since more open woodlands contain more potential foraging and movement areas for bats. To test this prediction, we compared bat abundance and species diversity between two intensively managed areas and two reference areas. Specifically, a WSI and PB were administered on a watershed located on the northwestern portion of the BRD during the fall of 2001 and spring of 2002. Similar management practices occurred in 1998 at treatment site two located on the eastern portion of the district. We

selected two areas within the BRD, where little or no forest management has occurred in recent years to serve as reference areas. All four sites were approximately 5000 ha in size. Mist netting was conducted at a variety of water sources to assess bat abundance and diversity. We mist netted each area for an average of 23 nights (range 12-34 nights) in the summer of both 2001 and 2002 (one reference site was only sampled in 2002). Both bat species diversity and abundance was higher on the managed areas as compared to our reference sites. In addition a relationship was found between the number of bats captured and the density of trees (basal area). In general, more bats were captured in more open areas. These data suggest that forest management strategies incorporating WSI and PB may be beneficial to bat communities. © NISC

1007. Efficacy of herbicides and fire to improve vegetative conditions for northern bobwhites in mature pine forests.

Jones, J. D. J. and Chamberlain, M. J.

Wildlife Society Bulletin 32(4): 1077-1084. (2004)

NAL Call #: SK357.A1W5; ISSN: 00917648.

Notes: doi: 10.2193/0091-7648(2004)032

[1077:EOHAFT]2.0.CO;2.

Descriptors: *Colinus virginianus*/ forest management/ glyphosate/ habitat management/ herbicide/ Imazapyr/ Louisiana/ northern bobwhite/ pine forest/ prescribed fire/ forest management/ gamebird/ habitat management/ herbicide/ prescribed burning/ species diversity/ vegetation structure/ *Colinus*/ *Colinus virginianus*

Abstract: Declining northern bobwhite (*Colinus virginianus*) populations during the past 30 years have prompted managers to seek ways to improve habitat quality for this species. Reductions in frequency of prescribed fire throughout considerable expanses of mature pine (*Pinus* spp.) forests have resulted in closed-canopy conditions, predominantly woody understory conditions, and a loss of early-successional habitats needed by bobwhites. Herbicides, particularly in conjunction with prescribed fire, may be useful for managing these pine forests to benefit the bobwhite and other early-successional species, but effects of herbicides in combination with fire are not well understood. Therefore, we used 3 similar-aged, mature pine stands to evaluate vegetative response to selective herbicides with prescribed fire with respect to bobwhite nesting and brood-rearing habitats. Our treatments were imazapyr with fire, imazapyr combined with glyphosate with fire, and dormant-season prescribed fire only. Plant diversity tended to decline on herbicide treatments during the first year but increased substantially on imazapyr plots during the second growing season following a burn. Bobwhite food plants increased following application of imazapyr during the first growing season and were greater for both herbicide treatments than burning alone during the second growing season. Abundance of hardwoods declined on both herbicide treatments. However, no treatments produced bare-ground percentages known to be selected by bobwhites, and only prescribed fire alone created and maintained suitable escape cover. Overall, imazapyr with fire provided the greatest net improvement in vegetative conditions for bobwhites and retained floristic diversity. We recommend that managers target areas in which vegetative conditions have progressed to where burning alone is incapable of restoring early-successional plant communities

needed by the bobwhite and other species and apply imazapyr with fire to create diverse, patchy habitat for bobwhites.

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1008. Elevated numbers of flying insects and insectivorous birds in riparian buffer strips.

Whitaker, D. M.; Carroll, A. L.; and Montevecchi, W. A. *Canadian Journal of Zoology* 78(5): 740-747. (2000)

NAL Call #: 470 C16D; ISSN: 00084301

Descriptors: abundance/ avifauna/ buffer zone/ insect/ insectivore/ riparian zone/ Canada/ Abies balsamea/ Dendroica coronata/ Dendroica striata/ Diptera/ Hymenoptera

Abstract: We compared the abundances of flying insects along undisturbed lakeshores and riparian buffer strips in balsam fir (*Abies balsamea*) forests in western Newfoundland. Insects were collected in pan traps placed on the forest floor and tanglefoot (sticky) traps suspended within the live canopy. Significantly greater numbers of insects were captured in riparian buffer strips than in undisturbed shorelines for four of five size classes in the canopy and two of five size classes in the understorey. Collections were dominated by adult Diptera and Hymenoptera. Mean capture rates along buffer strips were 120-200% of the mean capture rates along undisturbed shorelines. This increase was greatest for large-bodied insects. A likely explanation for our observations is that buffer strips act as windbreaks, collecting airborne insects blown in from adjacent clearcuts and lakes. This phenomenon has been widely documented in agricultural landscapes. Understorey wind speed was generally greater along buffer strips than controls, which is a reflection of increased exposure caused by clear-cutting. A concurrent parallel study conducted at the same sites investigated the effects of riparian buffering on breeding bird assemblages. Ubiquitous insectivorous birds, including the yellow-rumped warbler (*Dendroica coronata*) and blackpoll warbler (*Dendroica striata*), were more abundant along buffer strips than undisturbed shorelines, possibly in response to increased prey availability. Increased food availability may in part explain the high numbers of insectivorous birds typically observed in riparian buffer strips in boreal forests. © 2008 Elsevier B.V. All rights reserved.

1009. Environmental impacts of forest monocultures: Water use, acidification, wildlife conservation, and carbon storage.

Cannell, M. G.

New Forests 17/18(1/3/1): 239-262. (1999)

NAL Call #: SD409.N48; ISSN: 0169-4286.

Notes: Literature review; Special issue: Planted forests: Contributions to the quest for sustainable societies/ edited by J. R. Boyle, J. Winjum, K. Kavanagh and E. Jensen. Paper presented at a symposium held June 1995, Portland, Oregon. Includes references.

Descriptors: forest plantations/ monoculture/ sustainability/ water use/ species diversity/ wildlife/ habitats/ wildlife conservation/ carbon/ carbon cycle/ evapotranspiration/ plant height/ pollutants/ surface water/ water pollution/ forest management/ volume/ yields/ plant succession/ botanical composition/ stand structure

Abstract: A broad assessment is given of the contentions that plantation forests are high consumers of water, increase acidification, sustain a low diversity of wildlife, and store more carbon than do unmanaged forests. The following conclusions are drawn: (1) Evapotranspiration from planted forest monocultures is greater than from short vegetation, as a result of greater interception loss. Water loss from conifer forests is usually greater than from deciduous hardwoods, but evapotranspiration from Eucalyptus in the dry tropics is often no greater than from native hardwoods. (2) Compared to short vegetation, forests can significantly increase the transfer of acidifying pollutants from the air to the soil and surface waters, and conifers are more likely to enhance acidification than are hardwoods. (3) There are normally sufficient plantation management options available to make most plantation landscapes the homes of a rich diversity of flora and fauna. (4) An area covered with a plantation managed for maximum volume yield will normally contain substantially less carbon than the same area of unmanaged forest. This citation is from AGRICOLA.

1010. Establishment success of conservation tree plantations in relation to silvicultural practices in Indiana, USA.

Jacobs, Douglass F.; Ross-Davis, Amy L.; and Davis, Anthony S.

New Forests 28(1): 23-36. (2004)

NAL Call #: SD409.N48 ; ISSN: 0169-4286

Descriptors: *Odocoileus virginianus*/ Cervidae/ Artiodactyla/ conservation/ forestry practices/ habitat alterations/ conservation planting/ tree establishment success/ white-tailed deer

Abstract: In the Central Hardwood Forest region of the United States, the variable and somewhat unpredictable establishment success of hardwood tree plantations has traditionally been attributed to competing vegetation and damage due to animal browse. We examined operational plantation establishment success (1-5 years following planting) as it relates to use of particular silvicultural practices. Silvicultural histories were obtained for 87 randomly selected plantations throughout Indiana and field data were collected from each to determine tree survival, tree vigor, and abundance of surrounding vegetation. Survival was highest at sites that were treated with herbicide prior to planting and that had been mechanically planted (as opposed to hand planted). The percentage of trees with evidence of dieback was highest on sites at which browse protection measures had been used, likely reflecting a combination of damage due to inherently high white-tailed deer (*Odocoileus virginianus* Zimmermann) populations at such sites and ineffectiveness of current browse protection measures. Sites planted by a professional forester and those with herbicide applied subsequent to planting had a higher percentage of trees deemed free-to-grow. Subsequent herbicide application did not reduce cover or height of competing vegetation; however, when used in conjunction with mechanical site preparation techniques, overall cover and height of herbaceous vegetation was reduced.

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1011. Evaluating the effects of ecosystem management: A case study in a Missouri Ozark Forest.

Gram, W. K.; Sork, V. L.; Marquis, R. J.; Renken, R. B.; Clawson, R. L.; Faaborg, J.; Fantz, D. K.; Le Corff, J.; Lill, J.; and Porneluzi, P. A.

Ecological Applications 11(6): 1667-1679. (2001)

NAL Call #: QH540.E23; ISSN: 10510761

Descriptors: animal communities/ community-level diversity/ ecosystem management/ even-aged vs. uneven-aged forest/ forest management/ meta-analysis/ Missouri Ozark Forest ecosystem Project/ Missouri Ozarks/ community structure/ ecosystem function/ ecosystem management/ sustainability/ Animalia/ Anura/ Aves

Abstract: Many federal and state management agencies have shifted from commodity-based management systems to multiple resource-based management systems that emphasize sustainable ecosystem management. Long-term sustainability of ecosystem functions and processes is at the core of ecosystem management, but a blueprint for assessing sustainability under different management strategies does not exist. Using the Missouri Ozark Forest Ecosystem Project (MOFEP) as a case study, we present one approach to evaluating the landscape-scale, short-term (one and two years posttreatment) consequences of even-aged and uneven-aged forest management treatments on community-level biological diversity. We chose changes in density of ecological species groups, representing groups of species with similar resource requirements, as our response variable. Changes in density are detectable before species completely disappear from an area, and these changes may be an early indicator of significant alterations to community structure and ecosystem function. Meta-analysis was used to statistically combine changes in densities across multiple species groups and assess the overall impacts of management treatments on the animal community. We also separately examined changes in density for each ecological species group. Our findings demonstrated that, in the short-term, even-aged and uneven-aged forest management treatments caused changes in animal community density in Missouri Ozark forests. Even-aged management sites showed greater changes than uneven-aged management sites after harvesting, and changes in species' densities were larger two years posttreatment (1998) than one year posttreatment (1997). Evaluation of treatment effects on individual ecological groups revealed that toads, forest interior birds, and edge/early successional birds were significantly affected by management treatments. We did not expect most species groups to exhibit treatment effects because relatively little forest biomass was removed per experimental site (only 10%), forest cover at the regional landscape level did not change and was generally high during the study, and the time scale was relatively short. The challenges facing ecosystem management evaluation parallel the challenges of ecological science in general: identifying appropriate variables, spatial and temporal scales, and experimental/management treatments. The integrative approach demonstrated in this paper is a first step toward the analysis of the effects of management treatments on multiple organisms within an ecosystem. © 2008 Elsevier B.V. All rights reserved.

1012. Evaluating the effects of ecosystem management alternatives on elk, mule deer, and white-tailed deer in the interior Columbia River Basin, USA.

Lehmkuhl, J. F.; Kie, J. G.; Bender, L. C.; Servheen, G.; and Nyberg, H.

Forest Ecology and Management 153(1-3): 89-104. (2001)

NAL Call #: SD1.F73; ISSN: 03781127.

Notes: doi: 10.1016/S0378-1127(01)00455-8.

Descriptors: Bayesian model/ Cervus elaphus/ ecosystem management/ forest management/ Odocoileus hemionus/ Odocoileus virginianus/ environmental impact/ forestry/ land use/ mathematical models/ ocean habitats/ watersheds/ land management/ ecosystems/ Bayesian analysis/ ecological modeling/ ecosystem management/ ungulate/ animals/ United States

Abstract: Elk (*Cervus elaphus*), mule deer (*Odocoileus hemionus*), and white-tailed deer (*Odocoileus virginianus*) are highly valued for their game, aesthetic, and spiritual qualities by sportsman, wildlife enthusiasts, and Native Americans in North America. As part of the Interior Columbia Basin Ecosystem Management Project (ICBEMP) of the US Forest Service and Bureau of Land Management, we: (1) defined key habitat associations of those species that could be used for a broad-scale (58 million hectares) analysis of management practices and (2) determined how three ecosystem management alternatives of a supplemental draft environmental impact statement (SDEIS) might affect the regional distribution of habitat for those species across the Basin over the next 100 years. For the three species, we developed a Bayesian Belief Network model that used available SDEIS datasets to estimate historical, current, and future habitat capability under the management alternatives in each of the 7467 subwatersheds (mean 8000 ha) in the study area. The model quantified "inherent habitat capability" as a function primarily of forage habitat capability, with cover as a minor influence. Forage habitat capability was a function of the percentage area of rangeland and early seral forest community types, and the qualitative influences of livestock overgrazing, wildfire, and prescribed fire. For the current and future periods, an "adjusted habitat capability" was estimated by adjusting inherent habitat capability for the negative effects of poor security from human disturbance. Open road density, cover area, and a terrain relief index were used to estimate the security effect. Habitat capability was reported by 15 ecological regions within the study area as mean subwatershed capability. Under all management alternatives, habitat capability increased about 5% for all three ungulate species over the next 100 years. Limitations of the coarse analysis scale restrict application of the model to large-scale assessments. Lacking regional population data, verification of model output was not feasible at the scale of analysis. However, the model was considered useful for tracking regional changes given the available habitat data and regional-scale objectives of the effort. © 2008 Elsevier B.V. All rights reserved.

1013. Evaluation of facilitated succession at Las Palomas Wildlife Management Area in south Texas.

Judd, Frank W.; Lonard, Robert I.; and Waggener, Gary L.

Texas Journal of Science 54(2): 163-176. (2002)

NAL Call #: 470 T31; ISSN: 0040-4403

Descriptors: conservation measures/ terrestrial habitat/

land and freshwater zones/ comprehensive zoology: habitat management/ revegetation program/ facilitated succession/ wildlife management areas/ forest and woodland/ native woodland/ Texas/ Las Palomas Wildlife Management Area/ revegetation programs

Abstract: This study examined the effectiveness of re-vegetation efforts which have been ongoing in the Lower Rio Grande Valley of Texas since 1958. Species composition, richness and diversity were evaluated in an undisturbed native woodland, a site planted with late successional species in 1961 (facilitated succession) and a farm field abandoned in 1974 (unaided succession) in northwestern Cameron County. Species richness and diversity for both trees and shrubs were greatest in the native woodland site. While there was greater similarity in species composition between the native woodland and the facilitated succession sites, species diversity in the tree and shrub layers of the facilitated succession site is still significantly lower than the native woodland site.

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1014. Evaluation of reforestation in the Lower Mississippi River Alluvial Valley.

King, S. L. and Keeland, B. D.

Restoration Ecology 7(4): 348-359. (1999)

NAL Call #: QH541.15.R45R515; ISSN: 1061-2971

Descriptors: reforestation/ forestry/ wildlife habitat/ habitat restoration/ Mississippi River valley

Abstract: Only about 2.8 million ha of an estimated original 10 million ha of bottomland hardwood forests still exist in the Lower Mississippi River Alluvial Valley (LMAV) of the United States. The U.S. Fish and Wildlife Service, the U.S. Forest Service, and state agencies initiated reforestation efforts in the late 1980s to improve wildlife habitat. We surveyed restorationists responsible for reforestation in the LMAV to determine the magnitude of past and future efforts and to identify major limiting factors. Over the past 10 years, 77,698 ha have been reforested by the agencies represented in our survey and an additional 89,009 ha are targeted in the next 5 years. Oaks are the most commonly planted species and bare-root seedlings are the most commonly used planting stock. Problems with seedling availability may increase the diversity of plantings in the future. Reforestation in the LMAV is based upon principles of landscape ecology; however, local problems such as herbivory, drought, and flooding often limit success. Broad-scale hydrologic restoration is needed to fully restore the structural and functional attributes of these systems, but because of drastic and widespread hydrologic alterations and socioeconomic constraints, this goal is generally not realistic. Local hydrologic restoration and creation of specific habitat features needed by some wildlife and fish species warrant attention. More extensive analyses of plantings are needed to evaluate functional success. The Wetland Reserve Program is a positive development, but policies that provide additional financial incentives to landowners for reforestation efforts should be seriously considered.

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1015. An evaluation of research on the effects of timber harvest on bird populations.

Sallabanks, R.; Arnett, E. B.; and Marzluff, J. M.

Wildlife Society Bulletin 28(4): 1144-1155. (2000)

NAL Call #: SK357.A1W5; ISSN: 00917648

Descriptors: bird populations/ cavity-nesting birds/ demography/ forest management/ forestry practices/ silviculture/ songbirds/ timber harvest/ abundance/ avifauna/ conservation management/ population density/ timber harvesting

Abstract: We reviewed 95 studies (published from 1972 to 1997) that examined relationships between timber harvest and populations of songbirds and cavity-nesting birds. We critique the way in which studies have been conducted, evaluate their usefulness to forest managers, and suggest new directions of study. The number of bird-forestry studies conducted increased throughout our review period and most appeared in *The Journal of Wildlife Management* (24%) and U.S. Department of Agriculture Forest Service technical publications (19%). More studies (32%) have occurred in the northeastern United States than elsewhere and most have examined effects of clearcutting (53%). Researchers typically collect data on all bird species, especially songbirds (78%), using common sampling protocols such as point-count surveys, line transects, and spot-mapping techniques to assess relative avian abundance (55%) and density (32%). Few studies (13%) measured avian demographic parameters such as nest success or survivorship. Most studies (68%) lasted only 1-2 years; only 7 (7%) lasted >4 years. Most studies (27%) had only one replicate/treatment. Research on effects of timber harvest on bird populations has been limited to mensurative (observational) studies in which treatment effects cannot be inferred statistically. Most research is correlational (84%) and does not address cause-and-effect relationships. Incorporating experimental treatments to provide pre- and post-timber-harvest comparisons is rare (16%). Future research should: 1) be more long-term; 2) incorporate rigorous experimental designs in which treatments are assigned randomly and better replicated; and 3) although difficult, measure parameters related to avian fitness and population viability. Rather than only documenting observed patterns, researchers need to focus on identifying causal mechanisms that can be translated into meaningful management recommendations to enhance conservation of forest avifauna.

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1016. Evaluation of silvicultural management in Missouri oak-hickory forests: Immediate effects of even- and uneven-aged forest management on small mammal communities on state forests in southern Missouri's oak- hickory forest.

Fantz, D. K. and Renken, R. B.

In: Missouri Department of Conservation Annual Report, 35, 2002.

Notes: Project no. MO W-013-54/JKob 3/ Study No. 35; 0085-3496 (ISSN).

Descriptors: abundance/ chipmunks/ cutting/ forest practices/ forests/ habitat changes/ habitat management/ hickory/ mammals/ mice, deer/ mice, white-footed/ oak/ pine/ rats, wood/ rodents/ species diversity/ squirrel, flying/ *Carya* spp./ *Pinus* spp./ *Quercus* spp./ Missouri/ Carter County/ Reynolds County/ Shannon County

Abstract: A capture-recapture study was conducted on northeast-facing slopes to determine the initial large-scale effects of even- and uneven-aged forest management as compared to no harvest management on species composition, species richness, and relative abundance of small mammal communities. Study sites were selected on the Current River and Peck Ranch Conservation Areas.
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1017. An evaluation of tradeoffs between wood production and ecological integrity in the Oregon Coast Range.

Spies, Thomas A.; Johnson, K. Norman; Reeves, Gordon; Bettinger, Pete; McGrath, Michael T.; Pabst, Robert; Burnett, Kelly; and Olsen, Keith

In: *Congruent Management of Multiple Resources: Proceedings from the Wood Compatibility Initiative workshop, General Technical Report-PNW 563/ Johnson, Adelaide C.; Haynes, Richard W.; and Monserud, Robert A.; Portland, OR: Pacific Northwest Research Station, Forest Service, U.S. Department of Agriculture, 2002. pp. 111-119.*

Notes: 0363-6224 (ISSN).

Descriptors: commercial activities/ conservation measures/ terrestrial habitat/ land zones/ comprehensive zoology: forestry/ timber production/ ecological integrity trade offs in old growth forests/ evaluation/ habitat management/ forest management strategies/ ecological integrity and timber production trade offs in old growth forests/ forest and woodland/ old growth forests/ ecological integrity and wood production trade offs/ Oregon/ Coast range
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1018. Evaluation of two forest management practices recommended for small mammals: Buffer strips and retention of woody debris.

Billig, S. C. and Servello, F. A.

In: *NCASI Proceedings.*; Vol. 2.

Portsmouth, NH; pp. 371; 2000.

Descriptors: debris/ harvesting/ wood/ coarse woody debris (CWD)/ forestry/ fiber debris/ forest management/ harvesting/ mammals/

Abstract: Small mammal communities between upland buffer strips and forest stands in harvested landscapes were compared. The relationship between small mammal abundance and coarse woody debris was determined. Results indicated that upland buffer strips retained similar communities of common small mammals as unharvested forest and were useful management tool in harvested areas. Abundance was not related to measures of CWD for most species, but it was important for some species in specific habitat types.

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1019. Experimental manipulation of spatial heterogeneity in Douglas-fir forests: Effects on squirrels.

Carey, Andrew B.

Forest Ecology and Management 152(1-3): 13-30. (2001)

NAL Call #: SD1.F73; ISSN: 0378-1127

Descriptors: commercial activities/ conservation measures/ ecology/ community structure/ terrestrial habitat/ land and freshwater zones/ *Glaucomys sabrinus*/ *Tamias townsendii*/ *Tamiasciurus douglasii* (Sciuridae): forestry/ silvicultural practices/ habitat management/ relative abundance/

population dynamics/ silvicultural practices effect/ forest and woodland/ Washington/ Thurston County/ Fort Lewis Military Reservation/ silvicultural practices effect on populations/ Douglas fir forests/ Sciuridae/ Rodentia, Mammalia/ chordates/ mammals/ vertebrates

Abstract: Squirrel communities simultaneously composed of abundant populations of *Glaucomys*, *Tamias*, and *Tamiasciurus* are: (1) a result of high production of seeds and fruiting bodies by forest plants and fungi and complexity of ecosystem structure, composition, and function; (2) indicative of high carrying capacity for vertebrate predators and (3) characteristic of old, natural forests in the Pacific northwest, USA. I hypothesized that silvicultural manipulation of canopies of second-growth forests could result in spatial heterogeneity that would reproduce the biocomplexity and plant-fungal productivity associated with high squirrel populations. I predicted that accelerating biocomplexity would require ≥ 20 years, but short-term effects of induced heterogeneity would be apparent in 5 years: initial decreases followed by increases in *Glaucomys* populations, nonlinear increases in *Tamias* populations, and little change in *Tamiasciurus* populations. If my predictions proved accurate, confidence in long-term predictions would be enhanced. I chose 16 13-ha stands with two different management histories for a randomized block experiment and began measuring squirrel populations in 1991. Variable-density thinnings were implemented in spring 1993. Fall and spring populations were measured through fall 1998. Populations responded as predicted, except for a treatment-management history interaction. Previous conventional thinnings altered ecosystem function such that low *Glaucomys* populations failed to respond to treatment. Variable-density thinning, in conjunction with retention of biological legacies and management of decadence, could possibly accelerate biocomplexity in second-growth forest that mimics that in old, natural forests.
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1020. Factors affecting avian species richness and density in riparian areas.

Peak, R. G. and Thompson, F. R.

Journal of Wildlife Management 70: 173-179. (2006)

NAL Call #: 410 J827

Descriptors: wildlife habitats/ riparian areas/ riparian forests/ riparian buffers/ wild birds/ species diversity/ population density/ wildlife management/ Missouri/ natural resources, environment, general ecology, and wildlife conservation/ forestry related/ animal ecology and behavior
This citation is from AGRICOLA.

1021. Factors affecting private forest landowner interest in ecosystem management: Linking spatial and survey data.

Jacobson, Michael G.

Environmental Management 30(4): 577-583. (2002)

NAL Call #: HC79.E5E5 ; ISSN: 0364-152X

Descriptors: biodiversity/ conservation/ environmental sciences/ geographic information system/ GIS data/ ecosystem management/ forests/ ecosystems/ forestry practices/ habitat alterations/ habitat management/ South Carolina/ wildlife-human relationships/ commercial enterprises/ wildlife management/ disturbances/ land zones/ conservation of natural resources/ ownership/ private sector/ forestry [economics]/ data collection/ decision making/ ecosystem/ environment/ humans

Abstract: Many factors influence forest landowner management decisions. This study examines landowner decisions regarding participation in ecosystem management activities, such as a landscape corridor cutting across their private lands. Landscape corridors are recognized worldwide as an important tool in biodiversity conservation. For ecosystem management activities to occur in areas dominated by a multitude of small private forest landholdings, landowner participation and cooperation is necessary. Data from a survey of landowners combined with an analysis of their land's spatial attributes is used to assess their interest in ecosystem management. Results suggest that spatial attributes are not good predictors of an owner's interest in ecosystem management. Other factors such as attitudes and opinions about the environment are more effective in explaining landowner interest. The results have implications for any land manager using GIS data and implementing ecosystem management activities on private forestland.

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1022. Factors determining the distribution of soil nematodes in a commercial forest landscape.

Matlack, Glenn R.

Forest Ecology and Management 146(1-3): 129-143. (2001)
NAL Call #: SD1.F73; ISSN: 0378-1127

Descriptors: commercial activities/ ecology/ population dynamics/ terrestrial habitat/ land and freshwater zones/ Nematoda: forestry/ management impact on soil community ecology/ community structure/ population density/ distribution within habitat/ forest soils/ forest and woodland/ soil habitat/ forest community ecology/ Mississippi/ forest soil/ Helminths/ invertebrates/ nematodes

Abstract: Soil nematodes were censused at 99 forested sites in southern Mississippi, USA to examine the impact of forest management practices on the soil community. Taxonomic richness and numerical abundance in five feeding groups were linked to soil organic matter, phosphorus, shrub cover, and abundance of other nematode groups, consistent with limitation by availability of food items. Sites adjacent to streams showed significantly larger populations of plant feeders than nearby uplands. Sites plowed (bedded) for tree planting and sites recently excavated had significantly lower richness and abundance of plant feeders than undisturbed sites. Fungal feeder richness was depressed at excavated sites, which showed low concentrations of soil organic matter. Aboveground vegetation structure and landscape position appeared to have little influence on nematode distributions. Commercial plantations and sites with a history of frequent fire did not differ from undisturbed sites in soil properties or in any measure of the nematode community. No significant changes in soil properties or nematode fauna were observed over a 60-year chronosequence beginning at tree establishment. These findings suggest that aboveground disturbance affects the nematode community only to the extent that it influences the availability of potential hosts or prey in the soil. In contrast to aboveground events, disturbance of the soil had a clear impact on the nematode community, with a magnitude proportional to disturbance intensity.

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1023. Factors influencing Acadian flycatcher nesting success in an intensively managed forest landscape.

Hazler, K. R.; Amacher, A. J.; Lancia, R. A.; and Gerwin, J. A.

Journal of Wildlife Management 70(2): 532-538. (2006)
NAL Call #: 410 J827; ISSN: 0022541X

Descriptors: Acadian flycatcher/ core area/ corridors/ ecological trap/ edge effect/ *Empidonax virescens*/ nesting success/ pine plantations/ South Carolina/ vegetation structure

Abstract: We examined factors affecting the nesting success of a migratory songbird, the Acadian flycatcher (*Empidonax virescens*), in loblolly pine plantations in the coastal plain of South Carolina, USA. From 1997-2000, we located and monitored 163 Acadian flycatcher nests in loblolly pine stands and corridors that were 18-27 years old. We used Mayfield logistic regression (Aebischer 1999, Hazler 2004) to model the effects of edge and stand-level vegetation structure on nest daily survival rate. There was no evidence of an effect of edge on nest survival, but nest survival was positively related to the height of the deciduous subcanopy and to the density of shrub cover. Although Acadian flycatchers are generally regarded as habitat specialists requiring mature hardwood forests, our data suggest that pine plantations can support breeding populations, provided that a substantial hardwood component is present. We believe that maintaining multiple vegetation strata and increasing the length of harvest rotations would improve the habitat value of pine plantations for Acadian flycatchers and presumably other species more typically associated with deciduous forests. Maintenance of a corridor network, as practiced by some industrial forest managers, is one means of providing more mature forest habitat, thereby fostering higher nesting success. Concern that these corridors might act as ecological traps seems to be unwarranted in our study area. Corridors thus appear to be a valuable management tool for promoting wildlife values within the context of an industrial forest landscape.

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1024. Factors influencing amphibian and small mammal assemblages in central Appalachian forests.

Mitchell, J. C.; Rinehart, S. C.; Pagels, J. F.; Buhlmann, K. A.; and Pague, C. A.

Forest Ecology and Management 96(1/2): 65-76. (1997)
NAL Call #: SD1.F73; ISSN: 0378-1127

Descriptors: wetlands/ biodiversity/ species diversity/ community ecology/ forest management/ forest ecology/ small mammals/ deciduous forests/ forest plantations/ clear felling/ plant succession/ seral stages/ climax communities/ habitats/ stand characteristics/ synecology/ age of trees/ stand density/ mixed forests/ wild animals/ Amphibia/ frogs/ insectivores/ rodents/ *Pinus strobus*/ *Quercus alba*/ *Quercus rubra*/ *Betula lenta*/ *Carya glabra*/ *Acer rubrum*/ *Soricidae*/ *Quercus montana*

Abstract: Terrestrial amphibian and small mammal assemblages were studied using drift fences and pitfall traps in five forested stands during 1987-88 on Shenandoah Mountain in the George Washington National Forest, Virginia, USA. The stands were (1) recently clear felled (2 yr old, dominant species *Pinus strobus*, *Quercus alba*), (2) white pine (*P. strobus*) managed forest, (3) mixed hardwood forest (dominant species *Q. rubra*, *Betula lenta*), (4) oak/hickory forest (dominant species *Q. prinus*, *Q. alba*,

Carya glabra) and (5) climax hardwood forest (dominant species *Q. rubra*, *Acer rubrum*, *Q. alba*). Eleven species of salamanders, 5 species of frogs, 5 species of shrews, and 7 species of rodents were monitored. Amphibians were significantly more abundant in forest stands consisting of mature hardwoods than in the recently clear felled area and the white pine forest. Although there was considerable variation in abundance among species in the 5 stands, small mammal abundance was high in all the habitats studied. Amphibian species diversity (Shannon Index) was less than half that for small mammals because red-backed salamanders (*Plethodon cinereus*) were dominant in most assemblages. Amphibian and small mammal diversity and total species richness were not related to estimated stand age, total number of canopy trees, tree diversity, or frequency of underground rocks. Maintenance of amphibian biodiversity requires the combination of mature hardwoods and wetland habitats (e.g. wildlife ponds and seepages). Most of the small mammals encountered were habitat generalists. Management focus on mature hardwood forests would maintain populations of small mammals requiring cool, moist situations in upper-altitude habitats in the central Appalachian Mountains.

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1025. Fallow discing for wildlife.

Franklin, R. A.

Forest Landowner 60(1): 54. (2001)

NAL Call #: SD144.A15F67; ISSN: 1087-9110.

Notes: First published in

http://www.clemson.edu/extfor/Landowner_tech_info/Spring%202000.pdf

(South Carolina Steward, Spring 2000).

Descriptors: *Odocoileus virginianus*/ Galliformes/ Odontophoridae/ *Colinus virginianus*/ agricultural practices/ habits-behavior/ birds/ foods-feeding/ habitat alterations/ habitat management/ habitat use/ mammals/ management/ nesting sites/ nests-nesting/ techniques/ wildlife/ white-tailed deer/ quail/ South Carolina

Abstract: The author encourages the use of fallow discing to manage and maintain wildlife openings in forests without having to go to the expense of clearing, fertilizing, and planting food patches. The process of fallow discing is described and its benefit to white-tailed deer and quail explained.

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1026. The fine scale physical attributes of coarse woody debris and effects of surrounding stand structure on its utilization by ants (Hymenoptera: Formicidae) in British Columbia, Canada.

Higgins, Robert J. and Lindgren, B. Staffan

In: *Insect Biodiversity and Dead Wood: Proceedings of a Symposium for the 22nd International Congress of Entomology, General Technical Report-SRS 93/ Grove, Simon J. and Hanula, James L.; Asheville, NC: Southern Research Station, Forest Service, U.S. Department of Agriculture, 2006. pp. 67-74.*

Notes: Symposium held August 15-21, 2004 at Brisbane, Australia.

http://www.srs.fs.usda.gov/pubs/gtr/gtr_srs093/gtr_srs093.pdf

Descriptors: commercial activities/ conservation measures/ reproduction/ reproductive behavior/ ecology/ animal constructions/ terrestrial habitat/ abiotic factors/ land zones/

Canada/ Formicidae: forestry/ habitat management/ breeding site/ biological breakdown/ distribution within habitat/ habitat utilization/ nests/ forest and woodland/ coarse woody debris utilization/ forest stand structure/ physical factors/ British Columbia/ Houston area/ Insecta, Hymenoptera, Apocrita, Aculeata, Formicoidea/ arthropods/ Hymenopterans/ insects/ invertebrates

Abstract: Coarse woody debris (CWD) is increasingly recognized in Canada for its contribution toward biodiversity. It is a particularly vital resource in subboreal forests as nesting habitat for ants (Formicidae). Wood, which has low specific heat, provides a thermally favorable environment in this cool climate. Ants contribute to the physical breakdown of wood, and colonies are a significant food source for many vertebrates. However, this resource differs significantly between harvested and non-harvested stands. This study examined the physical attributes of CWD in 8-10 year old harvested and non-harvested stands while also examining the associated ant fauna. We found no significant difference in volume or total surface area between stand types. However, in harvested stands CWD is smaller in diameter, shorter, has less bark and has less evenly distributed decay classes as compared to non-harvested stands. In addition, the lack of earliest decay class and the physical damage evident on the majority of CWD pieces in harvested stands creates concern regarding the long term availability of CWD in harvested stands. Ants exploit available CWD in harvested stands but the community structure of this fauna appears to be young in these 8-10 year post-harvest stands. Larger ant species such as *Camponotus herculeanus* and *Formica aserva* were present but not common in these stands. They seem to require larger pieces of CWD and stumps for nesting habitat than is the average for CWD in harvested stands. The desirability of these ants as prey for bears and birds makes management of their nesting habitat of interest for conservation biology. Ants were largely excluded from non-harvested stands, probably because of cool and humid conditions. Historically, the ant fauna of this landscape was probably restricted to natural gaps and disturbed areas.

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1027. Fire and amphibians in North America.

Pilliod, D. S.; Bury, R. B.; Hyde, E. J.; Pearl, C. A.; and Corn, P. S.

Forest Ecology and Management 178(1-2): 163-181. (2003)

NAL Call #: SD1.F73; ISSN: 03781127

Descriptors: amphibians/ aquatic ecosystems/ fuel reduction/ prescribed fire/ wildland fire/ ecosystems/ fires/ forestry/ fuels/ fire management/ ecology/ aquatic ecosystem/ fire/ fire management/ population decline/ ecosystem fire history/ ecology/ ecosystems/ forest fires/ fuels/ water animals/ North America

Abstract: Information on amphibian responses to fire and fuel reduction practices is critically needed due to potential declines of species and the prevalence of new, more intensive fire management practices in North American forests. The goals of this review are to summarize the known and potential effects of fire and fuels management on amphibians and their aquatic habitats, and to identify information gaps to help direct future scientific research. Amphibians as a group are taxonomically and ecologically diverse; in turn, responses to fire and associated habitat alteration are expected to vary widely among species and among geographic regions. Available data suggest that amphibian responses to fire are spatially and temporally

variable and incompletely understood. Much of the limited research has addressed short-term (1-3 years) effects of prescribed fire on terrestrial life stages of amphibians in the southeastern United States. Information on the long-term negative effects of fire on amphibians and the importance of fire for maintaining amphibian communities is sparse for the majority of taxa in North America. Given the size and severity of recent wildland fires and the national effort to reduce fuels on federal lands, future studies are needed to examine the effects of these landscape disturbances on amphibians. We encourage studies to address population-level responses of amphibians to fire by examining how different life stages are affected by changes in aquatic, riparian, and upland habitats. Research designs need to be credible and provide information that is relevant for fire managers and those responsible for assessing the potential effects of various fuel reduction alternatives on rare, sensitive, and endangered amphibian species.
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1028. Fire and birds in maritime Pacific Northwest.

Huff, Mark H.; Seavy, Nathaniel E.; Alexander, John D.; and Ralph, C. John

Studies in Avian Biology 30: 46-62. (2005)

NAL Call #: QL671.S8; ISSN: 0197-9922.

Notes: Literature review.

Descriptors: conservation measures/ ecology/ abiotic factors/ physical factors/ land zones/ habitat management/ prescribed burning/ fire/ United States, Maritime Pacific Northwest/ Aves/ birds/ chordates/ vertebrates

Abstract: Resource managers face the challenge of understanding how numerous factors, including fire and fire suppression, influence habitat composition and animal communities. We summarize information on fire effects on major vegetation types and bird/fire relations within the maritime Pacific Northwest, and pose management-related questions and research considerations. Information on how fire affects birds is limited for the maritime Pacific Northwest, even though fire is an essential process within natural vegetation communities throughout the region. We describe fire regimes, vegetation succession patterns, bird communities, and fire effects on birds for 12 major vegetation types in the region. Fire regimes and fire effects vary considerably within this region due to its diverse topography and climate. Seven of the types have a low- to moderate-severity fire regime and five have a high-severity fire regime with fire-return intervals that span several centuries. Bird communities and effects of fire are best known from the western hemlock type, which has a high-severity fire regime. The postfire stand-initiation stage in this type supports a reasonably distinct avifauna compared to other successional stages, a phenomenon that has been documented for high-severity fire regimes in other regions. In general, there is a high turnover of species after high-severity fires, with a shift primarily from canopy-dwelling to ground-, shrub-, and snag-dwelling species that mostly are not associated with other successional stages. No studies exist that directly address how bird communities are affected by habitat changes from fire suppression in this region. The most likely bird communities vulnerable to these changes are in low-severity, high-frequency fire regimes that include the Douglas-fir type, drier portions of the white fir type, Oregon-oak woodlands and savannas, native grasslands and sclerophyllous shrublands. In general, prescribed fire is not being used for bird

conservation in this region. Where prescribed fire is being used to restore fire as an ecological process or more often for reducing potentially hazardous fuels, bird conservation objectives can be achieved as a secondary benefit. New land management policies that will greatly accelerate fuel reduction activities throughout the Pacific Northwest, including use of prescribed fire, are currently being undertaken with limited scientific information on the ecological consequences for bird communities.

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1029. Fire and fire surrogate treatment effects on leaf litter arthropods in a western Sierra Nevada mixed-conifer forest.

Apigian, K. O.; Dahlsten, D. L.; and Stephens, S. L.

Forest Ecology and Management 221(1-3): 110-122. (2006)

NAL Call #: SD1.F73; ISSN: 03781127.

Notes: doi: 10.1016/j.foreco.2005.09.009.

Descriptors: forest restoration/ leaf litter arthropods/ pitfall trapping/ prescribed burn/ biodiversity/ forestry/ mastication/ leaf litter arthropods/ pitfall trapping/ fires/ arthropod/ fire/ forest management/ habitat management/ restoration ecology/ species richness/ fires/ forestry/ Araneae/ Arthropoda/ Coleoptera/ Coniferophyta/ Formicidae

Abstract: Frequent, low-intensity fires were a common feature of Sierran forest ecosystems, but suppression policies over the past century have left many forests at risk for catastrophic wildfires. Recent policies highlight the use of prescribed burning or harvesting as fire risk reduction tools, but few studies have investigated the impacts of these management practices on the leaf litter fauna of Sierran forests. This study examines how three fire and "fire surrogate" treatments, prescribed burning, overstory thinning with understory mastication, and combined thinning and burning, impact diversity and abundance of Coleoptera and other leaf litter arthropods. Pitfall trapping was used to collect litter arthropods before and immediately after treatments in replicated forest compartments. The diverse Coleoptera assemblage was dominated by only a few common species, with many rare species represented by only one or two individuals. Rank-abundance diagrams indicated that much of the change in the beetle assemblage due to the treatments was a result of changes in the numbers of rare species. Indicator species analysis showed several species closely allied with the treated compartments, but few with the untreated controls. Both NMS and CCA ordination show considerable change in overall assemblage structure on compartments treated with fire, but less change in the thinned compartments. Coleoptera species richness was slightly higher in burned compartments. Some common beetle species, families of beetles, and other common groups such as ants and spiders showed changes in abundance due to the treatments, but the changes were taxon-specific and showed no general pattern. Overall impacts of the treatments appear to be moderate, and the increased habitat heterogeneity at the compartment level may provide additional habitat for many rare species to coexist. We conclude that the use of fire and fire surrogate treatments in Sierran mixed-conifer forests is justified from the standpoint of their effects on leaf litter arthropods, but the history of management at the site and the scale of treatments must be carefully considered.

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1030. Fire ecology and management of the major ecosystems of southern Utah.

Hood, Sharon M. and Miller, Melanie
Fort Collins, CO: Rocky Mountain Research Station, Forest Service, U.S. Department of Agriculture; General Technical Report-RMRS 202, 2007. 110 p.

http://www.fs.fed.us/rm/pubs/rmrs_gtr202.pdf

Descriptors: fire/ forest management/ prescribed burning/ wildlife/ Utah

Abstract: This document provides managers with a literature synthesis of the historical conditions, current conditions, fire regime condition classes (FRCC), and recommended treatments for the major ecosystems in southern Utah. Sections are by ecosystems and include: 1) coniferous forests (ponderosa pine, mixed conifer, and Engelmann spruce-subalpine fir), 2) aspen, 3) pinyon-juniper, 4) big and black sagebrush, and 5) desert shrubs (creosotebush, blackbrush, and interior chaparral). Southern Utah is at the ecological crossroads for much of the western United States. It contains steep environmental gradients and a broad range of fuels and fire regimes associated with vegetation types representative of the Rocky Mountains, the Great Basin, Northern Arizona and New Mexico, and the Mohave Desert. The Southern Utah Demonstration Area consists of contiguous state and federal lands within the administrative boundaries of the Bureau of Land Management (BLM), Fishlake and Dixie National Forests, National Park Service, and State of Utah, roughly encompassing the southern 15 percent of Utah (3.24 million ha). The vegetation types described are similar in species composition, stand structure, and ecologic function, including fire regime to vegetation types found on hundreds of millions of hectares in the 11 western states.

1031. Fire impact to small mammals in Piedmont oak-shelterwoods.

Keyser, P. D.; Sausville, D. J.; Ford, W. M.; Mengak, M. T.; Brose, P.; and Van Lear, D. H.

Southeastern Association of Fish and Wildlife Agencies, Proceedings 55: 375-381. (2001).

Notes: Published Wildlife Report.

Descriptors: abundance/ burning/ fire/ forests/ habitat management/ hardwoods/ mammals/ mice, white-footed/ oak/ rodents/ seasons/ shrews/ trapping/ wildlife management areas/ *Quercus* spp./ Virginia/ Buckingham County/ Piedmont Region

Abstract: As part of a larger study examining the role of prescribed fire in regenerating upland oaks, seasonal prescribed burns were applied to first-stage shelterwood harvested stands on Horsepen WMA in the Virginia Piedmont in 1995. Small mammal communities in these stands were surveyed to assess the impact of such fires on this component of the fauna.

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1032. Florida scrub jay habitat restoration utilizing a fuel wood timber harvest: The planning phase.

Alshouse, Alan W.; Neal, Harry V.; Lala, Ruth; and Shaw, Susan

Proceedings of the Annual Conference on Ecosystems Restoration and Creation 28: 93-99. (2001).

<http://images.library.wisc.edu/EcoNatRes/EFacs/Wetlands/Wetlands28/reference/econatres.wetlands28.aalshouse.pdf>

Descriptors: commercial activities/ conservation measures/ terrestrial habitat/ land zones/ *Aphelocoma coerulescens*

coerulescens: forestry/ fuel wood timber harvest/ habitat management/ xeric scrub restoration/ use of fuel wood timber harvest/ scrub/ Florida/ Seminole County/ Aves, Passeriformes, Corvidae/ birds/ chordates/ vertebrates
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1033. Foliage structure influences foraging of insectivorous forest birds: An experimental study.

Whelan, C. J.

Ecology 82(1): 219-231. (2001)

NAL Call #: 410 Ec7; ISSN: 00129658

Descriptors: aviary experiment/ bird community structure/ deciduous foliage/ foliage structure/ foraging behavior/ Insectivorous birds/ New Hampshire/ northern hardwoods/ Parulidae/ vegetation structure/ warblers/ avifauna/ foraging behavior/ habitat structure/ insectivory/ leaf morphology/ *Acer saccharum*/ *Betula alleghaniensis*/ *Dendroica caerulescens*/ *Dendroica virens*/ *Setophaga ruticilla*

Abstract: Preferences for foraging in particular tree species have been well documented in a variety of bird species, but underlying reasons remain little investigated.

Understanding the causal bases for such patterns of habitat use can help to elucidate mechanisms of habitat selection and, therefore, community organization and structure. I experimentally tested the hypothesis that fine-scale foliage structure of two deciduous tree species influences the foraging behavior of three small, insectivorous bird species. On sugar maple (*Acer saccharum*), with its orbicular leaves elevated above the branch, Black-throated Blue Warblers (*Dendroica caerulescens*) and American Redstarts (*Setophaga ruticilla*) captured prey predominantly from lower leaf surfaces, whereas Black-throated Green Warblers (*Dendroica virens*) captured prey predominantly from upper leaf surfaces. In contrast, on yellow birch (*Betula alleghaniensis*), with its oblong-ovate leaves held within the plane of the supporting branch, all three bird species captured prey disproportionately from upper leaf surfaces. Overall, aerial maneuvers were used more frequently to capture prey from upper than from lower leaf surfaces on sugar maple, but the opposite occurred on yellow birch, where non-aerial maneuvers were used more frequently to capture prey from upper than from lower leaf surfaces. Those results indicate that the leaf surface from which prey are more easily captured (with less energetically costly non-aerial maneuvers) differs between those tree species. Experimental manipulation of leaf dispersion and distance to prey demonstrated that leaf dispersion is the chief determinant of prey capture location (upper vs. lower leaf surfaces), and that distance to prey is the chief determinant of prey capture maneuver (aerial vs. non-aerial). When foraging on artificial branches in which vertical distance between branches was systematically increased experimentally, Black-throated Green Warblers captured a significantly smaller proportion of prey from lower surfaces of leaves on the upper branch than did Black-throated Blue Warblers. Taken together, these results indicate that different tree species, as well as different locations within tree species, present insectivorous birds with distinct foraging environments and, therefore, constitute distinct foraging microhabitats. Furthermore, even closely related bird species that are generally similar morphologically respond in behaviorally unique ways to differences in foliage structure. For those reasons, forest management practices that enhance tree species diversity could concomitantly enhance foraging opportunities (niche

diversity) for forest insectivores and may thus help to promote high bird species diversity and maintain abundant populations.

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1034. Food availability versus preference of wild turkey poults in intensively-managed pine stands in Mississippi.

Igley, Raymond B.; Leopold, Bruce D.; Burger, Loren W.; and Miller, Darren A.

Proceedings of the Annual Conference Southeastern Association of Fish and Wildlife Agencies 59: 100-113. (2005)

NAL Call #: SK1.S6; ISSN: 0276-7929

Descriptors: nutrition/ diet/ feeding behavior/ life cycle and development/ development/ ecology/ population dynamics/ predators/ terrestrial habitat/ land zones/ Invertebrata: population density/ prey resource selection/ gamebird young/ intensively managed pine stands/ avian predators/ *Meleagris gallopavo silvestris*/ distribution within habitat/ forest and woodland/ Mississippi/ Kemper County/ Interior Flatwoods Resource Area/ Aves, Galliformes, Phasianidae/ birds/ chordates/ invertebrates/ vertebrates

Abstract: Importance of invertebrates to growth and development of eastern wild turkey (*Meleagris gallopavo silvestris*) poults has been well documented. However, few studies have investigated direct invertebrate use by poults, specifically in relation to alternative forest management regimes. Therefore, we measured invertebrate selection by turkey poults in thinned, mid-rotation loblolly pine (*Pinus taeda*) plantations, treated with factorial combinations of prescribed burning and a selective herbicide, in east-central Mississippi in 2000 and 2001. Using suction sampling and human-imprinted turkey poults, we quantified invertebrate use by poults relative to availability. Turkey poults exhibited heterogeneous use of invertebrate Orders among broods across all treatments and years of study ($P < 0.001$). Additionally, poults did not select invertebrates relative to availability across all treatments and years of study ($P < 0.001$). Consistent with previous research, poults exhibited selection of five Orders (Coleoptera, Diptera, Gastropoda, Homoptera, Hymenoptera) and avoided four Orders (Araneae, Hemiptera, Orthoptera, and 'other'). Future research better defining relationships between poults, vegetation structure, and food availability may assist managers in achieving quality brood habitat.

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1035. Forage production after thinning a natural loblolly pine-hardwood stand to different basal areas.

Peitz, David G.; Shelton, Michael G.; and Tappe, Philip A.

Wildlife Society Bulletin 29(2): 697-705. (2001)

NAL Call #: SK357.A1W5; ISSN: 0091-7648

Descriptors: loblolly pine/ *Pinus taeda*/ habitat management/ wildlife/ habitat alterations/ forestry practices/ food supply/ ecosystems/ forests, mixed/ loblolly pine/ forests, deciduous/ silviculture/ stress/ cover/ food s/ feeding/ vegetation/ Arkansas: Drew County

Abstract: Mixed pine (*Pinus* spp.)-hardwood forests are common in the southern United States (U.S.), but little quantitative information exists on the response of understory forage to reductions in basal area from thinning. The authors determined understory forage characteristics before thinning and two and four years after thinning a 35-years-old natural loblolly pine (*P. taeda*)-hardwood stand

(initially 27 m²/ha of pine and 8 m²/ha of hardwood basal area). A combination of three loblolly pine (15, 18, and 21 m²/ha) and three hardwood (0, 3.5, and 7 m²/ha) basal areas was replicated three times, resulting in 27 0.08-ha plots. Understory coverage and forage biomass were determined on 25 understory plots systematically located within each plot, with data analyzed using analysis of variance and regression. Herbaceous forage biomass and coverage and light intensity were correlated negatively ($P < 0.05$) with retained pine and hardwood basal areas, with hardwood basal area being the more important factor. Stand thinning improved herbaceous forage availability for wildlife, but the response was time-dependent. Forage from woody browse and vines also increased following stand thinning although responses were not as time-dependent as herbaceous forages. Results of this study indicate that managers can manipulate forage production by thinning stands to prescribed basal areas and compositions.

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1036. Foraging area size and habitat use by red bats (*Lasiurus borealis*) in an intensively managed pine landscape in Mississippi.

Elmore, L. W.; Miller, D. A.; and Vilella, F. J.

American Midland Naturalist 153(2): 405-417. (2005)

NAL Call #: 410 M58; ISSN: 00030031

Descriptors: activity patterns/ bats/ best management practices/ BMPs/ conservation planning/ foraging behavior/ forest management/ habitat use/ Mississippi/ *Lasiurus borealis*/ Riparia

Abstract: Forest managers are increasingly expected to incorporate biodiversity objectives within forest landscapes devoted to timber production. However, reliable data on which to base management recommendations for bats within these systems are extremely limited. Although the red bat (*Lasiurus borealis*) is a widespread common species in temperate forests of North America, little is known of its ecology within intensively managed pine (*Pinus* spp.) forests of the southeastern United States. Therefore, we investigated size of foraging areas and habitat use by red bats during summer 2000 and 2001 in an intensively managed pine landscape in east-central Mississippi, USA. We captured bats using four-tier mist nets placed over water and attached radiotransmitters to red bats. Radiotagged red bats ($n = 16$) used habitat types randomly at the study area and foraging area scale. Mean size of foraging areas and mean maximum distance traveled between diurnal roosts and foraging locations were not different ($P < 0.05$) among adult male, adult female, juvenile male or juvenile females ($n = 18$). Most foraging areas contained a reliable source of water and all but one diurnal roost was located within foraging areas. Location of diurnal roosts may dictate location of foraging areas. Open canopy conditions in intensively managed pine stands (young, open canopy stands, thinned stands and riparian hardwood stands) likely provide appropriate foraging habitat for red bats. Landscape context may influence size of foraging areas and commuting distances of red bats. Provision of appropriate aged forest stands for diurnal roosts may be the best management action for red bats within intensively managed pine landscapes.

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1037. Foraging by bats in cleared, thinned and unharvested boreal forest.

Patriquin, Krista J. and Barclay, Robert M. R.
Journal of Applied Ecology 40(4): 646-657. (2003)
 NAL Call #: 410 J828; ISSN: 0021-8901
Descriptors: Chiroptera/ Lasiorycteris noctivagans/ Myotis lucifugus/ Myotis septentrionalis/ Vespertilionidae/ Microchiroptera/ Lasiorycteris noctivagan/ Lasiorycteris noctivagans/ behavior/ terrestrial ecology/ wing/ selective harvesting/ body size/ boreal forests/ Alberta/ cleared, thinned and unharvested forest/ foods-feeding/ forests/ ecosystems/ forestry practices/ habitat alterations/ habitat management/ habitat use/ Peace River area/ wings/ wildlife-human relationships/ morphology/ biometrics/ Canada/ commercial enterprises/ conservation/ wildlife management/ disturbances/ land zones/ nutrition/ chiroptera/ clear-cut/ forestry/ logging/ silviculture/ thinning/ Microchiroptera/ forest/ habitat change/ dispersion/ abundance

Abstract: 1. Modern silvicultural methods employ various styles of selective harvesting in addition to traditional clear-cutting. This can create a mosaic of patches with different tree densities that may influence habitat use by foraging bats. Use of forest patches may also vary among bat species due to variation in their manoeuvrability. Apart from studies investigating use of clear-cuts, few have tested for differences in use of forest patches by bats, or for differences among bat species. 2. We investigated the influence of various harvesting regimes, which created forest patches of different tree densities, on habitat selection by foraging bats in the boreal mixed-wood forest of Alberta, Canada. We also tested for variation in habitat selection among species related to differences in body size and wing morphology. 3. Over two summers we assessed habitat use by bats using ultrasonic detectors to count the echolocation passes of foraging bats. We measured activity in three forest types and four tree densities, ranging from intact (unharvested) forests to clear-cuts. 4. Smaller, more manoeuvrable, species (*Myotis* spp.) were less affected by tree density than the larger, less manoeuvrable, *Lasiorycteris noctivagans*. Two *Myotis* spp. differed in their habitat use. *Myotis lucifugus*, an aerial insectivore, preferred to forage along the edge of clear-cuts, while *M. septentrionalis*, a species that gleans prey from surfaces, did not forage in clear-cuts but preferred intact forest. 5. The largest species in our study, *L. noctivagans*, preferred clear-cuts and avoided intact patches. There were therefore differences in habitat selection by foraging bats among the species in our study area, and these were correlated with size and wing morphology. 6. Synthesis and applications. Our results suggest that, in the short term, thinning has minimal effect on habitat use by bats. They also indicate that silvicultural methods have different immediate effects on different species of bats that may be obscured if the community is studied as a single entity. Management for forest-dwelling bats must take such species-specific effects into consideration. Harvesting that creates a mosaic of patches with different tree densities is likely to satisfy the requirements of more species than a system with less diverse harvesting styles.

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1038. Foraging patterns of pileated woodpeckers in a managed Acadian forest: A resource selection function.

Lemaitre, Jerome and Villard, Marc Andre
Canadian Journal of Forest Research 35(10): 2387-2393. (2005)
 NAL Call #: SD13.C35; ISSN: 0045-5067
Descriptors: Picidae/ Piciformes/ *Dryocopus pileatus*/ wildlife-human relationships/ Canada/ commercial enterprises/ conservation/ wildlife management/ diameter at breast height/ disturbances/ study methods/ techniques/ habitat use/ food habits studies/ foods-feeding/ foraging pattern/ forests/ ecosystems/ forestry practices/ habitat alterations/ habitat management/ habitat quality/ land zones/ New Brunswick/ North America/ Northwest, Black Brook District/ nutrition/ resource selection function/ terrestrial ecology/ ecological requirements/ habitat/ forest/ vegetation/ silviculture/ food/ *Fagus* spp.

Abstract: We analyzed the relative influence of foraging substrate characteristics as predictors of the probability of use by the pileated woodpecker (*Dryocopus pileatus* L.) and determined threshold values for significant predictors. We sampled used and available substrates around 126 stations distributed in an intensively managed forest in northwestern New Brunswick, Canada. We developed a resource selection function (RSF), validated by a resampling procedure, and compared selection ratios for significant predictors. Diameter at breast height (DBH) of trees and snags was the most significant predictor, probably reflecting nesting selection by its main prey, carpenter ants (*Camponotus* spp.). The pileated woodpecker preferred deciduous substrates with DBH > 35 cm and coniferous substrates with DBH > 30 cm. Among deciduous substrates, it preferred snags over living trees, but there was no such preference for coniferous substrates. American beech (*Fagus grandifolia* Ehrh.) was clearly preferred over all other species. The RSF we developed and the thresholds we obtained should help forest managers and conservation planners assess habitat quality for this keystone species.

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1039. Forest bird response to partial cutting in lodgepole pine forests on caribou winter range in west-central British Columbia.

Waterhouse, Michaela J. and Armleder, Harold M.
British Columbia Journal of Ecosystems and Management 8(1): 75-91. (2007)
 NAL Call #: SD146.B7 B34; ISSN: 1488-4674.
http://www.forrex.org/jem/ISS39/vol8_no1_art6.pdf
Descriptors: commercial activities/ conservation measures/ ecology/ terrestrial habitat/ land zones/ North America/ Canada/ Aves: forestry/ partial cutting of forest/ community structure and habitat use effect/ habitat management implications/ forest/ habitat management/ community structure and habitat use response to partial cutting of forest significance/ community structure/ partial cutting of forest effect/ habitat utilization/ forest and woodland/ community structure and habitat use/ influence of partial cutting of forest/ conservation implications/ Chilcotin Plateau/ Aves/ birds/ chordates/ vertebrates

Abstract: Breeding birds were surveyed 1 year pre-harvest (1995) and 4 years post-harvest (1996-2001) to measure the response to partial cutting in old lodgepole pine (*Pinus contorta* Dougl.) forests on the Chilcotin Plateau of British

Columbia. The irregular group shelterwood and group selection systems recommended to manage northern caribou (*Rangifer tarandus caribou* Gmelin) habitat did not negatively affect the breeding bird community. In some years within the post-harvest period, dark-eyed juncos (*Junco hyemalis* L.), red crossbills (*Loxia curvirostra* L.), yellow-rumped warblers (*Dendroica coronata* L.), and gray jays (*Perisoreus canadensis* L.) showed significant ($\alpha = 0.05$) increases in use of the partial-cutting treatments compared with the no-harvest treatment. No species decreased significantly in any of the partial-cutting treatments. The increased observations of mostly common species resulted in significantly ($\alpha = 0.05$) higher species richness, and increased frequency of observations for the bird community in some years in the partial cuts. Partial cutting of caribou habitat will maintain bird communities typical of mature to older lodgepole pine forests.

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1040. Forest clearings management: Insects and vegetation for wild turkey broods.

Lafon, Nelson W.; Norman, Gary W.; Jeffreys, Jay C.; Steffen, David E.; and Fell, Richard D.

Proceedings of the Annual Conference Southeastern Association of Fish and Wildlife Agencies 55: 547-559. (2001)

NAL Call #: SK1.S6; ISSN: 0276-7929

Descriptors: conservation measures/ nutrition/ diet/ prey/ ecology/ predators/ terrestrial habitat/ land zones/ Insecta: habitat management/ forest clearing management/ prey availability/ avian predators/ *Meleagris gallopavo sylvestris*/ prey availability in brood habitat/ forest and woodland/ Virginia/ George Washington and Jefferson National Forests/ arthropods/ birds/ chordates/ insects/ invertebrates/ vertebrates

Abstract: Insects and herbaceous vegetation important to young eastern wild turkeys (*Meleagris gallopavo sylvestris*) may be enhanced in forested areas by managing clearings. Natural resource agencies in Virginia and other eastern states have committed significant resources to create and maintain forest clearings to provide habitat for wild turkey broods in predominantly forested areas. However, techniques used to manage clearings often lack definitive ecological justifications. We compared effectiveness of 4 management regimes on forest clearings typical of those used by wildlife managers in the eastern United States to produce insects and vegetation beneficial to turkey broods. Ranging from low to high intensity in development and maintenance, treatments were 1) mowing; 2) disking and liming; 3) planting ladino clover (*Trifolium repens latum*), mowing, and liming; and 4) planting a perennial grass-forb mixture, mowing and liming. Insect production did not differ between high intensity (3 and 4 above) and low intensity (1 and 2 above) treatments ($P=0.19$). Mowing may have suppressed insect numbers briefly before increasing them, while disking apparently delayed insect production. We observed several year and period differences in insect dry weights perhaps attributable to timing of vegetation treatments or natural environmental fluctuations. Areas receiving high intensity treatments had higher clover cover estimates ($P=0.08$) and more plant species per plot ($P=0.036$). All treated areas had adequate brood vegetation dry weight, plant height, and herbaceous cover estimates. Herbaceous vegetation and insects associated with forest clearings may be important for other wildlife species

besides wild turkeys. Managers should consider effects on all species of interest as they weigh potential gains from intensive management practices against the extra cost and labor involved with those treatments. Managers can promote herbaceous ground cover and insects useable by wild turkey broods with simple, low-intensity management techniques.

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1041. Forest decision making under uncertainty: Adaptive management for the conservation of bird populations on a national wildlife refuge (*Picoides borealis*, *Hylocichla mustelina*, Georgia).

Moore, Clinton Thomas. University of Georgia, 2002.

Notes: Advisor: Conroy, Michael J.

Descriptors: birds/ uncertainty/ decision-making/ forest management / habitat management/ red-cockaded woodpecker/ *Picoides borealis*/ wood thrush/ *Hylocichla mustelina*

Abstract: I constructed a stochastic, spatially-explicit landscape model to seek optimal forest management decisions for long-term persistence of populations of red-cockaded woodpecker (*Picoides borealis*) and wood thrush (*Hylocichla mustelina*) on the Piedmont National Wildlife Refuge in Georgia, USA. I addressed uncertainty in decision making by considering alternative model forms that expressed different mechanisms of response by the forest and the bird populations to silvicultural actions. The implication of model uncertainty in this system is that conservation tradeoffs for both species differ according to choice of model. Decision variables in each model were the spatial scheduling of forest compartments for silvicultural treatments and the average periodicity of prescribed burning in compartments. Model responses were the number of active woodpecker clusters and abundance of wood thrushes. Additionally, I obtained a composite response as the average of the two abundance responses, each scaled by its standard error. I simulated each model under extremes of the decision alternatives, and I found a near-optimal management schedule for each model and for each of the responses. I also found near-optimal schedules for the case of complete uncertainty with regard to all models in the model set. Forest and bird monitoring data collected on the Refuge are the means by which measures of belief in each model are updated and decisions are adaptively improved. In nearly all models, both species responded strongly, but in opposite directions, to burning, and woodpeckers were sensitive to compartment scheduling. Consequently, optimal decisions were mostly similar among models, and values of information computed for each response suggested that little would be gained in management performance by resolving uncertainty among these models. However, fundamental uncertainties in the management of this system were probably not captured in this model set, and adaptive approaches therefore still hold promise for Refuge management. Current impediments to conducting adaptive management on the Refuge are (1) uncertainties regarding objectives, (2) lack of a comprehensive forest monitoring system, (3) inadequate system models, and (4) constraints in the expression and breadth of decision alternatives. I discuss critical information needed for the adaptive management of this and similar resource systems.

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1042. Forest habitat associations of the golden-mantled ground squirrel: Implications for fuels management.

Shick, Katharine R.; Pearson, Dean E.; and Ruggiero, Leonard F.

Northwest Science 80(2): 133-139. (2006)

NAL Call #: 470 N81; ISSN: 0029-344X

Descriptors: Mustelidae/ Carnivora/ Sciuridae/ Rodentia/ Falconiformes/ wildlife-human relationships/ commercial enterprises/ conservation/ wildlife management/ disturbances/ habitat use/ forests/ ecosystems/ forest habitat association/ forest health restoration practices/ forestry practices/ habitat alterations/ fuel management/ habitat management/ land zones/ Montana/ pine and larch stands/ population ecology/ status/ terrestrial ecology/ United States, western region/ Larix spp./ Pinus ponderosa/ ponderosa pine

Abstract: Golden-mantled ground squirrels are commonly associated with high-elevation habitats near or above upper timberline. This species also occurs in fire-adapted, low-elevation forests that are targeted for forest health restoration (FHR) treatments intended to remove encroaching understory trees and thin overstory trees. Hence, the golden-mantled ground squirrel may be affected by FHR treatments, but little is known about its habitat associations within these forest types. We sampled mature western larch and ponderosa pine forests in western Montana to determine the macro- and microhabitat associations of this ground squirrel. At the macrohabitat scale, golden-mantled ground squirrels were absent from western larch stands which consistently had a denser understory. Because we did not detect golden-mantled ground squirrels within larch stands, it is unclear whether FHR treatments in this forest type would improve habitat conditions for these ground squirrels. In contrast, golden-mantled ground squirrels were common in ponderosa pine stands and favored more open conditions there. At the microhabitat scale within ponderosa pine stands, golden-mantled ground squirrels were captured at trap stations with fewer canopy trees, more rock cover, and less grass and forb cover compared to stations without captures. Thus, FHR treatments that open the understory of ponderosa pine stands while maintaining-mature pines similar to historic conditions may increase golden-mantled ground squirrel populations. However, the extent to which golden-mantled ground squirrels are positively affected by FHR treatments in ponderosa pine stand types may be limited by the degree of their dependence on rocky structure.

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1043. Forest management activities for improved wildlife habitat.

Dougherty, D. S.

Forest Landowner 63(1): 36-38. (2004)

NAL Call #: SD144.A15F67; ISSN: 10879110

Descriptors: agriculture/ ecosystems/ environmental protection/ hardwoods/ land use/ management/ softwoods/ strategic planning/ timber/ hardwood stands/ timber management/ wildlife habitat/ wildlife management/ forestry/ agriculture/ forest management/ forestry/ forests/ hardwoods/ land use/ Pinus/ thinning/ wildlife/ Quercus phellos/ Salix

Abstract: When Arthur Dick bought a farm which he named Willow Oaks Plantation, he retained his District Manager

Nate Farris of Dougherty and Dougherty Forestry in Wallace, NC to help in managing the wildlife successfully. Arthur assigned Farris the following goals: 1) prepare a 12-month proposed activity schedule and budget; 2) implement the proposed activities and; 3) produce a long-term land management plan. Farris responded by first evaluating the existing wildlife habitat conditions for each land use or timber stand type on the property, assessing the potential for each land use type, and, completing activities in each stand type to improve the habitat. With this kind of management, it is expected that the wildlife will be a mosaic of well-interspersed, forage producing stand types capable of contributing to an abundance of high-quality hunting memories.

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1044. Forest management and bird populations: An introduction.

Sallabanks, Rex and Marzluff, John M.

Wildlife Society Bulletin 28(4): 1086-1087. (2000)

NAL Call #: SK357.A1W5; ISSN: 0091-7648

Descriptors: birds/ communities/ ecosystems/ forestry practices/ habitat management/ management/ wildlife/ wildlife-habitat relationships

Abstract: The authors discuss the organization and objectives of a symposium entitled "Contemporary research on the effects of forest management on bird populations" held during the fall of 1997 in conjunction with the fourth Annual Conference of The Wildlife Society in Showmass Village, Colorado. Objectives of the symposium were: 1) to bring the scientific community up to date on the current state of knowledge on how forest management practices, such as timber harvest, influence bird populations; 2) to set standards for future research by providing results from studies that have taken an experimental or mechanistic approach and therefore have the greatest utility for on-the-ground management; and 3) to provide targets for the next decade of research by identifying the information gaps that still exist for researchers and managers working in forested ecosystems.

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1045. Forest management and female black bear denning.

White T. H.; Bowman, J. L.; Jacobson, H. A.; Leopold, B. D.; and Smith, W. P.

Journal of Wildlife Management 65(1): 34-40. (2001)

NAL Call #: 410 J827; ISSN: 0022541X

Descriptors: batture/ black bear/ denning/ elevation/ flooding/ forest management/ Mississippi Alluvial Valley/ reproduction/ topography/ Ursus americanus/ den/ flooding/ habitat selection/ United States/ Ursus americanus

Abstract: Most habitats available to black bear (*Ursus americanus*) in the Mississippi Alluvial Valley (MAV) consist of seasonally flooded commercial forests where lack of suitable dens may limit population growth. We studied interactions between forest management and flooding relative to female black bear denning. Denning behavior differed between commercial and noncommercial forests. Females used tree dens exclusively on noncommercial forests, whereas on commercial forests, most (83%) were ground dens. Variations in ground den elevation resulted in differing inundation probabilities, altering survival probabilities for neonates. On commercial forests, ground

dens with similar inundation probabilities as tree dens allowed successful reproduction to occur. Management practices that enhance suitable cover in areas of minimal inundation probability may mitigate for lack of den trees in flood-prone landscapes.

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1046. Forest management and the dead wood resource in ponderosa pine forests: Effects on small mammals.

Chambers, Carol L.

In: Proceedings of the Symposium on the Ecology and Management of Dead Wood in Western Forests, General Technical Report-PSW 181/ Laudenslayer, W. F.; Shea, P. J.; Valentine, B. E.; Weatherspoon, C. P.; and Lisle, T. E.; Albany, CA: Pacific Southwest Research Station, Forest Service, U.S. Department of Agriculture, 2002. pp. 679-693. Notes: 0196-2094 (ISSN); Symposium held November 2-4, 1999 in Reno, NV.

<http://www.fs.fed.us/psw/publications/documents/gtr-181/>
Descriptors: commercial activities/ conservation measures/ ecology/ habitat utilization/ terrestrial habitat/ land zones/ *Peromyscus boylii*/ *Peromyscus maniculatus*/ *Peromyscus truei*: forestry/ forest restoration treatments/ habitat management/ habitat utilization/ Dead wood use/ forest management implications/ habitat preference/ forest and woodland/ Arizona/ Colorado River/ Arizona strip/ Mount Trumbull/ Mammalia, Rodentia, Muridae/ chordates/ mammals/ rodents/ vertebrates

Abstract: Changes in vegetation structure and composition affect habitat for wildlife. Species such as small mammals that are restricted to small home ranges and are relatively immobile may be most affected since it is more difficult to find and move to new habitat. In the southwestern United States, forest management treatments (thinning and prescribed burning) are being implemented to alter structure and function of ponderosa pine (*Pinus ponderosa*) ecosystems and recreate pre-settlement (ca. 1870) tree species composition and size class distribution. These forest restoration treatments will affect the availability of dead wood to wildlife (e.g., prescribed fires may consume dead wood, forest operations may create snags and logs). I live-trapped small mammals in a northern Arizona ponderosa pine forest prior to restoration treatment and found that mouse species (*Peromyscus* species) were associated with some dead wood elements (e.g., Gambel oak [*Quercus gambelii*] snags, ponderosa pine snags, ponderosa pine stumps).

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1047. Forest management and wildlife in forested wetlands of the southern Appalachians.

Wigley, T. Bently and Roberts, Thomas H.

Water, Air and Soil Pollution 77(3-4): 445-456. (1994)

NAL Call #: TD172.W36; ISSN: 0049-6979

Descriptors: forested wetlands/ wildlife/ Appalachian Mountains/ Animalia/ Plantae/ animals/ plants/ biodiversity/ ecology/ environmental protection/ forestry/ habitat/ resource management

Abstract: The southern Appalachian region contains a variety of forested wetland types. Among the more prevalent types are riparian and bottomland hardwood forests. In this paper we discuss the temporal and spatial changes in wildlife diversity and abundance often associated with forest management practices within bottomland and riparian forests. Common silvicultural

practices within the southern Appalachians are diameter-limit cutting, clearcutting, single-tree selection, and group selection. These practices alter forest composition, structure, and spatial heterogeneity, thereby changing the composition, abundance, and diversity of wildlife communities. They also can impact special habitat features such as snags, den trees, and dead and down woody material. The value of wetland forests as habitat also is affected by characteristics of adjacent habitats. More research is needed to fully understand the impacts of forest management in wetlands of the southern Appalachians.
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1048. Forest management for spotted owls on Rayonier lands of the Olympic Peninsula: The wildlife plan area.

Varland, Daniel E.

Northwestern Naturalist 81(2): 89. (2000)

NAL Call #: QL671.M8; ISSN: 1051-1733

Descriptors: Strigidae/ Strigiformes/ *Strix occidentalis*/ habits-behavior/ birds/ dispersal/ endangered-threatened species/ habitat management/ habitat use/ land use/ management/ snags/ study methods/ techniques/ wildlife
Abstract: The Wildlife Agreement between the Washington State Department of Fish and Wildlife and Rayonier for 66,000 acres of Rayonier land on the northwest Olympic Peninsula is designed primarily to create spotted owl dispersal habitat between the Olympic National Park Interior and the park Coastal Strip. Through this cooperative agreement, Rayonier is performing landscape management practices to create more dispersal habitat and is co-sponsoring a snag research program to provide more habitat for bird and mammal species. The duration of the agreement is 30 years, with options for two extensions of 10 years each.

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1049. Forest management guidelines for forest-dwelling caribou in Quebec.

Courtois, R.; Ouellet, J. P.; Dussault, C.; and Gingras, A.

Forestry Chronicle 80: 598-607. (Sept. 2004-Oct. 2004)

NAL Call #: 99.8 F7623

Descriptors: caribou/ forest management/ habitat management/ Quebec/ Canada

Abstract: The forest-dwelling ecotype of woodland caribou (*Rangifer tarandus caribou*) is vulnerable to predation, hunting, and disturbances due to anthropogenic activities. Its strategies of space and habitat use are oriented towards reducing the effects of these limiting factors. Caribou occupy large home ranges, undertake extensive movements, and avoid fragmented areas. They use various habitats, but especially mature and over-mature conifer stands with irregular structure, which are less suitable for other ungulates, wolves and black bears. In order to protect habitat for forest-dwelling caribou, we suggest an ecosystem approach based on the protection of large forested blocks, the concentration of forest harvesting in large management blocks, and the maintenance of habitat connectivity. This strategy focuses on short-term conservation of minimum caribou habitats in the protected blocks, a medium-term habitat recovery in the management blocks, the maintenance of forest activities, and facilitation of seasonal and dispersal movements. Within the management blocks, we recommend creation of an irregular forest structure similar to the pattern created by natural disturbances inherent to spruce-moss forests.

These guidelines have been tested in Quebec for the last few years and were well received by forest and wildlife agencies as well as the forest industry.
This citation is from AGRICOLA.

1050. Forest management strategy, spatial heterogeneity, and winter birds in Washington.

Haveri, Bruce A. and Carey, Andrew B.
Wildlife Society Bulletin 28(3): 643-652. (2000)
NAL Call #: SK357.A1W5; ISSN: 0091-7648
Descriptors: Aves/ wildlife-habitat relationships/ wildlife/ species diversity/ overwintering/ management/ habitat management/ habitat alterations/ forests/ forestry practices/ ecosystems/ Douglas fir/ conservation/ birds/ behavior/ silviculture/ fauna/ diversity/ dead wood/ *Pseudotsuga* spp./ Washington: Thurston County
Abstract: Ecological management of second-growth forest holds great promise for conservation of biodiversity, yet little experimental evidence exists to compare alternative management approaches. Wintering birds are one of several groups of species most likely to be influenced by forest management activities. The authors compared species richness and proportion of stand area used over time by wintering birds in 16 second-growth Douglas-fir (*Pseudotsuga menziesii*) stands to determine the effects of management strategy and experimental variable-density thinnings. Management strategies were retaining legacies (large live, dead, and fallen trees from the previous old-growth stand) with long rotations and managing for high-quality timber with multiple thinnings and removal of defective trees. Experimental thinnings were designed to reduce inter-tree competition and monopolization of light, moisture, and nutrients by trees at the expense of other growth forms; reproduce the within-stand spatial heterogeneity found in old-growth forests; and accelerate development of habitat breadth. Proportion of area used and species richness increased with experimental thinnings. Two of the eight most common winter species increased their use of experimentally thinned stands. No species exhibited greater use of unthinned, competitive-exclusion-stage stands over thinned stands. Variable-density thinnings, in conjunction with other conservation measures (legacy retention, decadence management, and long rotations), should provide habitat for abundant and diverse birds.
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1051. Forest management under uncertainty for multiple bird population objectives.

Moore, C. T.; Plummer, W. T.; and Conroy, M. J.
In: Bird Conservation Implementation and Integration in the Americas: Proceedings of the Third International Partners in Flight Conference, General Technical Report-PSW 191; Albany, CA: Pacific Southwest Research Station, Forest Service, U.S. Department of Agriculture, 2005. pp. 373-380.
Notes: Bibliography.
http://www.fs.fed.us/psw/publications/documents/psw_gtr191/Asilomar/pdfs/373-380.pdf
Descriptors: Aves/ birds/ habitat management/ habitat/ forest/ theory-model/ simulation/ Georgia
© NISC

1052. Forest restoration in a global context.

Stanturf, J. A.
In: Proceedings of a Conference on Sustainability of Wetlands and Water Resources: How Well Can Riverine Wetlands Continue to Support Society into the 21st Century?, General Technical Report-SRS 50/ Holland, Marjorie M.; Warren, Melvin L.; and Stanturf, John A.; Asheville, NC: Southern Research Station, Forest Service, U.S. Department of Agriculture, 2002. pp. 160-167.
Notes: , Southern Research Station, USDA Forest Service.
<http://www.forestdisturbance.net/publications/ForestRestGolbal-Stanturf.pdf>
Descriptors: afforestation/ agricultural land/ bottomland forests/ choice of species/ degraded forests/ degraded land/ forest plantations/ forests/ land use/ reclamation/ rehabilitation/ silviculture
Abstract: Forest restoration on land cleared for agriculture is occurring around the world. Often land was abandoned because of infertility, frequent flooding, or other site limitations. In some countries, market forces or changing trade policies drive conversion of cleared land to plantations of exotic or native tree species. The objective of this paper is to introduce the special session on restoration of bottomland hardwoods by placing efforts in the Lower Mississippi Alluvial Valley into a global context. The challenges of forest restoration are surprisingly similar: overcoming site degradation, prescribing appropriate species, and applying cost-effective establishment methods. While plantation forestry remains the most effective approach to large-scale restoration, the trend is toward plantations that are more complex. This trend is characterized by more intimate association with other land uses, more diverse goals for species composition and vegetation structure in restoration planting, and more direct involvement by landowners in both the conception and implementation of restoration schemes. Benefits of restoration planting include reduced soil erosion; improved water quality; increased wildlife habitat; and increased supply of wood for fuel, lumber, and fiber. Increasingly, objectives of restoration planting include carbon sequestration.
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1053. Forest vertebrate responses to landscape-level changes in Ontario.

Voigt, Dennis R.; Baker, James A.; Rempel, Robert S.; and Thompson, Ian D.
In: Ecology of a managed terrestrial landscape: Patterns and processes of forest landscapes in Ontario/ Euler, David; Perera, Ajith H.; Thompson, I. D.; and Ontario Ministry of Natural Resources.
Vancouver, B.C.: UBC Press, 2000; pp. 198-234.
Descriptors: commercial activities/ conservation measures/ ecology/ terrestrial habitat/ abiotic factors/ land and freshwater zones/ Canada/ Vertebrata: forestry/ habitat management/ landscape level management/ forest fauna/ population dynamics/ forest and woodland/ physical factors/ Ontario/ forest taxa responses/ chordates/ vertebrates
© Thomson Reuters Scientific

1054. Forestry herbicide influences on biodiversity and wildlife habitat in southern forests.

Miller, K. V. and Miller, J. H.

Wildlife Society Bulletin 32(4): 1049-1060. (2004)

NAL Call #: SK357.A1W5; ISSN: 00917648.

Notes: doi: 10.2193/0091-7648(2004)032

[1049:FHIOBA]2.0.CO;2.

Descriptors: biodiversity/ habitat/ herbicide/ release treatment/ site preparation/ United States, southeastern region/ wildlife/ biodiversity/ forest management/ habitat quality/ herbicide/ species richness/ yield

Abstract: In the southern United States, herbicide use continues to increase for timber management in commercial pine (*Pinus* spp.) plantations, for modifying wildlife habitats, and for invasive plant control. Several studies have reported that single applications of forestry herbicides at stand initiation have minor and temporary impacts on plant communities and wildlife habitat conditions, with some reports of enhanced habitat conditions for both game and nongame species. Due to the high resiliency of floral communities, plant species richness and diversity rebound rapidly after single herbicide treatments, with short- and long-term compositional shifts according to the selectivity and efficacy of the herbicide used. Recently, however, a shift to the Southeast in North American timber supplies has resulted in increased forest management intensity. Current site-preparation techniques rely on herbicide combinations, often coupled with mechanical treatments and ≥ 1 years of post-planting applications to enhance the spectrum and duration of vegetation control. This near-total control of associated vegetation at establishment and more rapid pine canopy closure, coupled with shortened and repeated rotations, likely will affect plant diversity and wildlife habitat quality. Development of mitigation methods at the stand and landscape levels will be required to minimize vegetative and wildlife impacts while allowing continued improvement in pine productivity. More uncertain are long-term impacts of increasing invasive plant occupation and the projected increase in herbicide use that will be needed to reverse this worsening situation. In addition, the potential of herbicides to meet wildlife management objectives in areas where traditional techniques have high social costs (e.g., prescribed fire) should be fully explored.

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1055. Forestry matters: Decline of oaks will impact wildlife in hardwood forests.

McShea, William J.; Healy, William M.; Devers, Patrick; Fearer, Todd; Koch, Frank H.; Stauffer, Dean; and Waldon, Jeff

Journal of Wildlife Management 71(5): 1717-1728. (2007)

NAL Call #: 410 J827; ISSN: 0022-541X

Descriptors: habitat use/ forests/ ecosystems/ habitat management/ hardwood forest habitats/ conservation/ wildlife management/ land zones/ *Quercus* spp.

Abstract: Acorn production by oaks (*Quercus* spp.) is an important food resource for wildlife in many deciduous forests. Its role as a hard mast crop that can be either stored or used to build fat reserves for winter survival cannot be replaced by most other potential foods. Changes in forest management, introduced pests and pathogens, and increased deer populations have resulted in significant changes in the demography of oaks in eastern North America, as evident in Forest Inventory and Analysis data.

Specifically, maples (*Acer* spp.) are replacing oaks in many forests through dominance of the younger age classes. These changes are not yet obvious in mast production but will take decades to reverse. Effective forest management for mast production is arguably one of the more important tasks facing wildlife professionals, yet receives scant attention by both public and private land managers. Public forests need to explicitly include mast production in their forest planning and reduce adversarial relationships over forest management. Market forces are driving commercial forests toward forest certification. Private forests compose 80% of our oak forests and are the hardest group to influence. States have not been able to effectively market forest plans and we recommend joining with advocacy groups more adept at motivating the public. Increased communication between wildlife and forestry professionals is needed through agency restructuring and joint meetings of professional agencies at the state level. Professional wildlife and forest managers are encouraged to make increased use of monitoring data and form a multiagency cooperative using a joint venture model, which has been successful for other organizations.

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1056. Forests, fungi, and small mammals: The impact of fire and thinning on a tri-trophic mutualism.

Meyer, Marc Datu

Davis, CA: University of California, Davis, 2004.

Notes: Degree: PhD; Advisor: Kelt, Douglas

Descriptors: ecology/ forestry/ wildlife/ fire/ mutualism/ selective harvesting/ forest management/ flying squirrels/ spotted owls/ chipmunks

Abstract: A fundamental question of forest management in North America is whether selective timber harvest mimics the effects of a natural fire regime. Understanding such effects on forest structure, ecological interactions, and wildlife within forest ecosystems is crucial to effective forest management. In Chapters 1 and 2, I identify significant habitat features of the northern flying squirrel (*Glaucomys sabrinus*), the primary prey of the California Spotted Owl (*Strix occidentalis Occidentalis*), in a mixed-conifer and red fir forest of the southern Sierra Nevada. In Chapters 3 and 4, I report on the short-term effects of mechanical thinning (light, heavy, and none) and prescribed burning (burned vs. unburned) on the interaction between truffle-producing mycorrhizal fungi and truffle-consuming lodgepole chipmunks (*Tamias speciosus*). Northern flying squirrels were strongly associated with perennial creeks. This association could be partly explained by the greater availability of truffles, the main food resource of flying squirrels, adjacent to creeks (Chapter 1). Flying squirrels selected nest trees that were larger in diameter, taller, and closer to riparian habitat than random or large neighboring trees. Flying squirrels also showed a preference for snags over live trees and selected red fir (*Abies magnifica*) but avoided incense cedar (*Calocedrus decurrens*, Chapter 2). Forest management practices that remove these preferred habitat elements could impact this important prey species of the California Spotted Owl. Prescribed burning and mechanical thinning had very different effects on forest structure (e.g. canopy cover, large tree density, shrub and herbaceous plant cover, soil depth), but both treatments had similar impacts on truffle production (no significant impact) and consumption of truffles by lodgepole chipmunks (both significantly reduced consumption). In

addition, neither treatment had a significant effect on the densities or demographic parameters of *T. speciosus* (Chapter 4). Different intensities of thinning also had similar impacts on *T. speciosus* densities and demographic parameters. These results suggest that burning and thinning have similar short-term effects on *T. speciosus*. However, longer-term data are needed to thoroughly evaluate the relative impacts of prescribed burning versus mechanical thinning on forest wildlife and their interactions.
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1057. Fuel reduction treatment and wildfire influence on carabid and tenebrionid community assemblages in the ponderosa pine forest of northern Arizona, USA.

Chen, Z.; Grady, K.; Stephens, S.; Villa-Castillo, J.; and Wagner, M. R.
Forest Ecology and Management 225(1-3): 168-177. (2006)
NAL Call #: SD1.F73; ISSN: 03781127.
Notes: doi: 10.1016/j.foreco.2005.12.043.

Descriptors: biodiversity/ Carabidae/ ecological indicators/ fuel reduction treatment/ ponderosa pine/ Tenebrionidae/ wildfire

Abstract: We investigated the response of community assemblages of carabids (Coleoptera: Carabidae) and tenebrionids (Coleoptera: Tenebrionidae) from June to August in 2003 and 2004 on ponderosa pine forest stands of various conditions that were created by fuel reduction treatments (thinning, and thinning plus prescribed burning) and wildfires between 1987 and 1996 in northern Arizona. We found that richness and abundance increased for carabids but decreased for tenebrionid significantly from June (the driest season of the year) to August (wet monsoon season of the year), a temporal partition for ecological niches in ponderosa pine forests. For both taxa, wildfire burned stands had the highest species richness and diversity; whereas the thinned stands had the highest species evenness. Both fuel reduction treatment and wildfire resulted in significantly different community assemblages of carabids and tenebrionids compared to unmanaged stands. Results showed that carabids from the genera of *Amara*, *Anisodactylus*, *Cicindela*, *Harpalus*, *Radix*, and tenebrionids in the genus of *Eleodes* were ecological indicators for wildfire stands. However, *Synuchus dubius*, and *Coelocnemis* spp.1 were indicator species for thinned stands, and unmanaged stands, respectively. We concluded that the richness and diversity of both taxa tended to increase after fuel reduction treatment and wildfire, and that some species from both taxa were suitable as ecological indicators for the structural change of ponderosa pine forests. Creating a mosaic of heterogeneous landscape through mechanical fuel reduction treatments is an important management strategy to maintain high invertebrate species diversity in ponderosa pine forest ecosystems in the southwestern US.
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1058. Gopher tortoise response to habitat management by prescribed burning.

Yager, L. Y.; Hinderliter, M. G.; Heise, C. D.; and Epperson, D. M.
Journal of Wildlife Management 71(2): 428-434. (Apr. 2007)
NAL Call #: 410 J827

Descriptors: prescribed burning/ habitat management/ *Gopherus polyphemus*/ gopher tortoises/ longleaf pines/ *Pinus palustris*

Abstract: As quality of forested habitat declines from altered fire regimes, gopher tortoises (*Gopherus polyphemus*) often move into ruderal areas to the detriment of the animal and land manager. We evaluated effects of a dormant-and-growing-season prescribed fire on habitat and gopher tortoise use of degraded longleaf pine (*Pinus palustris*) forests surrounding military training areas. We burned 4 of 8 sites in winter 2001-2002 and again in April 2003. Changes in vegetation measured during 2001-2004 indicated that burn treatments did not increase herbaceous vegetation. Similarly, movement patterns, burrow usage, and home range of tortoises radiotracked from 2002-2004 did not differ between treatments. Woody cover initially was reduced in the forests postburn, and we found more new burrows in burned forest sites. Once shrub cover was reduced, tortoises started using forested habitat that had become overgrown. However, shrub reduction may be temporary, as woody stem densities increased postburn. Thus, the one-time use of fire to manage tortoise habitat may not rapidly restore the open canopy, sparse woody midstory, and abundant herbaceous vegetation that this species requires. Repeated prescribed fires or additional management techniques may be needed for complete restoration.

This citation is from AGRICOLA.

1059. Grassland bird response to harvesting switchgrass as a biomass energy crop.

Roth, A. M.; Sample, D. W.; Ribic, C. A.; Paine, L.; Undersander, D. J.; and Bartelt, G. A.
Biomass and Bioenergy 28(5): 490-498. (2005);
ISSN: 09619534.

Notes: doi: 10.1016/j.biombioe.2004.11.001.
Descriptors: biomass energy/ grassland birds/ panicum virgatum/ switchgrass/ combustion/ composition/ electric power generation/ energy utilization/ fuels/ vegetation/ biofuels/ habitat/ landscape/ biomass/ avifauna/ behavioral response/ energy crop/ grassland/ Wisconsin/ *Ammodramus henslowii*/ *Aves*/ *Cistothorus platensis*/ *Panicum virgatum*/ *Troglodytes troglodytes*

Abstract: The combustion of perennial grass biomass to generate electricity may be a promising renewable energy option. Switchgrass (*Panicum virgatum*) grown as a biofuel has the potential to provide a cash crop for farmers and quality nesting cover for grassland birds. In southwestern Wisconsin (near lat. 42°52', long. 90°08'), we investigated the impact of an August harvest of switchgrass for bioenergy on community composition and abundance of Wisconsin grassland bird species of management concern. Harvesting the switchgrass in August resulted in changes in vegetation structure and bird species composition the following nesting season. In harvested transects, residual vegetation was shorter and the litter layer was reduced in the year following harvest. Grassland bird species that preferred vegetation of short to moderate height and low to moderate density were found in harvested areas. Unharvested areas provided tall, dense vegetation structure that was especially attractive to tall-grass bird species, such as sedge wren (*Cistothorus platensis*) and Henslow's sparrow (*Ammodramus henslowii*). When considering wildlife habitat value in harvest management of switchgrass for biofuel, leaving some fields unharvested each year would be a good compromise, providing some habitat for a larger number of grassland bird species of management concern than if all fields were harvested annually. In areas

where most idle grassland habitat present on the landscape is tallgrass, harvest of switchgrass for biofuel has the potential to increase the local diversity of grassland birds.
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1060. Grazing management of wet pastures in an environmentally sensitive area.

Mallon, E. D.; McAdam, J. H.; and Montgomery, W. I. In: Vegetation management in forestry, amenity and conservation areas: Managing for multiple objectives; Series: Aspects of Applied Biology 44. Warwick: Association of Applied Biologists, 1996; pp. 245-250.

Notes: ISSN: 0265-1491.

NAL Call #: QH301.A76 no.44

Descriptors: natural resource management/ wildlife management/ forestry/ habitat/ pastures/ grazing management/ wetlands

This citation is from AGRICOLA.

1061. Ground beetle (Coleoptera: Carabidae) species assemblage as an indicator of forest condition in northern Arizona ponderosa pine forests.

Villa-Castillo, J. and Wagner, M. R.

Environmental Entomology 31(2): 242-252. (2002)

NAL Call #: QL461.E532; ISSN: 0046225X

Descriptors: Carabidae/ forest health/ forest management/ Pinus ponderosa/ prescribed fire/ thinning/ beetle/ forest health/ forest management/ prescribed burning/ thinning/ canopy thinning/ community structure/ fire ecology/ forest/ growing season/ habitat quality/ indicator organism/ native species/ organismal community/ plant stand structure/ species reintroduction/ United States/ United States/ Amara/ Carabidae/ Coleoptera/ Cyclothraclis constrictus/ Harpalus/ Pinus ponderosa/ Synuchus dubius

Abstract: Reintroduction of fire and thinning have been suggested as the main practices to regain forest health in northern Arizona ponderosa pine (*Pinus ponderosa* Dougl. ex Lawson) forests. Criteria for assessing the impact of such management practices in the forest are based on benchmark reconstructed conditions resembling pre-European forest stand structure and on the enhancement of tree vigor. A range of forest conditions currently exists including stands that have been unmanaged, thinned only, thinned plus prescribed burned and burned by wildfire. A surrogate taxon was used to assess forest condition under criteria of maintaining habitat for native species operating at the soil level. We assessed changes occurring in ground beetle assemblages at the stand scale as related to changes that had occurred in forest stands previously treated with the above treatments. A pitfall-trapping scheme was deployed during the summer months of 1998, 1999, and 2000. A total of 4,452 specimens was caught representing 1.5 genera and 20 species of ground beetles. We found that species diversity increased as the level of disturbance increased. The indicator species assemblage found on the wildfire treatment was represented by species in the genera *Amara* and *Harpalus* that are characteristic of dry-open habitats. Unmanaged stands generally had the lowest diversity and the assemblage was dominated by the species *Synuchus dubius* (Leconte). The thinned only stands did not significantly vary from unmanaged stands in species assemblage. *Cyclothraclis constrictus* (Say) was indicative of the thinning plus broadcast burned stands. Stands that were thinned plus burned were richer than both

unmanaged and thinned only stands without a shift toward an open-area dominant assemblage as occurred in the stands burned by wildfire.

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1062. Habitat and landscape correlates of presence, density, and species richness of birds wintering in forest fragments in Ohio.

Doherty, P. F. and Grubb, T. C.

Wilson Bulletin 112(3): 388-394. (2000)

NAL Call #: 413.8 W692; ISSN: 00435643

Descriptors: avifauna/ community structure/ habitat fragmentation/ habitat structure/ landscape structure/ United States

Abstract: We investigated the distribution of wintering woodland bird species in 47 very small, isolated, woodland fragments (0.54-6.01 ha) within an agricultural landscape in north-central Ohio. Our objectives were to determine correlations between temporal, habitat, and landscape variables and avian presence, density, and species richness within the smallest woodlots occupied by such species. Our results suggest that even common species are sensitive to variation in habitat, landscape, and season. Woodlot area explained the most variation in presence, density, and species richness. Shrub cover was also an important predictor variable for presence of the smallest resident birds. Shrub cover might function as both a refuge from predators and as a windbreak, reducing thermal costs in a flat, open landscape. Landscape factors related to isolation and connectedness were also correlated with species presence and density. The species composition of the community changed through the winter, as did the density of individual species, suggesting that the winter season may play an important role in determining the distributions of bird populations across woodlots. The models presented here for Ohio birds in this specific landscape may have biological inference for other species in similar landscapes.

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1063. Habitat and population ecology of northern bobwhite in northern Mississippi (Colinus virginianus).

Szukaitis, Scott J. Mississippi State University, 2002.

Notes: Degree: MS; Advisor: Burger, Loren W.

Descriptors: population ecology/ breeding/ wildlife management/ habitat management/ mortality/ survival/ habitat use/ *Colinus virginianus*/ northern bobwhite quail/ Mississippi/ Black prairie wildlife management

Abstract: To further the understanding of the population processes involved in population response to habitat management by northern bobwhite *Colinus virginianus*, I studied changes in survival, reproductive effort, reproductive strategies, nest success, and chick survival and recruitment during the 3 and 4 years of habitat management on Black Prairie Wildlife Management Area, in North-Central Mississippi, 1999-2001. I radio-collared 253 bobwhite (146 male and 107 female) and monitored breeding season survival, cause-specific mortality, reproductive effort, reproductive success, nest site vegetative characteristics, habitat use, and brood survival. Breeding season survival was 23.8%. Mammalian (31.6%), avian (25.9%), and unknown predators (16.3%) accounted for most of the natural mortality. Males accounted for 30.43% of total nesting effort, whereas female first nests and renests accounted for 52.17% and 17.39%,

respectively. Overall nest survival extended to include the length of the mean laying period (15 days) and the 23-day incubation period (38 days) was 15.97%. Brood recruitment to fall was estimated at 46.62% and 19.0% for 1999 and 2000, respectively.

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1064. Habitat associations of black-backed and three-toed woodpeckers in the boreal forest of Alberta.

Hoyt, J. S. and Hannon, S. J.

Canadian Journal of Forest Research 32(10): 1881-1888. (2002)

NAL Call #: SD13.C35; ISSN: 00455067.

Notes: doi: 10.1139/x02-109.

Descriptors: fires/ flame retardants/ fire suppression/ forestry/ birds/ boreal forest/ conservation management/ ecological impact/ habitat use/ logging (timber)/ prescribed burning/ silviculture/ Canada/ Aves/ Coniferophyta/ Picea/ Picidae/ Picoides/ Picoides arcticus/ Picoides tridactylus/ Tridactylus

Abstract: Recent studies suggest that black-backed (*Picoides arcticus*) and three-toed woodpeckers (*Picoides tridactylus*) might decrease in abundance because of habitat loss from fire suppression and short-rotation logging in landscapes managed for forestry. We examined black-backed and three-toed woodpecker occupancy of stands in a 2-year post-fire forest, mature and old-growth spruce and pine forests, and six post-fire coniferous forests of different ages. Three-toeds were detected in old stands and in the 2-year-old burn, and their probability of occupancy of burned forests decreased between 3 and 8 years post-fire. Within 50 km of the 2-year-old burn, black-backs were only detected in the burn and not in old-growth or mature conifer stands. However, they did occupy old coniferous stands located 75 and 150 km from the recent burn. They had a similar probability of occupying stands in the 3-, 4-, and 8-year-old burns but were not detected in the 16-year-old burn. The persistence of three-toed woodpeckers in boreal Alberta will likely depend on the presence of both old-growth and recently burned coniferous forests or forests with old-growth structural characteristics. Black-backed woodpeckers appear to be more burn dependent than three-toeds, and their long-term persistence may depend on the frequency of recently burned forests within their dispersal range.

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1065. Habitat associations of gopher tortoise burrows on industrial timberlands.

Jones, Jeanne C. and Dorr, Brian

Wildlife Society Bulletin 32(2): 456-464. (2004)

NAL Call #: SK357.A1W5; ISSN: 0091-7648

Descriptors: Chelonia/ Anapsida/ Cryptodira/ Testudines/ Testudinidae/ Gopherus polyphemus/ biogeography/ canopy coverage/ commercial forest management/ foraging conditions/ intermediate forest stand thinning/ loam soil/ midstory control/ nesting/ population decline/ prescribed fire/ sandy soil/ timber industry/ Alabama/ corporate timberlands/ forests/ ecosystems/ habitat management/ habitat use/ Mississippi/ conservation/ wildlife management/ land zones/ *Pinus palustris*

Abstract: The western population of the gopher tortoise (*Gopherus polyphemus*) was listed as threatened under the Endangered Species Act in 1987 due to extensive population declines. Declines have been linked to site

conversion of native pine (*Pinus* spp.) forests for urban development, agriculture, and commercial forest management. We conducted surveys to detect tortoise burrows on corporate timberlands in southern Mississippi and southwestern Alabama during summer 1994. We surveyed 2,759 0.5-ha strip transects on soil types of 9 different suitability categories for gopher tortoises. We found 460 active and 264 abandoned burrows on the 1,380 ha surveyed. Edaphic and vegetative conditions, such as sandy soils and total and midstory canopy coverage, influenced gopher tortoise occurrence. Logistic regression analyses revealed that active burrow occurrence was related positively to deep, sandy soils and related negatively to total canopy closure and fine loam soils with limited sand content. Abandoned burrow occurrence was related positively to increasing midstory canopy closure and selected soil types. Sandy soils and open overstory canopy that created favorable burrowing, nesting, and foraging conditions were important influences in active burrow occurrence. Vegetation management techniques, such as prescribed fire, midstory control, and intermediate forest stand thinning, are recommended on gopher tortoise conservation areas and connective corridor habitats on commercial timberlands. We theorize that restoration of longleaf pine (*P. palustris*) forests on sandy ridges can produce desirable core habitats and dispersal corridors for gopher tortoises in landscapes dominated by intensively managed pine plantations.

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1066. Habitat characteristics in the core breeding range of the Swainson's warbler.

Graves, G. R.

Wilson Bulletin 114(2): 210-220. (2002)

NAL Call #: 413.8 W692; ISSN: 00435643

Descriptors: breeding site/ habitat management/ habitat selection/ passerines/ United States/ *Arundinaria gigantea*/ *Limnothlypis swainsonii*

Abstract: I investigated the physiognomic and floristic characteristics of Swainson's Warbler (*Limnothlypis swainsonii*) territories at five localities within its core breeding range in Arkansas, Mississippi, Louisiana, and Florida. The warbler attained its greatest abundance (10-20 territorial males/ km²) in floodplain forest characterized by small (<25 cm dbh) trees (ca 620-820 stems/ha) and understory thickets of saplings, vines, and shrubs (ca 35,000-48,000 small woody stems/ha). Territories in mature forest typically were associated with disturbance gaps. Canopy height, basal area, and floristics appear to be relatively unimportant factors in habitat selection, provided that understory requirements are met, which explains the warbler's occurrence in regenerating clearcuts as well as in relic tracts of old growth forest. Giant cane (*Arundinaria gigantea*), hypothesized to be an essential habitat requisite along the northern periphery of its breeding range, was sparse or absent in the prime breeding locations surveyed in this study. Selective thinning and clearcutting are viable habitat management techniques for the Swainson's Warbler.

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1067. Habitat islands, forest edge and spring-active invertebrate assemblages.

Pearce, J. L.; Venier, L. A.; Eccles, G.; Pedlar, J.; and McKenney, D.

Biodiversity and Conservation 14(12): 2949-2969. (2005)
NAL Call #: QH75.A1B562; ISSN: 0960-3115

Descriptors: commercial activities/ conservation measures/ ecology/ terrestrial habitat/ land zones/ North America/ Canada/ Araneae/ Carabidae: forestry/ clearcutting/ logging activity/ habitat management/ spruce forest management/ community structure/ spring active assemblage composition/ clearcut matrix/ forest and woodland/ Ontario/ Thunder Bay/ Rinker Lake Research Area/ arachnids/ arthropods/ beetles/ Chelicerates/ insects/ invertebrates
Abstract: Forest management results in forest patches of varying sizes within a clearcut matrix. The result is a large amount of edge habitat and many small patches across the landscape. Here we describe the spring-active epigeal spider and carabid fauna found at the forest-clearcut edge of spruce forest in northern Ontario, Canada. We include two types of edge: the forest-clearcut interface and the small habitat patches formed by forest residuals within the clearcut. Spring-active forest spiders and carabids appear little affected by adjacent clearcutting activity, and some forest species, such as *Agyneta olivacea* (Emetron), *Diplocentria bidentata* (Emetron) and *Microneta viaria* (Blackwall), are more prevalent at the forested edge. Common and abundant spider species were equally recorded in forest interior and forest edge. Generally, no invasion of open-habitat species was observed within the forest, although smaller forest patches may be at higher risk.

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1068. Habitat preferences of primary cavity excavators in Washington's East Cascades.

Bevis, Kenneth R. and Martin, Sandra K.

In: Proceedings of the Symposium on the Ecology and Management of Dead Wood in Western Forests, General Technical Report-PSW 181/ Laudenslayer, W. F.; Shea, P. J.; Valentine, B. E.; Weatherspoon, C. P.; and Lisle, T. E.; Albany, CA: Pacific Southwest Research Station, Forest Service, U.S. Department of Agriculture, 2002. pp. 207-221.
Notes: 0196-2094 (ISSN); Symposium held November 2-4, 1999 in Reno, NV.

<http://www.fs.fed.us/psw/publications/documents/gtr-181/>

Descriptors: commercial activities/ ecology/ population dynamics/ habitat utilization/ terrestrial habitat/ land zones/ Aves: forestry/ habitat preference/ abundance/ primary cavity excavators/ forest/ population density/ forest management treatments/ dead tree characteristics/ habitat preference/ forest and woodland/ Washington/ East Cascades/ Cle Elum/ Aves/ birds/ chordates/ vertebrates
Abstract: Primary cavity excavator (PCE) bird densities and habitat preferences in relation to forest management treatments and snag characteristics were investigated in grand fir forests of eastern Washington. PCE birds selected large diameter, broken top snags for feeding and nesting. They selected western larch and Douglas-fir for feeding excavations and ponderosa pine and Douglas-fir for nest cavity snags. Grand fir were also utilized as available on managed plots. Soft snags with advanced wood decay were particularly important for nest sites. Species composition of PCE birds varied significantly in different forest management treatments, with unique species groups

associated with unmanaged and heavily managed sites. Total population densities of PCE birds were most closely associated with snag density, particularly large diameter snags (> 25 cm DBH).

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1069. Habitat quality and reproductive behavior in chickadees and tits: Potential for habitat matrix use in forest generalists.

Otter, Ken A.; van Oort, Harry; and Fort, Kevin T.
In: Ecology and behavior of chickadees and titmice: An integrated approach/ Otter, Ken A.

Oxford: Oxford University Press, 2007.

Notes: ISBN: 9780198569992.

NAL Call #: QL696.P2615 E26

Descriptors: conservation measures/ reproduction/ ecology/ habitat utilization/ terrestrial habitat/ Paridae: habitat management/ potential use of managed matrix vegetation to improve breeding success/ reproductive behavior/ relationships with habitat quality/ potential use of managed matrix vegetation/ reproductive productivity/ breeding success/ enhancement through potential use of managed matrix vegetation/ habitat preference/ habitat quality and reproductive behavior/ forest and woodland/ Aves, Passeriformes/ birds/ chordates/ vertebrates
Abstract: Habitat destruction and fragmentation poses one of the most serious threats to biodiversity in conservation biology. What distinguishes habitat fragments is that the intervening gaps are often vegetated, rather than open expanses of ocean. This intervening habitat, referred to as 'the matrix', differs in species composition or age and/or structure of the vegetation so as to be sufficiently distinct from the remnant habitat islands they surround. Matrix habitat is considered less hospitable for remnant-dwelling species, yet terrestrial matrices may not be quite as impermeable as open oceans. This chapter addresses the potential for breeding in altered habitats, such as those found in managed habitat matrices that separate remnant, native forest. Using studies on both Eurasian tits and North American chickadees, analyses investigating breeding in forests of divergent habitat quality are paralleled with proposed management of matrix vegetation as alternative breeding habitat for matrix-tolerating species.

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1070. Habitat restoration across large areas: Assessing wildlife responses in the Clearwater Basin, Idaho.

Svancara, L. K.; Servheen, G.; Melquist, W.; Davis, D.; and Scott, J. M.

Western Journal of Applied Forestry 19(2): 123-132. (2004)

NAL Call #: SD388.W6; ISSN: 0885-6095

Descriptors: modeling/ ecosystem management/ habitat management/ restoration

Abstract: Over the past century, fire suppression and prevention have altered disturbance regimes across the Pacific Northwest, resulting in a significant divergence of historical and current conditions in forested habitats. To address this continuing trend in habitat changes and begin restoring historical patterns of disturbance, the Clearwater Basin Elk Habitat Initiative (CEI) proposes relatively extensive management actions in the Clearwater basin of north-central Idaho. We attempted to evaluate potential effects of such management actions on selected wildlife species using extant data sets and suggest ways to improve such projects with respect to a multispecies and

adaptive management approach. Although there is increased interest in ecosystem management over large areas, the increased scale of analysis and implementation require a substantial increase in the level of species information beyond what currently exists. We conclude that baseline information required for an effective multispecies land-management policy in the Clearwater basin does not exist for many terrestrial wildlife species. To implement a true multispecies or ecosystem approach, wildlife and land managers should cooperate to increase existing population data and modeling efforts for wildlife species in the basin and develop a sustainable monitoring program to evaluate habitat management changes and their influence on wildlife populations within the context of adaptive management theory. Management actions to restore disturbance patterns should attempt spatial and temporal scales that are biologically relevant to the population ecology of species being affected.

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1071. Habitat selection and home range size of ruffed grouse in Rhode Island.

Endrulat, E. G.; McWilliams, S. R.; and Tefft, B. C. *Northeastern Naturalist* 12(4): 411-424. (2005)
NAL Call #: QH105.M2M36; ISSN: 10926194.

Notes: doi: 10.1656/1092-6194(2005)012[0411:HSAHRS]2.0.CO;2.

Descriptors: *Bonasa umbellus*/ *Carya*/ Coniferophyta/ Phasianidae

Abstract: *Bonasa umbellus* (Ruffed Grouse) are one of many wildlife species that require early successional forest and whose populations have declined as New England forests have matured. We studied habitat selection and home range size of Ruffed Grouse in oak-hickory forests in Rhode Island to determine the importance of different habitat types for grouse. Home range size did not significantly differ by age or gender (mean = 103 ± 24.91 ha). Habitat selection was assessed at two spatial scales: home range and study area scale. At the study area scale, grouse selected early successional forest, mixed deciduous-conifer stands, deciduous forest, and forested roads, whereas grouse avoided evergreen forests and developed areas. Given that grouse selected early successional forests at a relatively large spatial scale, we suggest that the conservation and restoration of early successional forested habitats will benefit Ruffed Grouse and many other associated wildlife.

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1072. Habitat selection by Swainson's warblers breeding in loblolly pine plantations in southeastern Louisiana.

Bassett-Touchell, C. A. and Stouffer, P. C. *Journal of Wildlife Management* 70(4): 1013-1019. (2006)
NAL Call #: 410 J827; ISSN: 0022541X.

Notes: doi: 10.2193/0022-541X(2006)70[1013:HSBSWB]2.0.CO;2.

Descriptors: habitat selection/ habitat structure/ *Limnithlypis swainsonii*/ Louisiana/ pine plantations/ *Pinus taeda*/ Swainson's warbler/ thinning/ vegetation characteristics

Abstract: Although Swainson's warbler (*Limnithlypis swainsonii*) is typically associated with bottomland hardwood forests, they also breed in even-age pine (*Pinus* spp.) plantations. We used mist nets and point counts from

1998-2000 to survey intensively managed even-age loblolly pine (*P. taeda*) plantations of different age classes and management histories to determine breeding status and stand structure preferences of Swainson's warbler in southeastern Louisiana, USA. We detected Swainson's warblers in 23 of 124 sampled loblolly pine stands. We also confirmed breeding in 7-24-year-old pine stands. We found Swainson's warblers in pine stands that had well-developed canopy closure, abundant understory vegetation, and sparse live ground cover. Floristic differences between hardwood and pine breeding habitats demonstrate that Swainson's warblers do not require specific vegetation composition, although they discriminate within habitats based on physical structure of vegetation. Although management of Swainson's warblers has generally been directed at bottomland hardwood forests, widespread use of pine plantations may offer additional management opportunities for this species of concern.

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1073. Habitat selection models for eastern wild turkeys in central Mississippi.

Miller, D. A.; Leopold, B. D.; Hurst, G. A.; and Gerard, P. D. *Journal of Wildlife Management* 64(3): 765-776. (2000)
NAL Call #: 410 J827; ISSN: 0022541X

Descriptors: eastern wild turkey/ habitat models/ habitat use/ logistic regression/ *Meleagris gallopavo silvestris*/ Mississippi/ predictive models/ ecological modeling/ gamebird/ habitat selection/ habitat use/ United States/ *Meleagris gallopavo*

Abstract: Few quantitative models of habitat use exist for eastern wild turkey (*Meleagris gallopavo silvestris*). We used logistic regression to build and cross-validate sex- and season-specific multivariate models of habitat selection for wild turkeys in central Mississippi. We examined 4 models: successfully nesting and unsuccessfully nesting females during preincubation, spring males, and summer males. Preincubation females were associated with riparian corridors, perhaps to travel from bottomland areas to upland nesting sites. During preincubation, successfully nesting females were more closely associated with potential nesting habitat than unsuccessfully nesting females. Habitat selection by males during spring corresponded with habitat use of females. During summer, males were nonselective in their habitat choices. Models developed were consistent with and complemented data from previous studies on this area. Our modeling procedure may be useful for other studies of wild turkey habitat selection. We recommend using habitat models in conjunction with habitat use analyses (e.g., use versus availability) to maximize information gained from habitat selection studies. Habitat management for turkeys in a predominantly forested area should include maintenance of riparian corridors and habitat diversity, with a preponderance of mature (>40-yr-old) timber stands, and a 3-4-year burning rotation in mature pine stands.

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1074. Habitat selection of female turkeys in a managed pine landscape in Mississippi.

Miller, D. A. and Conner, L. M. *Journal of Wildlife Management* 71(3): 744-751. (May 2007)
NAL Call #: 410 J827

Descriptors: coniferous forests/ wildlife habitats/ wild birds/ game birds/ turkeys/ forest management/ habitat

preferences/ animal preferences/ estimation/ females/
wildlife management/ Pinus/ autumn/ winter/ agricultural
land/ montane forests/ hardwood forests/ lowland forests/
spring/ summer/ forest roads/ forest thinning/ forest stands/
prescribed burning/ regression analysis/ Mississippi/
Meleagris gallopavo silvestris

Abstract: Intensive pine (*Pinus* spp.) management is a dominant form of forest management in the southeastern United States. Previous research has shown that managed pine forests provide suitable habitat for eastern wild turkeys (*Meleagris gallopavo silvestris*), but little research has examined seasonal habitat selection for female wild turkeys from a landscape perspective, particularly within managed pine landscapes. Therefore, we used a long-term (1986-1993) data set to describe seasonal habitat selection by female wild turkeys, using an information-theoretic approach from a landscape perspective, on an intensively managed pine landscape. Habitat use patterns during preincubation and autumn-winter were indicative of female wild turkeys moving between a bottomland hardwood-agricultural field complex during autumn-winter and upland managed pine stands during the remainder of the year. During spring and summer, female wild turkeys used landscapes primarily composed of intensively managed pine, including thinned and burned stands and roadsides. Our results confirm results of short-term, stand-based habitat analyses on our study area. We recommend variable fire return intervals of 3 to 7 years to improve habitat conditions for wild turkeys within intensively managed pine forests. Further research is needed to examine management actions, such as thinning, prescribed fire, and herbicide use, within the context of wild turkey use of intensively managed pine landscapes. This citation is from AGRICOLA.

1075. Harvest-related edge effects on prey availability and foraging of hooded warblers in a bottomland hardwood forest.

Kilgo, John C.

Condor 107(3): 627-636. (2005)

NAL Call #: QL671.C6; ISSN: 0010-5422

Descriptors: commercial activities/ nutrition/ diet/ feeding behavior/ ecology/ population dynamics/ predators/ terrestrial habitat/ land zones/ Arthropoda: forestry/ strategies/ abundance effects/ avian predator foraging efficiency relations/ forest habitat/ population size/ forestry strategies effects/ avian predator foraging efficiency relations/ avian predators/ *Wilsonia citrina*/ predator foraging efficiency/ forestry strategies effect on prey abundance relations/ forest and woodland/ Hardwood forest habitat/ avian predator foraging efficiency/ South Carolina/ Aiken/ Allendale and Barnwell counties/ abundance/ Aves, Passeriformes, Parulidae/ arthropods/ birds/ chordates/ invertebrates/ vertebrates

Abstract: The effects of harvest-created canopy gaps in bottomland hardwood forests on arthropod abundance and, hence, the foraging ecology of birds are poorly understood. I predicted that arthropod abundance would be high near edges of group-selection harvest gaps and lower in the surrounding forest, and that male Hooded Warblers (*Wilsonia citrina*) foraging near gaps would find more prey per unit time than those foraging in the surrounding forest. In fact, arthropod abundance was greater >100 m from a gap edge than at 0-30 m or 30-100 m from an edge, due to their abundance on switchcane (*Arundinaria gigantea*);

arthropods did not differ in abundance among distances from gaps on oaks (*Quercus* spp.) or red maple (*Acer rubrum*). Similarly, Hooded Warbler foraging attack rates were not higher near gap edges: when foraging for fledglings, attack rate did not differ among distances from gaps, but when foraging for themselves, attack rates actually were lower 0-30 m from gap edges than 30-100 m or >100 m from a gap edge. Foraging attack rate was positively associated with arthropod abundance. Hooded Warblers apparently encountered fewer prey and presumably foraged less efficiently where arthropods were least abundant, i.e., near gaps. That attack rates among birds foraging for fledglings were not affected by distance from gap (and hence arthropod abundance) suggests that prey availability may not be limiting at any location across the forest, despite the depressing effects of gaps on arthropod abundance.

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1076. Harvest retention patches are insufficient as stand analogues of fire residuals for litter-dwelling beetles in northern coniferous forests.

Gandhi, K. J. K.; Spence, J. R.; Langor, D. W.; Morgantini, L. E.; and Cryer, K. J.

Canadian Journal of Forest Research 34: 1319-1329.

(June 2004)

NAL Call #: SD13.C35

Descriptors: conifers/ forest stands/ forest trees/ canopy gaps/ habitat fragmentation/ forest insects/ forest litter/ Coleoptera/ fauna/ species diversity/ logging/ forest fires/ insect ecology/ forest habitats/ refuge habitats/ stand structure/ forest succession/ population size/ conservation practices/ Alberta/ residual size/ residual shape/ plant ecology/ forestry related/ animal ecology and behavior/ natural resources, environment, general ecology, and wildlife conservation

Abstract: We compared litter-dwelling beetle assemblages of <1- to 2-ha unharvested coniferous patches embedded in 1-year-old clearcuts with beetle assemblages from <1- to 10-ha unburned fire residuals within 15- and 37-year-old burned forests. Our primary objective was to determine whether unharvested patches retain biotic elements that are similar to those of the surrounding uncut forests and to those of patches of forest skipped by wildfires. Beetle assemblages of the harvest residuals were similar to those of the uncut forest, suggesting that harvest residuals retain elements of the mature forest. However, beetle assemblages of harvest residuals differed from those of fire residuals. Thus, harvest residuals sited without regard to microhabitat characteristics or stand structure in fire residuals are insufficient analogues for the late successional habitats provided by fire residuals. There was no relationship between size of harvest residuals and either beetle catch or diversity. Beetle catches were higher in round harvest residuals, and a number of forest species also appeared to be aggregated in round residuals. Forest managers may preserve biotic elements of young uncut forest by leaving round harvest residuals in clearcuts; however, a closer habitat match between harvest and fire residuals is likely required to preserve and maintain landscape-level forest biodiversity.

This citation is from AGRICOLA.

1077. Harvesting impacts on selected floral and faunal communities in the Mississippi River batture lands: Pre-treatment measurements.

Lockhart, Brian R.; Thompson, Lynne C.; Tappe, Philip A.; Peitz, David G.; Weih, Robert C.; Guo, Yanfei; Brown, Nicholas R.; Lawson, Edwin R.; and Ku, Timothy T. In: Proceedings of the southern forested wetlands ecology and management conference/ Flynn, Kathryn M. Clemson: Consortium for Research on Southern Forested Wetlands, 1996; pp. 30-35.

Descriptors: commercial activities/ ecology/ terrestrial habitat/ land and freshwater zones/ Carabidae/ Aves: forestry/ practices/ community structure relationship/ community structure/ forestry practices effect/ forest and woodland/ Mississippi/ Issaquena County/ Pittman Island/ influence of forestry practices/ bottomland forest/ Carabidae/ Caraboidea, Adephaga, Coleoptera, Insecta/ arthropods/ birds/ chordates/ coleopterans/ beetles/ insects/ invertebrates/ vertebrates

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1078. Herpetofaunal assemblages in relation to forestry practices on wildlife management areas in northeast Louisiana.

Dixon, Marcie. University of Louisiana at Monroe, 2006.

Notes: Degree: MS; Advisor: Carr, John L.

Descriptors: forestry practices/ bottomland hardwood forests/ wildlife management/ reforestation/ Bayou Lafourche/ Louisiana/ Ouachita Parish

Abstract: Ouachita (OWMA) and Russell Sage Wildlife Management Areas (RSWMA) are state-owned and managed public lands in Ouachita Parish, northeast Louisiana. Both are comprised of bottomland hardwood forest within the Bayou Lafourche floodplain, although OWMA also has extensive areas of reforested agricultural fields. Between the two WMAs, twenty-six 500-meter transects were marked. Visual encounter surveys (VES), and drift fence surveys were conducted along transects, whereas anuran call surveys were conducted at points independent of the transects. Surveys conducted from April 2003 through November 2004 resulted in 40 species at OWMA and 42 species at RSWMA. Both VES and drift fence sampling individually accounted for a little over half (55-68%) of the total species known from each WMA. The two techniques produced very similar indices of overall similarity. Significant differences in diversity were found among treatments at OWMA between the reforested and forested tracts, with the reforested areas having less diversity. At RSWMA there were no significant effects of timber treatment management.

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1079. Herpetofaunal species richness responses to forest landscape structure in Arkansas.

Loehle, Craig; Wigley, T. Bently; Shipman, Paul A.; Fox, Stanley F.; Rutzmoser, Scott; Thill, Ronald E.; and Melchior, M. Anthony

Forest Ecology and Management 209(3): 293-308. (2005)
NAL Call #: SD1.F73; ISSN: 0378-1127

Descriptors: commercial activities/ ecology/ community structure/ terrestrial habitat/ land zones/ Amphibia/ Reptilia: forestry/ management strategies effect on species diversity/ species diversity/ forest habitat characteristics and management strategies relations/ forest and woodland/ habitat characteristics and management strategies/ species

diversity relations/ Arkansas/ Amphibia/ amphibians/ chordates/ reptiles/ vertebrates

Abstract: Species accumulation curves were used to study relationships between herpetofaunal richness and habitat characteristics on four watersheds in Arkansas that differed markedly with respect to management intensity. Selected habitat characteristics were estimated for stands containing the sample points and within buffers with radii of 250, 500 m, and 1 km surrounding the sample points. Richness of all three herpetofaunal groups (amphibians, reptiles, and all herpetofauna) was greater in hardwood forests than in pine or mixed pine-hardwood. For all three groups, the youngest forest age class had the most species. For amphibians and total herpetofauna, richness declined as stand ages increased. Reptiles had the highest richness at sample points with the lowest class of stand basal area (BA), whereas amphibians were richest at points having the highest BA. In contrast to expectations, there was no effect of distance from water on richness of any taxa; however, we may have had incomplete data on the spatial distribution of small ponds outside the sample plots because they were not recorded in the GIS data. Results for distance to roads were ambiguous, but with more separation of compared curves as more plots were sampled, a positive influence of road proximity was suggested. There was a positive effect of buffer age diversity at the 250 m scale for all three herpetofaunal groups, but less so at scales >250 m except for amphibians, which also showed a positive effect at the 1 km scale. The two most intensively managed watersheds had higher species richness than the two less intensively managed watersheds for reptiles, amphibians, and both groups combined. In this study landscape, where urban and agricultural influences were minimal, we did not observe negative impacts of forest management and associated activities, and local habitat heterogeneity created by silviculture often had a positive effect on herpetofaunal species richness. © 2005 Elsevier B.V. All rights reserved.
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1080. Herpetological habitat relations in the Ouachita Mountains, Arkansas.

Crosswhite, D. L.; Fox, S. F.; and Thill, R. E.

In: Ouachita and Ozark Mountains Symposium: Ecosystem Management Research, General Technical Report-SRS 74/ Guldin, J. M.; Asheville, NC: Southern Research Station, Forest Service, U.S. Department of Agriculture, 2004. pp. 273-282.

Descriptors: canopy/ clear felling/ dead wood/ forest litter/ forest management/ forests/ ground cover/ habitats/ mixed forests/ mountain areas/ mountain forests/ rotations/ selective felling/ silvicultural systems/ wild animals/ wildlife conservation/ Amphibia/ Pinus echinata/ Quercus/ reptiles
Abstract: We studied habitat relationships of the herpetofauna inhabiting managed pine-oak woodlands of the Ouachita Mountains, Arkansas. We used drift fence arrays with pitfall and double-ended funnel traps to sample two replications each of three treatments: young clearcuts, selectively harvested stands, and late-rotation untreated controls. Our objectives were to compare herpetofaunal communities among these treatments and to quantify habitat relationships. Ninety-one days of trapping over two field seasons yielded 633 captures representing 35 species. Canonical correspondence analysis indicated that species composition differed significantly among

treatments. The most distinct separation of species groups was between reptiles and amphibians; reptiles were far more abundant in the young, xeric clearcuts, while amphibians were most abundant in the other two treatments. Four habitat parameters (canopy coverage, litter depth, woody plant cover, and large, woody debris) explained much of the variation in species composition among sample sites. Several species showed clear preferences for particular habitats.

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1081. Heterospecific facilitation of forest-boundary crossing by mobbing understory birds in north-central Florida.

Sieving, K. E.; Contreras, T. A.; and Maute, K. L. *Auk* 121(3): 738-751. (2004)

NAL Call #: 413.8 AU4; ISSN: 00048038

Descriptors: Megascops asio/ Florida/ birds/ forest birds/ predation risk/ predation management/ forest habitat

Abstract: Perception of predation risk by animals living in habitat mosaics moderates movement behaviors, potentially influencing the connectivity of landscapes. Perception of risk varies with environmental factors, which opens the possibility of managing connectivity for animals in fragmented landscapes. Observing understory forest birds wintering in north-central Florida, we tested the hypothesis that the presence of the Tufted Titmouse (*Baeolophus bicolor*), a vigilant, socially dominant flocking species, would increase the propensity of multispecies flocks engaged in mobbing to cross forest boundaries and move into open areas. Eastern Screech-Owl (*Megascops asio*) calls were broadcast next to an owl model at sites within continuous oak forest habitats (control) or just outside of forest in either old-field habitats with clustered saplings and shrub cover (shrub treatment) or in early successional habitats (open treatment; 11 trials in each habitat). In both treatments (forest adjacent to open or shrub), models were positioned 15 m from forest boundaries in nonforest habitat. For each individual responding to the playback (i.e. that entered a 30-m radius around the model), we recorded the species and its proximity to the model using three distance classes: within 15 m (at the forest edge), 10 m (out in the open), and 1 m (at the model). Both greater vegetative cover and presence of titmice were significantly correlated with proportion of responding individuals and species that approached and crossed forest boundaries, and the effects were additive. We show experimentally that socially dominant titmice can facilitate forest-boundary crossing by other bird species, which suggests a potential mechanism defining connectivity in fragmented landscapes for wintering forest birds.

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1082. Home range and survival characteristics of male Bachman's sparrows in an old-growth forest managed with breeding season burns.

Cox, James A. and Jones, Clark D.

Journal of Field Ornithology 78(3): 263-269. (2007)

NAL Call #: 413.8 B534; ISSN: 0273-8570

Descriptors: Fringillidae/ Passeriformes/ *Aimophila aestivalis*/ Bachman's sparrow/ longleaf pine/ *Pinus palustris*/ survival/ site fidelity/ prescribed burning/ home range/ Georgia

Abstract: Prescribed burning is essential for maintaining suitable habitat for Bachman's Sparrows (*Aimophila*

aestivalis), but burns conducted during the breeding season may lead to site abandonment and low survival or productivity. We monitored a color-banded population of Bachman's Sparrow in Georgia for four breeding seasons to assess home range size, site fidelity, and survival in an area managed primarily using breeding season burns. Our study area was one of the last remaining tracts of old-growth longleaf pine (*Pinus palustris*), and alternating halves of the tract were burned during the breeding season during each year of our study. Mean home range size for males (N= 46) during the breeding season was 3.1 ha based on 95% fixed kernel analysis and 1.8 ha based on minimum convex polygons. Breeding season burning had no effect on male site fidelity and home range characteristics. The proportion of males remaining on burned areas was similar to the proportion remaining on unburned areas. Shifts in home range centroids pre- and postburn were also similar for males on unburned (median = 49.7 m) and burned (median = 65.6 m) areas. In addition, the size of home ranges that were burned (ha) was similar to that of home ranges that were not burned (ha). Estimated annual survival for males was 0.59. The median shift in annual home range centers calculated for 38 males observed during multiple breeding seasons was 63 m and, coupled with our survival estimates, suggest greater site fidelity than previously reported. These results suggest that breeding season burns were not as detrimental to Bachman's Sparrows as reported at other locations, and such burns may be helpful in maintaining suitable habitat.

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1083. Home range and survival of breeding painted buntings on Sapelo Island, Georgia.

Springborn, E. G. and Meyers, J. M.

Wildlife Society Bulletin 33(4): 1432-1439. (2005)

NAL Call #: SK357.A1W5; ISSN: 00917648

Descriptors: Georgia/ home range/ maritime shrub/ movement/ painted bunting/ *Passerina ciris*/ pine-oak forest/ Sapelo Island/ wetlands

Abstract: The southeastern United States population of the painted bunting (*Passerina ciris*) has decreased approximately 75% from 1966-1996 based on Breeding Bird Survey trends. Partners in Flight guidelines recommend painted bunting conservation as a high priority with a need for management by state and federal agencies. Basic information on home range and survival of breeding painted buntings will provide managers with required habitat types and estimates of land areas necessary to maintain minimum population sizes for this species. We radiotracked after-second-year male and after-hatching-year female buntings on Sapelo Island, Georgia, during the breeding seasons (late April-early August) of 1997 and 1998. We used the animal movement extension in ArcView to determine fixed-kernel home range in an unmanaged maritime shrub and managed 60-80-year-old pine (*Pinus* spp.)-oak (*Quercus* spp.) forest. Using the Kaplan-Meier method, we estimated an adult breeding season survival of 1.00 for males (n = 36) and 0.94 (SE = 0.18) for females (n = 27). Painted bunting home ranges were smaller in unmanaged maritime shrub (female: kernel x = 3.5 ha [95% CI: 2.5-4.5]; male: kernel x = 3.1 ha [95% CI: 2.3-3.9]) compared to those in managed pine-oak forests (female: kernel x = 4.7 ha [95% CI: 2.8-6.6]; male: kernel x = 7.0 ha [95% CI: 4.9-9.1]). Buntings nesting in the managed pine-oak forest flew long distances (≥ 300 m) to

forage in salt marshes, freshwater wetlands, and moist forest clearings. In maritime shrub buntings occupied a compact area and rarely moved long distances. The painted bunting population of Sapelo Island requires conservation of maritime shrub as potential optimum nesting habitat and management of nesting habitat in open-canopy pine-oak sawtimber forests by periodic prescribed fire (every 4-6 years) and timber thinning within a landscape that contains salt marsh or freshwater wetland openings within 700 m of those forests.
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1084. How dead trees sustain live organisms in western forests.

Bunnell, Fred L.; Houde, Isabelle; Johnston, Barb; and Wind, Elke
In: Proceedings of the Symposium on the Ecology and Management of Dead Wood in Western Forests, General Technical Report-PSW 181/ Laudenslayer, W. F.; Shea, P. J.; Valentine, B. E.; Weatherspoon, C. P.; and Lisle, T. E.; Albany, CA: Pacific Southwest Research Station, Forest Service, U.S. Department of Agriculture, 2002. pp. 291-318.
Notes: 0196-2094 (ISSN); Symposium held November 2-4, 1999 in Reno, NV.
<http://www.fs.fed.us/psw/publications/documents/gtr-181/>
Descriptors: conservation measures/ nutrition/ feeding behavior/ reproduction/ reproductive behavior/ ecology/ terrestrial habitat/ land zones/ Vertebrata: habitat management/ dead tree use/ dead wood use/ forest/ foraging/ breeding site/ habitat utilization/ forest and woodland/ North America/ Pacific Northwest/ chordates/ vertebrates
Abstract: Dead wood contributes to biological richness as substrate, cavity sites, foraging sites, and shelter or cover. In the Pacific Northwest, 69 vertebrate species commonly use cavities, 47 species respond positively to down wood, and prevalence of both uses is related to natural fire regimes. Almost 80 percent of nests of weak excavators are in dead trees; strong excavators make greater use of live trees. Most bat roosts are in dead trees, whereas carnivores use mostly declining, living trees. Selection of both cavity and foraging sites is governed by decay patterns. Some species prefer large pieces of down wood. Management implications are discussed.
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1085. How should we spatially distribute dying and dead wood?

Bunnell, Fred L.; Boyland, Mark; and Wind, Elke
In: Proceedings of the Symposium on the Ecology and Management of Dead Wood in Western Forests, General Technical Report-PSW 181/ Laudenslayer, W. F.; Shea, P. J.; Valentine, B. E.; Weatherspoon, C. P.; and Lisle, T. E.; Albany, CA: Pacific Southwest Research Station, Forest Service, U.S. Department of Agriculture, 2002. pp. 739-752.
Notes: 0196-2094 (ISSN); Symposium held November 2-4, 1999 in Reno, NV.
<http://www.fs.fed.us/psw/publications/documents/gtr-181/>
Descriptors: commercial activities/ conservation measures/ ecology/ habitat utilization/ terrestrial habitat/ land zones/ Vertebrata: forestry/ habitat use/ spatial distribution/ dead wood density/ habitat management/ habitat utilization/ habitat preference/ forest and woodland/ North America/ Pacific Northwest/ chordates/ vertebrates

Abstract: We consider density and degree of aggregation of dead wood. Cavity nesters as a group respond asymptotically to snag density and attain half their maximum density at about 2.4 large snags/hectare. However, individual species show different responses, and there is no apparent effect of territoriality among smaller species. Dispersed retention of trees and snags strongly favors secondary cavity nesters and increases their abundance above that found in mature or old-growth forests: large patches favor primary nesters. Despite good operational and biological reasons for patchwise retention of dead wood, there are negative effects on some species.
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1086. Hypothetical response of mixed Douglas-fir tan oak forests to different fire intensity-severity levels: Implications for terrestrial salamanders and their habitats.

Major, Don J. and Edwards, Thomas C.
Northwestern Naturalist 84(2): 105. (2003)
NAL Call #: QL671.M8; ISSN: 1051-1733
Descriptors: Plethodon spp./ forest ecosystems/ fire regimes/ salamanders/ Douglas fir/ tan oak/ Pseudotsuga menzeseii/ Lithocarpus densifloris/ Pacific Northwest region
Abstract: Fire suppression activities in many forested ecosystems have dramatically altered stand structure and ensuing fire regimes of fire-dependent ecosystems. In the Pacific Northwest, the effect of fire suppression on stand structure and composition is likely to be most dramatic in fire-dependent systems characterized by short fire return intervals and mixed severity fire regimes. Prescribed burning has been identified as an effective management strategy to both reduce excessive fuel loadings (short-term) and successfully maintain (long-term) the fire-dependent mixed Douglas-fir (Pseudotsuga menzeseii) tan oak (Lithocarpus densifloris) forests of the Klamath-Siskiyou region. These forests are also the home to two endemic terrestrial salamanders (Plethodon spp.). The direct and indirect effects of natural (wildland fire) and prescribed burning activities on these resident terrestrial salamanders and their habitats remain unknown. We examined the effect of different fire intensity-severity levels on post-fire stand structure and composition in mixed Douglas-fir-tan oak forests with the use of a conceptual model of pre- and post-fire response profiles describing stand and forest floor structure-composition. This information was combined with preliminary observations from our current work and published ecological requirements of these terrestrial salamanders to identify potential fire-mediated changes in important habitat components. Stand-level dynamics resulting from the identified response profiles were explored to provide insights on potential fine- and coarse-scale impacts of fire as well as identify specific knowledge gaps in fire-salamander relationships.
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1087. Identifying habitat linkages for American black bears in North Carolina, USA.

Kindall, Jason L. and Van Manen, Frank T.
Journal of Wildlife Management 71(2): 487-495. (2007)
NAL Call #: 410 J827; ISSN: 0022-541X
Descriptors: Carnivora/ Ursidae/ Ursus americanus/ wildlife management/ habitat linkage/ forests/ ecosystems/ forest cohesion and agriculture edge density/ habitat management/ habitat use/ highway underpass positioning/

home range-territory/ North Carolina/ Washington County, Albemarle-Pamlico Peninsula/ behavior/ conservation/ wildlife management/ land zones

Abstract: Understanding landscape structure and the role of habitat linkages is important to managing wildlife populations in fragmented landscapes. We present a data-based method for identifying local- and regional-scale habitat linkages for American black bears (*Ursus americanus*) on the Albemarle-Pamlico Peninsula of North Carolina, USA. We used weights-of-evidence, a discrete multivariate technique for combining spatial data, to make predictions about bear habitat use from 1,771 telemetry locations on 2 study areas (n = 35 bears). The model included 3 variables measured at a 0.2-km(2) scale: forest cohesion, forest diversity, and forest-agriculture edge density, adequately describing important habitat characteristics for bears on our study area. We used 2 categories of unique habitat conditions to delineate favorable bear habitat, which correctly classified 79.5% of the bear locations in a 10-fold model validation. Forest cohesion and forest-agriculture edge density were the most powerful predictors of black bear habitat use. We used predicted probabilities of bear occurrence from the model to delineate habitat linkages among local and regional areas where bear densities were relatively high. Our models clearly identified 2 of the 3 sites previously recommended for wildlife underpasses on a new, 4-lane highway in the study area. Our approach yielded insights into how landscape metrics can be integrated to identify linkages suitable as habitat and dispersal routes.

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1088. Immediate, landscape-scale impacts of even-aged and uneven-aged forest management on herpetofaunal communities of the Missouri Ozark Forest ecosystem project.

Renken, Rochelle B. and Fantz, Debby K.

In: Proceedings of the Second Missouri Ozark Forest Ecosystem Project Symposium: Post-treatment Results of the Landscape Experiment, General Technical Report-NC 227/ Shifely, S. R. and Kabrick, J. M.; St. Paul, MN: North Central Forest Experiment Station, Forest Service, U.S. Department of Agriculture, 2002. pp. 171-182.

Notes: 0363-616X (ISSN).

Descriptors: conservation measures/ ecology/ terrestrial habitat/ land zones/ Reptilia: habitat management/ forest management/ immediate landscape scale impacts/ community structure/ forest management/ forest and woodland/ Missouri/ Ozarks/ Amphibia/ amphibians/ chordates/ reptiles/ vertebrates

Abstract: We examined the immediate, landscape-scale impacts of even-aged and uneven-aged forest management on the species composition, species richness, and relative abundance of herpetofaunal communities and selected focal groups of species during the second and third years following initial tree harvest on Missouri Ozark Forest ' Ecosystem Project (MOFEP) sites in southern Missouri. We compared these measures of the pre-treatment (1992-1995) community to measures of the 1998 and 1999 post-treatment communities. We did not observe changes in species composition, species richness, and overall amphibian and reptile relative abundance in 1998 or 1999 because of the first-entry harvest within sites. Landscape-scale impacts also were not observed in the relative abundances of woodland salamanders (*Plethodon*

spp.) and a group of small snakes (prairie ring-necked snake (*Diaolphis punctatus arnyi*), northern red-bellied snake (*Storeria occipitomaculata occipitomaculata*), and western smooth earthsnake (*Virginia valeriae elegans*)). We did observe a landscape-scale effect on pond-breeding salamanders (*Ambystoma* spp.) and skinks (*Eumeces* spp.). Even-aged and uneven-aged forest management appeared to dampen a natural oscillation in *Ambystoma* relative abundance estimates on southwest-facing slopes and resulted in an increase in *Eumeces* relative abundance on northeast-facing slopes in 1998. Potential mechanisms for these observed impacts and future analysis plans are discussed.

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1089. Impact of forest type and management strategy on avian densities in the Mississippi Alluvial Valley, USA.

Twedt, D. J.; Wilson, R. R.; Henne-Kerr, J. L.; and Hamilton, R. B.

Forest Ecology and Management 123(2-3): 261-274. (1999) NAL Call #: SD1.F73; ISSN: 0378-1127

Descriptors: agro-forestry/ avian density/ bottomland hardwood forests/ cottonwood plantations/ forest birds/ forest management effects/ silviculture/ avifauna/ density/ forest management/ species richness/ United States/ *Geothlypis trichas*/ *Hylochichla mustelina*/ *Icteria virens*/ *Passerina cyanea*/ *Populus deltoides*/ *Vireo griseus*

Abstract: Avian territory densities were determined from 20 Breeding Bird Censuses in mature (>30 years) bottomland hardwood stands and 18 Breeding Bird Censuses in young (6-9 years old) cottonwood (*Populus deltoides*) plantations in the Mississippi Alluvial Valley. Avian species richness, diversity, and territory density were greater ($p < 0.01$) in bottomland hardwood stands than in intensively-managed cottonwood stands but these parameters were not impacted by selective timber harvest within bottomland hardwood stands nor by method of regeneration within cottonwood plantations ($p > 0.05$). Even so, detrended correspondence analysis based on avian territory densities readily segregated forest types and silvicultural treatments. Timber harvest within bottomland hardwood stands resulted in a shift in bird communities toward those found in cottonwood stands by increasing the densities of early-successional species such as Indigo Bunting (*Passerina cyanea*), Yellow-breasted Chat (*Icteria virens*), and Common Yellowthroat (*Geothlypis trichas*). Conversely, regenerating cottonwood stands from root sprouts; rather than planting stem cuttings, resulted in a shift in bird communities toward those found in bottomland hardwood stands by increasing densities of species such as White-eyed Vireo (*Vireo griseus*) and Wood Thrush (*Hylochichla mustelina*). Tree species diversity, angular canopy cover, and midstory density were positively associated with bird species assemblages in bottomland hardwood stands, whereas vegetation density at ground level was positively associated with bird communities in cottonwood plantations. Conversion of agricultural fields to short-rotation cottonwood plantations results in increased breeding bird populations by adding up to 140 additional territories 40 ha^{-1} . Even so, relative conservation values, derived from indicator species analysis and Partners in Flight concern scores, suggest that mature bottomland hardwood forests are twice as 'valuable' for bird conservation as are cottonwood plantations.

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1090. The impact of the timing of brush management on the nutritional value of woody browse for moose, *Alces alces*.

Rea, Roy V. and Gillingham, Michael P.

Journal of Applied Ecology 38(4): 710-719. (2001)

NAL Call #: 410 J828; ISSN: 0021-8901

Descriptors: commercial activities/ nutrition/ diet/ land and freshwater zones/ Canada/ *Alces alces* (Cervidae): forestry/ brush management timing/ food plants/ *Salix scouleriana* (Scouler's willow)/ woody browse/ nutritional value/ British Columbia/ Vanderhoof/ Cervidae/ Artiodactyla, Mammalia/ chordates/ mammals/ vertebrates

Abstract: 1. We examined how the removal of above-ground biomass (mechanical brushing) at different times of the year affected the nutritional value of regenerating shoots of Scouler's willow *Salix scouleriana* for moose for two winters after brushing. 2. Brushing trials were conducted throughout the 1996 and 1997 growing seasons in central British Columbia on a 10-year-old regenerating clear-cut replanted in lodgepole pine *Pinus contorta* var. *latifolia*. 3. We assessed the nutritional value of the browse in relation to length, diameter, mass, digestible energy, digestible protein, tannin and lignin content of current annual growth shoots in winter, as well as the phenology of plant leafing. 4. One winter after brushing, willows brushed in early July had shoots that were lower in lignin, higher in digestible protein and lower or not different in tannin content compared with shoots from earlier brushed or unbrushed willows. Willows brushed in early July also had long, heavy, shoots that were high in digestible energy and delayed leaf senescence. 5. In the second winter after brushing, willows that were brushed in July had larger shoots that were lower in digestible energy, digestible protein, tannin and lignin content and delayed leaf senescence compared with several other treatments. Willows brushed after July regenerated negligible shoot material in the first year after brushing. Willows brushed in September delayed leaf flush in the first post-brushing spring. 6. To increase the nutritional value of woody browse for cervids, we suggest that brushing should be performed in early to mid-July (mid-summer). 7. Reductions in browse quality and quantity may negatively affect many mammalian species. Therefore, we recommend that the needs of other fauna potentially affected by changes in shrub architecture, shoot morphology and shoot chemistry be considered when planning the timing of brush management activities.

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1091. Impact of timber harvest on species accumulation curves for oak herbivore communities of the Missouri Ozarks.

Marquis, Robert J.; Forkner, Rebecca; Lill, John T.; and Le Corff, Josiane

In: Proceedings of the Second Missouri Ozark Forest Ecosystem Project Symposium: Post-treatment Results of the Landscape Experiment, General Technical Report-NC 227/ Shifely, S. R. and Kabrick, J. M.; St. Paul, MN: North Central Forest Experiment Station, Forest Service, U.S. Department of Agriculture, 2002. pp. 183-195.

Notes: 0363-616X (ISSN).

Descriptors: conservation measures/ nutrition/ diet/ parasites diseases and disorders/ hosts/ ecology/ community structure/ land zones/ Insecta: habitat management/ forest management/ timber harvest methods/ oak herbivore diversity/ food plants/ *Quercus alba*/ *Quercus*

velutina/ herbivore diversity/ plant hosts/ species diversity/ Missouri/ Ozarks/ Insecta/ arthropods/ insects/ invertebrates

Abstract: We report the effects of two timber harvest methods, even-aged and uneven-aged harvest, versus no harvest on species accumulation curves for leaf-chewing herbivores of *Quercus alba* and *Q. velutina* in the Missouri Ozarks. The study was part of a larger project, the Missouri Ozark Forest Ecosystem Project (MOFEP). Herbivores were sampled four times during the year (early May, June, July, and late August) for each of 4 years after cutting. Species accumulation curves were generated by plotting the total number of species recorded per leaf area sampled in all stands (N=6 stands/site) within a site in May 1997, the first census of the first year following cutting, and then adding the number of new species encountered in each subsequent census through the end of 2000. Treatment effects first became apparent in 1998. Uneven-aged management tended to reduce the rate of species accumulation across years for *Q. alba* compared to no harvest (control) and even-aged management, although marginally so. In contrast, even-aged management significantly increased the rate of species accumulation on *Q. velutina* compared to no harvest, with uneven-aged curves lower than no harvest. The May and June censuses contributed most to the treatment effect for *Q. alba* and *Q. velutina*, respectively. We interpret these results to mean that the treatments either increased or decreased population size relative to controls, thus resulting in an increased or decreased probability, respectively, of sampling a species. Species accumulation curves were lower for younger forests, suggesting that continued cutting, regardless of harvesting method, will reduce species richness of this herbivore fauna.

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1092. Impacts of alternative timber harvest practices on leaf-chewing herbivores of oak.

Forkner, Rebecca E.; Marquis, Robert J.; Lill, John T.; and Le Corff, Josiane

Conservation Biology 20(2): 429-440. (2006)

NAL Call #: QH75.A1C5; ISSN: 0888-8892

Descriptors: commercial activities/ conservation measures/ nutrition/ diet/ ecology/ population dynamics/ terrestrial habitat/ land zones/ Lepidoptera: forestry/ alternative timber harvest practices/ leaf chewing communities/ oak forests/ habitat management/ food plants/ *Quercus alba*/ *Quercus velutina*/ community structure/ population density/ forest and woodland/ Missouri/ Ozark Forest/ Insecta/ arthropods/ insects/ invertebrates/ lepidopterans

Abstract: Studies of the effects of logging on Lepidoptera rarely address landscape-level effects or effects on larval, leaf-feeding stages. We examined the impacts of uneven-aged and even-aged logging on the abundance, richness, and community structure of leaf-chewing insects of white (*Quercus alba* L.) and black (*Q. velutina* L.) oak trees remaining in unharvested areas by sampling 3 years before and 7 years after harvest. After harvest, white oaks in uneven-aged sites had 32% fewer species of leaf-chewing insects than control sites. This reduction in species richness may have resulted from changes in microclimate (reducing plant quality and/or changing leaf phenology) that affected a much larger total area of each site than did even-aged cuts. For black oak after harvest, species richness in uneven- and even-aged sites increased relative to levels before harvest. Harvesting did not alter total insect density

or community structure in the unlogged habitat for either oak species with one exception: insect density on black oak increased in the oldest forest block. Community structure of herbivores of black and white oaks in clearcut gaps differed from that of oaks in intact areas of even-aged sites. Furthermore, both richness and total insect density of black oaks were reduced in clearcut gaps. We suggest that low-level harvests alter herbivore species richness at the landscape level. Treatment effects were subtle because we sampled untreated areas of logged landscapes, only one harvest had occurred, and large temporal and spatial variation in abundance and richness existed. Although the effects of logging were greater in uneven-aged sites, the effects of even-aged management are likely to increase as harvesting continues.

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1093. Impacts of land management practices on a population of nine-banded armadillos in northern Florida.

McDonough, C. M. and Loughry, W. J.
Wildlife Society Bulletin 33(4): 1198-1209. (2005)

NAL Call #: SK357.A1W5; ISSN: 00917648

Descriptors: armadillo/ *Dasypos novemcinctus*/ fire/ Florida/ hardwood removal

Abstract: Over a 12-year period (1992-2003), we examined the impact of prescribed burning and hardwood removal on a population of nine-banded armadillos (*Dasypos novemcinctus*) located at Tall Timbers Research Station just north of Tallahassee, Florida. Although these armadillos are often found in close proximity to humans, there currently are no data on how they are affected by human impacts on the environment. Responses to annual burns between 1992-1997 indicated that in some years armadillos, particularly adults, avoided areas that had been burned, but effects were inconsistent and relatively weak. In contrast, hardwood removal during 1998-2000 coincided with a significant decline in population numbers that continued through 2003. However, interpretation of hardwood removal effects was complicated by the occurrence of a severe drought during the same time period. Comparisons between animals in logged and unlogged parts of the study area during the period of hardwood removal revealed few differences, suggesting drought was an important influence. However, because our population continued to decline after the drought ended, it seems likely that hardwood removal generated more persistent effects that were temporarily masked by the drought. We observed armadillos frequently in logged areas, probably because few other habitat choices were available. Armadillos weighed less during and after hardwood removal than prior to it. Although adult reproductive behavior appeared largely unaffected by logging, numbers of juveniles captured and recruited declined significantly with the onset of hardwood removal. There was no evidence that the disturbance from logging caused increases in distances moved by animals that remained in the study area. Our results may have broader implications for predicting how armadillo populations in Latin America will be affected by similar land management practices.

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1094. Implementing the expanded prescribed fire program on the Gila National Forest, New Mexico: Implications for snag management.

Boucher, Paul F.; Block, William M.; Benavidez, Gary V.; and Wiebe, L. E.

NMOS Bulletin 29(2): 25-26. (2001).

Notes: Published by the New Mexico Ornithological Society.

Descriptors: birds/ ecosystems/ snags/ habitat management/ forests, coniferous/ ponderosa pine/ fires-burns/ wildlife-habitat relationships/ habitat use/ *Pinus ponderosa*/ *Pinus* spp./ New Mexico/ Gila National Forest
Abstract: Efforts to return natural fire to the Gila National Forest, New Mexico, have resulted in controversy regarding management of snags (standing dead trees). The importance of snags for wildlife, especially cavity-dependent birds, is well documented. Although general uses of snags by birds are known (nesting, roosting, perching, and foraging), the authors know little about the optimum number of snags that would persist under a natural fire regime. Recently, efforts were initiated to understand relationships among snags, birds, and fire in fire-adapted ponderosa pine forests of the southwestern United States. Preliminary results suggest that fire exclusion has resulted in large numbers of old snags (dead \geq six years), but few recent snags (dead $<$ six years). In contrast, fewer old snags but more recent snags were found on areas experiencing a recent fire. Understanding snag dynamics under conditions that emulate natural fire regimes is key to understanding the ramifications of management efforts. For example, snags may need to be removed in order to hold a prescribed fire within the maximum manageable area. Although some existing snags are lost, replacement snags are created as a result of the fire. Information that details the range of variation of snag dynamics follow natural fire events may help guide key management decisions made during the fire and satisfy ecological and safety concerns.

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1095. Importance of coarse woody debris to avian communities in loblolly pine forests.

Lohr, S. M.; Gauthreaux, S. A.; and Kilgo, J. C.

Conservation Biology 16(3): 767-777. (2002)

NAL Call #: QH75.A1C5; ISSN: 08888892.

Notes: doi: 10.1046/j.1523-1739.2002.01019.x.

Descriptors: avifauna/ coarse woody debris/ community composition/ habitat management/ habitat use/ nesting/ snag/ Aves/ Galliformes/ *Melanerpes*/ *Melanerpes erythrocephalus*/ *Myiarchus*/ *Myiarchus crinitus*/ *Picidae*/ *Pinus taeda*/ *Pipilo*/ *Pipilo erythrophthalmus*/ *Thryothorus*/ *Thryothorus ludovicianus*/ *Troglodytes troglodytes*
Abstract: To investigate the importance of standing (snags) and down coarse woody debris (DCWD) to bird communities in loblolly pine (*Pinus taeda*) forests, we compared breeding (1997-1999) and nonbreeding (1997-1998, 1998-1999) responses of birds among two coarse woody debris (CWD) removal and control treatments. In each of four blocks, we established four experimental units: (1) DCWD removed, (2) snags and DCWD removed, and (3) and (4) unmodified control plots. We quantified vegetation layers to determine their effects on the experimental outcome. Total breeding bird abundance, abundance of resident species, breeding bird diversity, breeding species richness, and abundance of Great

Crested Flycatchers (*Myiarchus crinitus*) were reduced by the removal of DCWD and snags. Total woodpecker and Carolina Wren (*Thryothorus ludovicianus*) breeding territories were reduced by snag removal. Weak excavating and secondary cavity-nesting species, Neotropical migrants, and Eastern Towhees (*Pipilo erythrophthalmus*) had fewer breeding territories on plots where DCWD was removed. Red-headed Woodpeckers (*Melanerpes erythrocephalus*) and midstory and canopy-nesting species were at lowest densities on plots where all CWD had been removed. The CWD removal had no effect on the nonbreeding bird community. Most breeding and nonbreeding species used habitats with sparse midstory and well-developed understory, whereas sparse canopy cover and dense midstory were important to some nonbreeding species. Snag and DCWD retention, and practices that maintain a dense understory and sparse midstory and canopy, will create favorable breeding habitat for many bird species of loblolly pine forests.

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1096. Importance of early successional habitat to ruffed grouse and American woodcock.

Dessecker, D. R. and McAuley, D. G.

Wildlife Society Bulletin 29(2): 456-465. (2001)

NAL Call #: SK357.A1W5; ISSN: 00917648

Descriptors: American woodcock/ aspen/ Bonasa umbellus/ early successional habitat/ even-age management/ Ruffed grouse/ *Scolopax minor*/ abundance/ forest management/ gamebird/ population decline/ United States/ Bonasa umbellus/ *Scolopax minor*

Abstract: Ruffed grouse (*Bonasa umbellus*) and American woodcock (*Scolopax minor*) provide of days of recreation each year for people in the eastern United States (U.S). These popular game birds depend on early successional forest habitats throughout much of the year. Ruffed grouse and woodcock populations are declining in the eastern United States as an abundance of shrub-dominated and young forest habitats decrease in most of the region. Continued decreases in early successional forest habitats are likely on nonindustrial private forest lands as ownership fragmentation increases and tract size decreases and on public forest lands due to societal attitudes toward proactive forest management, especially even-age treatments.

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1097. Importance of patch scale vs. landscape scale on selected forest birds.

Lee, M.; Fahrig, L.; Freemark, K.; and Currie, D. J.

Oikos 96(1): 110-118. (2002)

NAL Call #: 410 OI4; ISSN: 0030-1299

Descriptors: Aves/ abundance/ birds/ data analysis/ dispersion/ field technique/ forest/ habitat management/ Ontario/ Canada

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1098. Increasing canopy heterogeneity to create structural and biological complexity in young, managed forests.

Wilson, Todd M.

Northwestern Naturalist 87(2): 193. (2006)

NAL Call #: QL671.M8; ISSN: 1051-1733.

Notes: Conference: 2006 Annual Meetings of the Society for Northwestern Vertebrate Biology and the Washington Chapter of the Wildlife Society, held jointly at Evergreen

State College, Washington, March 27-April 1, 2006.

Descriptors: forest management/ birds/ invertebrates/ mammals/ wildlife/ habitat management/ monitoring/ forest canopy/ thinning/ Pacific Northwest

Abstract: Young, simplified forests currently dominate much of the managed landscape in the Pacific Northwest. Increasing canopy heterogeneity through variable-density thinning (VDT) has been suggested as one way to help stimulate key ecological processes in these forests that, over time, can lead to structurally and biologically complex forests that provide habitat for a wide range of organisms, including old growth associated species like northern spotted owls (*Strix occidentalis caurina*). Two large-scale experimental studies, The Forest Ecosystem Study in the Puget Trough and the Olympic Habitat Development Study on the Olympic Peninsula, were initiated in the early 1990s to test this hypothesis. Treatment effects were measured by monitoring key biotic communities in 51 stands, including arboreal rodents (squirrels and chipmunks), forest-floor small mammals (mice, voles, and shrews), resident and neotropical birds, terrestrial amphibians, mycorrhizal fungi, litter invertebrates, and under-, mid-, and over-story vegetation. Overall results to date suggest that 1) VDT had positive or neutral effects for most (but not all) organisms two to 11 y post-thinning, 2) prior management history had a major influence on treatment effects and stand trajectories, 3) future success in accelerating complexity may depend on managing for site-specific issues such as laminated root rot and competitive exclusion by clonal natives, and 4) VDT appears promising as part of a suite of new eco-silviculture tools to create healthy forests that provide sustainable habitats for a wide range of plant and wildlife communities, including threatened and endangered species.

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1099. Influence of a granivorous diversionary food on population dynamics of montane voles (*Microtus montanus*), deer mice (*Peromyscus maniculatus*), and western harvest mice (*Reithrodontomys megalotis*).

Sullivan, T. P. and Sullivan, D. S.

Crop Protection 23(3): 191-200. (2004); ISSN: 02612194.

Notes: doi: 10.1016/j.cropro.2003.08.005.

Descriptors: deer mice/ diversionary food/ feeding damage/ *Microtus*/ *Peromyscus maniculatus*/ population dynamics/ *Reithrodontomys megalotis*/ Sunflower seed/ voles/ Western harvest mice/ food supplementation/ forest/ pest control/ pest damage/ population dynamics/ rodent/ British Columbia/ Canada/ North America/ summerland/ *Microtus montanus*/ *Peromyscus maniculatus*/ *Pinus contorta*/ *Reithrodontomys megalotis*

Abstract: Feeding damage to forest and agricultural crops by voles of the genera *Microtus* and *Clethrionomys* occurs periodically in temperate and boreal ecosystems. Application of diversionary food is an alternative management practice that does not rely on a reduction in the target population. This study tested two hypotheses that a granivorous diversionary food, sunflower seeds, would (1) reduce feeding damage to tree seedlings by montane voles (*Microtus montanus*) without enhancing abundance or other population attributes and (2) enhance population dynamics of non-target deer mice (*Peromyscus maniculatus*) and western harvest mice (*Reithrodontomys megalotis*) in old field habitats at Summerland, British Columbia, Canada in 1993-1995. Small mammal populations were intensively

live-trapped on replicate control and food sites pre- and post-treatment in two (A and B) experiments (food application rates of 68.1 and 113.5kg/ha). Mean abundance and recruitment of voles/ha were similar between control and treatment sites. Mean abundance and recruitment of deer mice was higher on treatment than control sites in Experiment B but not in A. Mean abundance and recruitment of western harvest mice was similar between control and treatment sites. Overall survival (28-day), early juvenile survival, and body mass showed no patterns for any of the species when comparing control and treatment sites. This granivorous diversionary food did not reduce feeding damage by voles to lodgepole pine (*Pinus contorta*) seedlings. The supply of sunflower seed was likely insufficient to divert voles from feeding on trees through the overwinter (5-6 months) period. The predicted increase in numbers of deer mice and western harvest mice appeared only as brief pulses of animals, and hence may not have increased the intensity of competition with voles.
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1100. Influence of conventional and chemical thinning on stand structure and diversity of plant and mammal communities in young lodgepole pine forest.

Sullivan, T. P.; Sullivan, D. S.; Lindgren, P. M. F.; and Boateng, J. O.
Forest Ecology and Management 170(1-3): 173-187. (2002)
NAL Call #: SD1.F73; ISSN: 03781127.

Notes: doi: 10.1016/S0378-1127(01)00775-7.

Descriptors: glyphosate herbicide/ lodgepole pine/ pre-commercial thinning/ small mammal communities/ species diversity/ stand structure/ understory vegetation/ biodiversity/ ecosystems/ plants (botany)/ vegetation/ silviculture practices/ forestry/ habitat use/ herbivore/ mammal/ silviculture/ stand structure/ thinning/ understory/ Canada/ *Alces alces*/ *Cervidae*/ *Lepus*/ *Lepus americanus*/ *Mammalia*/ *Odocoileus*/ *Odocoileus hemionus*/ *Pinus contorta*

Abstract: Silvicultural practices that provide a wide variety of vegetative composition and structure (habitats) in young stands should help manage for biological diversity across forested landscapes. This study was designed to test the hypotheses that: (i) abundance and diversity of stand structure attributes (species diversity and structural diversity of herb, shrub and tree layers) and forest floor small mammal communities, and (ii) relative habitat use by large herbivores, will increase from unthinned to conventionally thinned to chemically thinned stands of young lodgepole pine (*Pinus contorta*) forest. Replicate study areas were located near Summerland, Kelowna and Williams Lake in south-central British Columbia, Canada. Each study area had three treatments: a conventionally thinned, a chemically thinned and an unthinned stand. Pre-commercial thinning was conducted in 1993. Coniferous stand structure and understory vegetation were measured prior to thinning in 1993 and 5 years later in 1998. Small mammal populations were sampled intensively from 1993 to 1998. Relative habitat use by large herbivores was sampled in 1998. Our results indicate that chemical thinning of young lodgepole pine stands produced an aggregated pattern of crop trees compared with stands subjected to conventional thinning. Diameter growth of crop trees in the chemically thinned stands was similar to that in the conventionally thinned, but also to that in unthinned stands. Although horizontal stratification

(aggregates of trees) was enhanced, vertical stratification (structural diversity of vegetation) was less in the chemically than conventionally thinned stands. Abundance and diversity of understory vegetation and small mammal communities were generally unaffected by stand thinning in these particular installations. Relative habitat use by mule deer (*Odocoileus hemionus*) occurred in a gradient from highest in the conventionally thinned stand to lowest in the unthinned stand. Habitat use by snowshoe hares (*Lepus americanus*) tended to have the opposite trend. Moose (*Alces alces*) exhibited no difference in habitat use among stands. Thus, although there were few differences among treatment stands, chemical thinning could be used to develop an aggregated pattern of crop trees in pre-commercially thinned stands to maintain habitat for herbivores such as snowshoe hares and mule deer. Understory plant and forest floor small mammal communities would be maintained in these stands as well.
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1101. Influence of habitat characteristics on detected site occupancy of the New Mexico endemic Sacramento Mountains salamander, *Aneides hardii*.

Haan, S. S.; Desmond, M. J.; Gould, W. R.; and Ward, J. P.
Journal of Herpetology 41(1): 1-8. (2007)
NAL Call #: QL640.J6; ISSN: 00221511.

Notes: doi: 10.1670/0022-1511(2007) 41

[1:IOHCOD]2.0.CO;2.

Descriptors: salamanders/ *Aneides hardii*/ canopy cover/ forest management/ amphibians/ wildlife habitat/ New Mexico

Abstract: The Sacramento Mountains Salamander (*Aneides hardii*) is a state-listed threatened species endemic to three mountain ranges in south-central New Mexico. Information about the ecological requirements of this species is inadequate for managers to make informed conservation decisions, yet changes in management practices are needed throughout the species range because of poor forest health. During summer 2004, we examined patterns of *A. hardii* distribution in relation to several abiotic and biotic parameters on 36 plots, each of which was 9.6-ha in area and located in mixed conifer forest. We evaluated 18 a priori logistic regression models using Akaike's Information Criterion corrected for small-sample bias (AIC_c). The model with the highest ranking (lowest AIC_c value) included soil moisture and soil temperature, and the second highest ranked model ($\Delta AIC_c = 0.05$) included only soil temperature. Soil temperature was lower, and soil moisture was higher on plots where salamanders were detected. The relative importance of canopy cover and log volume was low in this study likely because the study plots, all of which had sufficient canopy cover and log volume, had similar disturbance history. We recommend managers focus on practices that ensure salamander microhabitats remain cool and moist in conservation areas. © 2007 Society for the Study of Amphibians and Reptiles.

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1102. The influence of local habitat and landscape composition on cavity-nesting birds in a forested mosaic.

Warren, T. L.; Betts, M. G.; Diamond, A. W.; and Forbes, G. J.

Forest Ecology and Management 214(1-3): 331-343. (2005)
NAL Call #: SD1.F73; ISSN: 03781127.

Notes: doi: 10.1016/j.foreco.2005.04.017.

Descriptors: cavity-nesting birds/ chickadee/ forest management/ landscape composition/ woodpecker/ biodiversity/ composition/ ecosystems/ landforms/ vegetation/ cavity-nesting/ landscapes/ sapsuckers/ woodpeckers/ forestry/ forest management/ habitat structure/ habitat use/ home range/ landscape structure/ nest site/ biodiversity/ birds/ ecosystems/ forestry/ formulations/ plants/ Aves/ Colaptes auratus/ Paridae/ Picoides pubescens/ Picoides villosus/ Sitta canadensis/ Sphyrapicus varius

Abstract: Forest management influences both stand and landscape structure. While research exists on stand-scale habitat relationships for cavity-nesting birds, there are few studies at the landscape scale. In a managed forest, we characterized the influence of local vegetation on the occurrence of cavity-nesting bird species and determined whether landscape scale variables explained any of the remaining variation. We selected three spatial extents for investigation based on the species' natural history: (1) local (100 m radius); (2) meso-scale (300 m radius); (3) macro-landscape (1000 m radius). Variables at the larger scales generally explained little of the species occurrence once we controlled for local factors. The occurrence of boreal chickadees, red-breasted nuthatches, hairy woodpeckers, and yellow-bellied sapsuckers was explained by variables solely at the local scale. Two species most commonly associated with younger stands, northern flicker and downy woodpecker, were influenced by variables at both the meso-scale and macro-landscape scales, although the amount of variance explained by the greater of these extents was small. We speculate that the comparatively strong influence of meso-scale variables may be due to the larger home range size of these two species. Sites that are appropriate at the stand level could remain unoccupied if the area of suitable habitat is not extensive enough to contain an entire home range.

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1103. Influence of long-term dormant-season burning and fire exclusion on ground-dwelling arthropod populations in longleaf pine flatwoods ecosystems.

Hanula, J. L. and Wade, D. D.

Forest Ecology and Management 175(1-3): 163-184. (2003)
NAL Call #: SD1.F73; ISSN: 03781127

Descriptors: arthropods/ fire/ insects/ Pinus palustris/ prescribed-burning/ biodiversity/ biomass/ ecosystems/ fires/ Shannon diversity/ forestry/ abundance/ arthropod/ burning/ exclusion experiment/ forest ecosystem/ species diversity/ wildlife management/ biomass/ ecosystems/ forest fires/ forestry/ United States/ Pinus palustris

Abstract: Frequent dormant-season prescribed burns were applied at 1-, 2- and 4-year intervals to longleaf pine stands, *Pinus palustris*, for over 40 years on the Osceola National Forest in Baker County, Florida. Control plots were unburned for the same period of time. Pitfall traps were operated from November 1994 to October 1999 to measure the short- and long-term effects of prescribed burning

frequency on the relative abundance and diversity of ground-dwelling macroarthropods. We also measured dead and live plant biomass to determine how long-term frequent fires affected the structure of the forest floor. The average total dead plus live plant biomass was significantly higher on plots where fire had been excluded. Annual and biennial burning resulted in about the same amount of total plant biomass (dead and live plant material combined) which was significantly less than the quadrennially burned plots. Shannon diversity (H') and evenness of ground-dwelling arthropods were reduced by burning. Annually burned plots had the lowest diversity and evenness while biennially and quadrennially burned plots also were significantly lower than unburned control plots. Dormant-season burning did not increase the number of rare genera regardless of frequency. Percent similarity of arthropod communities was highest for comparisons between plots that had been burned (60-68%) and lowest for the comparison of annually burned plots to unburned controls (37%). Examination of diversity and similarity through time showed that changes were due to short-term effects caused by the application of fire and not long-term changes in the ground-dwelling arthropod community. Burning significantly reduced the numbers of predators regardless of fire frequency and resulted in an increased number of detritivores. A total of 42 genera were reduced by prescribed burning; 32 genera were captured in greater numbers on annually burned plots, and 11 genera had higher numbers in one or both of the intermediate burn frequencies (biennial or quadrennial). Twenty-six genera were captured in equal numbers on quadrennially and annually burned plots, but in significantly lower numbers than on unburned plots, demonstrating that 4 years was insufficient time for their populations to recover from mild dormant-season fires. Arthropod response to burning appeared to be species specific so attempts to generalize how arthropods will respond based on a few species or groups should be avoided. The slow recovery rate of so many species suggests that management oriented toward conservation of biodiversity in longleaf pine flatwoods should include areas of fire exclusion.

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1104. Influence of precommercial thinning on snowshoe hares.

Bull, E. L.; Heater, T. W.; Clark, A. A.; Shepherd, J. F.; and Blumton, A. K.

Portland, OR: Pacific Northwest Research Station, Forest Service, U.S. Department of Agriculture; Research Paper-PNW 562, 2005. 16 p.

Notes: 05025001 (ISSN).

Descriptors: fuel reduction/ *Lepus americanus*/ Oregon, northeastern/ snowshoe hare/ thinning/ habitat use/ home range/ lagomorph/ relative abundance/ survival/ thinning/ *Lepus*/ *Lepus americanus*/ *Pinus contorta*

Abstract: Relative abundance, survival, home range, and habitat use of snowshoe hares (*Lepus americanus*) were evaluated in five precommercial thinning treatments in lodgepole pine (*Pinus contorta* Dougl. ex Loud.) stands in northeastern Oregon between June 2000 and July 2003. A combination of track surveys, trapping grids, and radiocollared hares was used to evaluate these characteristics. Relative abundance of snowshoe hare tracks was highest in unthinned control stands and lowest in the recently thinned stands. The highest abundance of snowshoe hares in trapping grids occurred in patch cuts

(10-m-wide cuts interspersed with unthinned patches 10 to 30 m wide). Hare home ranges were smallest in the patch cuts. Habitat use changed seasonally, with hares using denser stands during summer and more open stands in winter. In the short term, the patch cut appeared to provide the best hare habitat of the treatments investigated.

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1105. Influence of prescribed fire on carabid beetle (Carabidae) and spider (Araneae) assemblages in forest litter in southwestern Oregon.

Niwa, C. G. and Peck, R. W.

Environmental Entomology 31(5): 785-796. (2002)

NAL Call #: QL461.E532; ISSN: 0046225X

Descriptors: Carabidae/ forest litter arthropods/ Oregon/ pitfall traps/ prescribed fire/ spiders/ abundance/ beetle/ forest floor/ litter/ pitfall trap/ prescribed burning/ United States/ Araneae/ Carabidae/ Coleoptera/ Omus cazieri/ Pterostichus herculeanus/ Pterostichus setosus/ Scaphinotus rugiceps/ Zacotus matthewsii

Abstract: The objective of this study was to determine if prescribed fire affects spider (Araneae) and carabid beetle (Carabidae) abundance, and whether the magnitude of this effect varies with time since fire. Within mixed conifer stands, nine understory fuels-reduction burns, ranging from <1 to 15 yr old, were compared with adjacent unburned sites. Pitfall traps were used to compare macroarthropod abundance over 5 too. In total, 3,441 spiders in 24 families and >120 species, and 14,793 carabid beetles from 17 Species, were identified from the samples. Seven spider families and five species of carabid beetles were abundant enough to be analyzed statistically. Four spider families were more abundant in unburned sites (Antrodiaetidae, Cybaeidae, Thomisidae and Linyphiidae) while three families were more numerous in burned sites (Lycosidae, Gnaphosidae and Dictynidae). Four of five carabid beetle species were more abundant in unburned sites [Pterostichus herculeanus Mannerheim, P. setosus Hatch, Scaphinotus rugiceps rugiceps (Horn) and Zacotus matthewsii LeConte]. There was no difference found for Omus cazieri van den Berghe. No differences in species richness or diversity (Simpson, Shannon-Wiener and Berger-Parker indices) were found for spiders or carabid beetles. Overall, the relationship between abundance and time since burning was weak, with marginal significance found only for Dictynidae and Gnaphosidae. We suggest that changes in foraging substrate, prey availability or microclimatic conditions since fire may have interacted with life history characteristics to influence the abundance of these organisms. Differences in fire intensities among years may have masked patterns in arthropod abundance associated with time since burning.

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1106. Influence of repeated fertilization on forest ecosystems: Relative habitat use by mule deer and moose.

Sullivan, T. P.; Sullivan, D. S.; Lindgren, P. M. F.; and Ransome, D. B.

Canadian Journal of Forest Research 36(6):

1395-1406. (2006)

NAL Call #: SD13.C35; ISSN: 00455067.

Notes: doi: 10.1139/X06-033.

Descriptors: mule deer/ moose/ thinning/ forest management/ wildlife habitat/ British Columbia/ Canada

Abstract: This study was designed to test the hypothesis that large-scale precommercial thinning (PCT) and repeated fertilization of young lodgepole pine (*Pinus contorta* Dougl. ex Loud. var. *latifolia* Engelm.) stands would enhance relative habitat use by mule deer (*Odocoileus hemionus* Rafinesque) and moose (*Alces alces* L.) in summer and winter periods, compared to that in mature and old-growth stands. Replicate study areas were located near Summerland, Kelowna, and Williams Lake in south central British Columbia, Canada. Each study area had a range of PCT densities, with and without fertilization, and mature and old-growth stands. Habitat use in summer and winter was measured by pellet-group counts of deer and moose from 1999 to 2003, 6-10 years after the onset of treatments. During summer months, habitat use by deer was enhanced by PCT with fertilization, and the 1000 stems/ha fertilized stands experienced greater use than the unthinned or mature stands. Winter habitat use by deer was similar in the 1000 stems/ha fertilized stands and old-growth stands. In both summer and winter, moose preferred fertilized to unfertilized stands and low-density to high-density stands. Intensive management of young lodgepole pine forests has considerable potential to develop summer and winter ranges for these ungulates.

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1107. Influence of repeated fertilization on forest ecosystems: Relative habitat use by snowshoe hares (Lepus americanus).

Sullivan, T. P.; Sullivan, D. S.; Lindgren, P. M. F.; and Ransome, D. B.

Canadian Journal of Forest Research 36(9): 2080-2089. (2006)

NAL Call #: SD13.C35; ISSN: 00455067.

Notes: doi: 10.1139/X06-093.

http://article.pubs.nrc-cnrc.gc.ca/RPAS/RPViewDoc?_handler_=HandleInitialGet&calyLang=eng&journal=cjfr&volume=36&articleFile=x06-093.pdf

Descriptors: snowshoe hares/ Lepus americanus/ wildlife habitat/ forest management/ thinning/ British Columbia/ Canada

Abstract: This study was designed to test the hypothesis that large-scale precommercial thinning (PCT) and repeated fertilization of lodgepole pine (*Pinus contorta* Dougl. ex Loud. var. *latifolia* Engelm.) would enhance relative habitat use by snowshoe hares (*Lepus americanus* Erxleben) in managed stands. Study areas were located near Summerland, Kelowna, and Williams Lake in south-central British Columbia, Canada. Each study area had nine treatments: four pairs of stands thinned to densities of 250, 500, 1000, and 2000 stems/ha, with one stand of each pair fertilized five times at 2-year intervals, and an unthinned stand. Understory vegetation and relative habitat use by snowshoe hares were measured annually from 1999 to 2003, 6-10 years after the onset of treatments. Mean crown volume index of herbs was significantly higher in fertilized than unfertilized stands, but density had no effect. Shrub volume was not affected by either treatment. Mean crown volume index of trees was significantly greater in the fertilized and high-density stands. Mean total richness of vascular plants was significantly reduced by fertilization. Mean total structural diversity of vegetation was highest in the low-density stands but was not affected by fertilization. Relative habitat use by hares, based on fecal pellet counts,

was highest in the 2000 stems/ha and unthinned stands in summer. This pattern also occurred in winter when hare use was higher in fertilized than unfertilized stands. Overall, fertilized 2000 stems/ha stands provided habitat for hares to a degree comparable with unthinned stands of lodgepole pine. © 2006 NRC.

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1108. Influence of surrounding vegetation on woodpecker nest tree selection in oak forests of the Upper Midwest, USA.

Adkins Giese, C. L. and Cuthbert, F. J.
Forest Ecology and Management 179(1-3): 523-534. (2003)
NAL Call #: SD1.F73; ISSN: 03781127

Descriptors: cavity nesting birds/ dead standing trees/ nest trees/ woodpeckers/ forestry/ functions/ harvesting/ mathematical models/ timber/ vegetation/ nesting/ ecology/ *Populus tremuloides*

Abstract: This study examined the influence of forest context on woodpecker nest tree selection, which has implications for forest managers leaving trees during timber harvest for cavity nesting birds. We surveyed habitat variables in 11.3 m radius subplots centered on 165 active woodpecker nest trees and 144 randomly selected points in oak forests of southeastern Minnesota and western Wisconsin in 1997-1998. Forward stepwise sequential F-tests indicated that the number of potential nest trees and basal area (BA) of dead elms were the most important variables in distinguishing nest sites and random sites. Discriminant function analysis correctly classified 71% of the observations. However, a comparison of nest sites only to those random sites containing a tree likely suitable for nesting showed no differences. This suggests that nest tree has a greater influence in nest site selection than does surrounding vegetation. Yellow-bellied sapsucker nest trees were surrounded by a significantly higher BA of trembling aspen (*Populus tremuloides*) and density of mast-producing trees than the nest trees of the downy, hairy, red-bellied, red-headed, and pileated woodpeckers, and the northern flicker. However, we found no interspecific differences among downy, hairy, red-bellied, and red-headed woodpeckers. This study is significant because it indicates forest management for cavity nesting birds should focus on providing suitable nest trees within the larger forest context; vegetation immediately surrounding nest trees may have minimal influence on woodpecker nest tree selection.

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1109. Influence of thinning of Douglas-fir forests on population parameters and diet of northern flying squirrels.

Gomez, D. M.; Anthony, R. G.; and Hayes, J. P.
Journal of Wildlife Management 69: 1670-1682. (Oct. 2005)
NAL Call #: 410 J827

Descriptors: coniferous forests/ *Pseudotsuga menziesii*/ forest trees/ forest thinning/ *Glaucomys*/ squirrels/ forest wildlife relations/ population density/ body size/ mortality/ viability/ wildlife food habits/ fungi/ diet/ population size/ wildlife management/ Oregon/ habitat management for wildlife/ natural resources, environment, general ecology, and wildlife conservation/ animal ecology and behavior/ forestry related/ forestry production artificial regeneration
This citation is from AGRICOLA.

1110. Influences of hardwood stand area and adjacency on breeding birds in an intensively managed pine landscape.

Turner, J. Chris; Gerwin, John A.; and Lancia, Richard A.
Forest Science 48(2): 323-330. (2002)

NAL Call #: 99.8 F7632; ISSN: 0015-749X

Descriptors: forestry practices/ habitat alterations/ terrestrial ecology/ forest interior/ hardwood stand area/ intensively managed pine landscape/ mature hardwood stands/ pine matrix/ forests/ ecosystems/ habitat management/ lower coastal plain/ managed pinewoods/ South Carolina/ wildlife-human relationships/ commercial enterprises/ conservation/ wildlife management/ disturbances/ land zones/ *Pinus* spp.

Abstract: We compared species richness, abundance, and community composition of breeding landbirds among three areal classes of mature hardwood stands within an intensively managed pine (*Pinus taeda*) landscape in the Lower Coastal Plain of South Carolina. We also compared these community metrics among rotation-age pines ([approx]20 yr old), the pine matrix (regenerated to rotation-age pine stands comprising 50% of the landscape), and all hardwood stands regardless of area. Approximately 220 fixed-radius point counts were conducted in 1995 and 1996. Species richness (21, 23, and 25 species, respectively) within small (n = 19; 1.0-4.4 ha), medium (n = 17; 6.0-34.4 ha), and large (n = 6; 65-560 ha) hardwood islands within the pine matrix was the same, but the trend was for richness to increase with island area. Forest interior, neotropical migrants dominated all hardwood stand areas. Most species were common to all areal classes, with only a few restricted to a particular areal class. Thus, there was little evidence that these hardwood islands, embedded in a managed pine landscape context, harbored unique bird communities. Species richness (40) was greatest within the matrix of pine stands of all ages, intermediate (32) in hardwood stands, and least (27) in rotation-age pine stands. Hardwood stands supported the highest total bird densities as well as the highest densities of neotropical migrants. Pine stands hosted high densities of both resident and early successional neotropical migrants. We concluded that the presence of hardwood stands embedded within a matrix of different age classes of pine likely allowed forest-interior neotropical migrants typical of hardwood stands to "spill over" into adjacent, structurally similar pine stands and vice versa.

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1111. Influences of herbivory and canopy opening size on forest regeneration in a southern bottomland hardwood forest.

Castleberry, S. B.; Ford, W. M.; Miller, K. V.; and Smith, W. P.

Forest Ecology and Management 131(1-3): 57-64. (2000)
NAL Call #: SD1.F73; ISSN: 03781127.

Notes: doi: 10.1016/S0378-1127(99)00200-5.

Descriptors: bottomland hardwoods/ group selection/ herbivory/ regeneration/ South Carolina/ white-tailed deer/ browsing/ canopy gap/ forest ecosystem/ herbivory/ regeneration/ relative abundance/ species diversity/ *Odocoileus virginianus*

Abstract: We examined the effects of white-tailed deer (*Odocoileus virginianus*) browsing and canopy opening size on relative abundance and diversity of woody and herbaceous regeneration in various sized forest openings in

a southern bottomland hardwood forest over three growing seasons (1995-1997). We created 36 canopy openings (gaps), ranging from 7 to 40 m in radius, by group selection timber harvest in December 1994. Fenced exclosures were constructed in the center of each gap and vegetation was sampled monthly from April to September. Plant species richness, diversity, evenness, relative abundance, and a browsing index were calculated for each gap size and for each exclosure type. Herbaceous richness, diversity, or evenness did not differ among exclosure types in any year of the study. Browsing index was higher in the controls in 1996 and 1997. Browsing index for woody species was highest in the controls in 1995 and 1997. Relative abundance of herbaceous species was highest in the 29 m gap size in 1997. Richness and diversity of woody species were lowest in the 29 m gap size in 1995 and 1996. Overall browsing rates on both woody and herbaceous vegetation were low throughout all the 3 years of the study. Low browsing rates reflect seasonal changes in habitat use by deer. Because of the low rates of browsing, vegetative differences among exclosure treatments and gap sizes likely are not attributable to deer herbivory. Other factors, such as soil disturbance, may have influenced the initial vegetative response more than herbivory or gap size.
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1112. Initial and long-term use of inserts by red-cockaded woodpeckers.

Saenz, D.; Conner, R. N.; Collins, C. S.; and Rudolph, D. C. *Wildlife Society Bulletin* 29(1): 165-170. (2001)

NAL Call #: SK357.A1W5; ISSN: 00917648

Descriptors: active cavity/ artificial cavity/ cavity tree/ insert cavity/ *Picoides borealis*/ red-cockaded woodpecker/ birds/ cavity/ management practices/ United States/ *Picoides borealis*

Abstract: Artificial cavities have become a standard management technique for red-cockaded woodpeckers (*Picoides borealis*). Seventy cavity inserts were installed in our study sites on the Angelina National Forest in eastern Texas from 1990 to 1995. Eighty-two percent of the inserts were used for at least one year. It is still too early to make a direct comparison, but it is likely that inserts will remain usable as long as natural cavities do. Inserts installed in 1990 and 1991 were 20.5 cm in height, whereas inserts installed from 1992 to 1995 were 25.5 cm in height. Larger inserts (25.5 cm) appear to remain usable for a longer time than smaller inserts (20.5 cm). Newer unused inserts are more likely to become active for the first time than older unused inserts. Similar to unused inserts, active cavities (naturally excavated and inserts) that have become inactive are less likely to be reactivated the longer they are inactive. Newness and recency of cavity use and red-cockaded woodpecker activity appear to be important factors in the attractiveness of inserts and naturally excavated cavities.
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1113. Initial cerulean warbler response to experimental silvicultural manipulations, Desha County, Arkansas.

Hamel, Paul B.; Staten, Mike; and Wishard, Rodney In: Proceedings of the 13th Biennial Southern Silvicultural Research Conference, General Technical Report-SRS 92/ Connor, Kristina F.; Asheville, NC: Southern Research Station, Forest Service, U.S. Department of Agriculture, 2006. pp. 3-9.

<http://www.treesearch.fs.fed.us/pubs/23305>

Descriptors: commercial activities/ conservation measures/ ecology/ terrestrial habitat/ land zones/ *Dendroica cerulea*: forestry/ forestry management/ habitat management/ habitat utilization/ forestry management effects/ forest and woodland/ Arkansas/ Desha County/ Aves, Passeriformes, Parulidae/ birds/ chordates/ vertebrates

Abstract: Cerulean warbler (*Dendroica cerulea* (Wilson) Aves, Parulidae) is a neotropical migratory bird that has become a focus of management attention. Since 1992, we have studied breeding birds on a 54-ha site owned by Anderson-Tully Company, in Desha County, AR. In 2002, we conducted an unreplicated experiment there to assess the species' response to silvicultural manipulation within its habitat. We applied one of two silvicultural prescriptions to randomly selected halves of the plot. Establishment criteria were that each half-plot be the same size and have had a comparable history of warbler use. Treatments were (1) a standard Anderson-Tully Company prescription designed to establish regeneration, develop existing advance regeneration, and add growth to residual sawtimber trees; and (2) a prescription designed to add growth to residual sawtimber trees and favor development of trees similar to those used by the cerulean warbler. Our initial posttreatment survey identified three cerulean warbler territories on the subplot treated with the cerulean warbler prescription and none on the other portion.

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1114. Initial response of butterflies to an overstory reduction and slash mulching treatment of a degraded pinon-juniper woodland.

Kleintjes, P. K.; Jacobs, B. F.; and Fettig, S. M.

Restoration Ecology 12(2): 231-238. (2004)

NAL Call #: QH541.15.R45R515; ISSN: 1061-2971

Descriptors: conservation measures/ ecology/ terrestrial habitat/ land zones/ Papilionoidea: habitat management/ Degraded pinon juniper/ woodland restoration/ Initial responses to overstory reduction and slash mulching treatment/ evidence for success/ community structure/ environmental indicators/ forest and woodland/ New Mexico/ Bandelier National Monument/ Insecta, Lepidoptera, Glossata, Heteroneura/ arthropods/ insects/ invertebrates/ Lepidopterans

Abstract: Overstory reduction and slash mulching (ORSM) has been shown to be an effective means for increasing herbaceous cover and diversity in degraded pinon (*Pinus edulis*) and juniper (*Juniperus monosperma*) woodlands of northcentral New Mexico. Local fire history, tree age-class structure, and grazing records suggest that many areas now occupied by dense pinon-juniper woodlands were formerly more open, with grassy understories that supported well-developed soils and a fire regime. At Bandelier National Monument, studies are evaluating the use of ORSM treatments as a restoration management tool. In 1999 and 2001, we evaluated the effects of an ORSM treatment implemented in 1997 upon butterfly abundance and species richness between a pair of treated and control watersheds. Butterfly abundance and species richness were significantly greater on the treated watershed in both years, and these measures were correlated with significant increases in forb and grass cover in the treated watershed. Five of the 10 most common nectar and larval host plants had significantly greater cover in the treated watershed, including the legume *Lotus wrightii*. Our results suggest that the increased herbaceous cover resulting from an ORSM treatment of a single watershed induced a positive, initial

response by butterflies. Using butterflies as indicators of site productivity and species richness, our results suggest ORSM is a promising technique for restoring biodiversity in degraded pinon-juniper woodlands.

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1115. Initiating uneven-aged management in longleaf pine stands: Impacts on red-cockaded woodpecker habitat.

McConnell, W. V.

Wildlife Society Bulletin 30(4): 1276-1280. (2002)

NAL Call #: SK357.A1W5; ISSN: 0091-7648

Descriptors: Picoides borealis/ Piciformes/ Picidae/ longleaf pine/ Pinus palustris/ red-cockaded woodpecker/ Picidae/ forestry/ stand management/ wildlife habitat

Abstract: The United States Forest Service and other land management agencies are introducing the widespread use of group selection, a form of uneven-aged management, into stands of longleaf (*Pinus palustris*) and other southern pines in the southeastern United States. I compared the results of applying 2 methods of group selection in longleaf stands on the Apalachicola National Forest to the guidelines contained in the United States Fish and Wildlife Service's draft revised red-cockaded woodpecker (*Picoides borealis*) recovery plan. The application of a group-selection method based on residual basal area and informal area regulation (BAAR) resulted in modified red-cockaded woodpecker habitat markedly superior to the habitat modified by a method based on residual basal area, an upper diameter limit, and a factor (q) used to establish the relationship between adjacent diameter classes (BDq). Restrictions imposed by the BDq method might result in failure to obtain pine regeneration. I recommend that concerned agencies initiate a long-term and broadly based research study to determine the relative merits of the several alternative methods now being used to manage the pine forests of the Southeast.

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1116. Integrating grouse habitat and forestry: An example using the ruffed grouse *Bonasa umbellus* in Minnesota.

Zimmerman, Guthrie S.; Gilmore, Daniel W.; and Gutierrez, R. J.

Wildlife Biology 13(1): 51-58. (2007)

NAL Call #: SK351.W663; ISSN: 0909-6396

Descriptors: Galliformes/ Phasianidae/ *Bonasa umbellus*/ signals/ auditory sense/ drumming/ forests/ ecosystems/ forestry practices/ habitat alterations/ habitat management/ habitat use/ habitat selection/ Minnesota/ Cloquet Forestry Center/ wildlife-human relationships/ behavior/ commercial enterprises/ communication/ conservation/ wildlife management/ disturbances/ land zones/ *Picea* spp./ *Pinus* spp./ *Populus* spp.

Abstract: We quantified forest stand attributes at ruffed grouse *Bonasa umbellus* drumming display sites to develop tree stocking guides as a tool for guiding ruffed grouse management. We estimated tree density and basal area surrounding grouse drumming sites and compared these with unused sites. We used model selection to assess predictions about whether tree density and basal area surrounding drumming sites varied by site classification (primary drumming site, alternate site, unused site) or forest type. We plotted the predicted values from the best model on tree stocking guides, which are tools commonly used by

forest managers. Tree density and basal area varied by site classification and by forest type. Our results show that stem density was higher and basal area lower at both primary and alternate drumming sites compared to unused sites in all forest types. We also found that grouse sites in aspen stands had a greater stem density and lower basal area than grouse sites in pine and spruce/fir stands.

Incorporating these results into a tree stocking guide suggested that management for grouse in aspen stands should attempt to maintain stands with average stem density and basal area for this species. In contrast, foresters who are managing for conifers and also wish to maintain some grouse habitat should favour wider spacing of trees in stands. Wider spacing will encourage the development of dense understory vegetation favoured by grouse as well as enhance the growth of quality saw-logs. Our study describes a method for incorporating habitat data on ruffed grouse and other wildlife into tree stocking charts, which are commonly used to facilitate management of forest stands.

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1117. Is a "hands-off" approach appropriate for red-cockaded woodpecker conservation in twenty-first-century landscapes?

Saenz, D.; Conner, R. N.; Rudolph, D. C.; and Engstrom, R. T.

Wildlife Society Bulletin 29(3): 956-966. (2001)

NAL Call #: SK357.A1W5; ISSN: 00917648

Descriptors: fire-maintained ecosystems/ *Picoides borealis*/ red-cockaded woodpecker/ wilderness/ conservation management/ endangered species/ forest management/ population ecology/ prescribed burning/ United States/ *Picoides borealis*

Abstract: The endangered red-cockaded woodpecker (*Picoides borealis*) is well adapted to fire-maintained pine ecosystems of the southeastern United States. Management practices vary greatly among land ownerships. In some wilderness areas and state parks, a "no management" policy has eliminated use of prescribed fire, artificial cavities, and woodpecker translocation, tools that have proved effective elsewhere in recovering woodpecker populations. We compared forests with essentially "no management" to actively managed forests of similar tree ages and similar red-cockaded woodpecker population demographics. We also compared sites that had received no management in the past to the same sites after management. In every case, populations in forests that did not use state-of-the-art management for woodpeckers declined severely compared to those in managed forests. Because managed forests typically used all available management techniques concurrently, it was not possible to separate and rank effectiveness of specific management activities. One exception was the Wade Tract in Georgia, where prescribed fire was the primary activity for herbaceous layer and hardwood management in a high-density, stable woodpecker population. Wilderness areas, which are intended to be pristine places that preserve biodiversity, are losing red-cockaded woodpeckers, a keystone species in the ecosystem, at an alarming rate. Collectively, 9 groups of red-cockaded woodpeckers were present in 4 wilderness areas in Texas national forests in 1983. At the close of the millennium, only one woodpecker group remained and its continued existence is unlikely without management. The very fragmented features of

present-day landscapes and intervention by humans impair the effectiveness of natural disturbance processes, primarily growing-season fire, that historically produced and maintained open pine savannas with grass-forb herbaceous layers in the pre-Columbian forests of the southeastern U.S.; therefore, active management must be used if the red-cockaded woodpecker is to persist.
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1118. Is forest close to lakes ecologically unique? Analysis of vegetation, small mammals, amphibians, and songbirds.

Ellen Macdonald, S.; Eaton, B.; Machtans, C. S.; Paszkowski, C.; Hannon, S.; and Boutin, S.
Forest Ecology and Management 223(1-3): 1-17. (2006)
NAL Call #: SD1.F73; ISSN: 03781127.
Notes: doi: 10.1016/j.foreco.2005.06.017.
Descriptors: amphibians/ biodiversity/ boreal/ community composition/ forest/ forest structure/ lake/ riparian/ small mammals/ songbirds/ understory vegetation
Abstract: We compared vegetation structure, flora, and fauna in forest stands at varying distances from small lakes in the boreal mixedwood zone of Alta., Canada, with that in the surrounding upland landscape. We tested the hypothesis that lakeside riparian forest is more structurally diverse, hosts different biotic communities, and has greater floral diversity and greater abundance and richness of other biota, as compared with similar forest in areas far from open water. Lakeside forest was characterized by greater canopy cover, and aspen height and diameter (breast height) than upland forest, but absolute differences were quite small and there was no evidence of greater structural diversity. Contrary to expectations, herb richness and diversity were lower in lakeside forests and the understory community there could not be differentiated from that of upland forests. Two species of anuran amphibians [wood frog (*Rana sylvatica*) and boreal toad (*Bufo boreas boreas*)] were more abundant in forest up to 100 m from lakes than in upland areas 400-1200 m away from open water. However, differences in abundance between trapping sites in the non-forested riparian zone and sites up to 100 m into the lakeside forest were small. Use of upland habitats by amphibians (juvenile wood frog in particular) was substantial during the latter part of their active season, possibly because they used upland areas for dispersal and overwintering. The two most abundant species of small mammal [red-backed vole (*Clethrionomys gapperi*) and deer mouse (*Peromyscus maniculatus*)] were trapped less often in the non-forested riparian zone, while the meadow vole (*Microtus pennsylvanicus*), meadow jumping mouse (*Zapus hudsonicus*), and shrews (*Sorex* spp.) were more abundant in those areas. Abundance did not differ significantly among trap lines located in forest from 50 m to >600 m from open water. Songbird abundance and richness were higher near lakes, possibly because of the additional niches available at the forest/lake interface and increased food supply for insectivorous birds. Overall, our results did not strongly support our hypotheses concerning the ecological attributes of lakeside riparian forest. If any part of these lakeside riparian areas can be considered ecologically unique or species-rich it appears to be the non-forested riparian zone and, for birds, the natural lakeshore ecotone (~50 m into the forest). We encourage those responsible for forest management to re-think prescriptive placement of fixed-width forested buffers around all lakes,

and instead consider a landscape-scale planning approach that determines the appropriate placement of uncut forest on the landscape to meet broad conservation objectives.
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1119. Landbird community composition varies among seasons in a heterogeneous ponderosa pine forest.

Wightman, C. S.; Germaine, S. S.; and Beier, P.
Journal of Field Ornithology 78(2): 184-194. (2007)
NAL Call #: 413.8 B534; ISSN: 02738570.
Notes: doi: 10.1111/j.1557-9263.2007.00102.x.
Descriptors: interseasonal variation/ landbird communities/ migration ecology/ *Pinus ponderosa*/ ponderosa pine/ species richness
Abstract: There is growing recognition of the need to conserve areas used by birds during migration, including forest and upland habitats. Because extensive thinning and burning treatments are planned for ponderosa pine (*Pinus ponderosa*) forests in the southwestern United States, information on the use of these forests by landbirds during migration is needed for conservation planning. We compared species richness among spring, breeding, and fall seasons at 69 points in a ponderosa pine forest to assess changes in landbird communities and the role of different ponderosa pine cover types in habitat selection among seasons. We detected a total of 64 bird species. Bird community similarity was lowest between the breeding and fall seasons and highest between the spring and breeding seasons. Twenty percent of the species detected were present exclusively in the fall and, of these, over half were Neotropical migrants. Only two species (3%) were detected exclusively during the spring. Although we found little difference in bird species similarity among vegetative cover types during the breeding season, forests that contained a deciduous component exhibited higher bird species similarity with each other than with habitats that did not include a deciduous component in spring and fall. In addition, foliage foragers dominated the community in spring and fall, and all Neotropical migrants detected exclusively in fall were found in ponderosa pine forests with a deciduous component. Our results indicate that ponderosa pine forests may be important to migrating or dispersing landbirds in autumn, especially if there is a deciduous component. © 2007 Association of Field Ornithologists.
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1120. Landscape characteristics of northern spotted owl nest sites in managed forests of northwestern California.

Folliard, Lee B.; Reese, Kerry P.; and Diller, Lowell V.
Journal of Raptor Research 34(2): 75-84. (2000)
NAL Call #: QL696.F3J682; ISSN: 0892-1016
Descriptors: *Neotoma fuscipes*/ *Strix occidentalis*/ strigidae/ strigiformes/ birds/ coastal habitat/ Douglas fir/ ecosystems/ endangered-threatened species/ foods-feeding/ forestry practices/ forests, coniferous/ forests, deciduous/ habitat management/ mammals/ nesting sites/ nests-nesting/ predation/ redwood/ succession/ wildlife-habitat relationships/ spotted owl/ habitat/ ecosystem/ ecological requirements/ nest/ habitat: description/ reproduction: nest structure, nest site/ success/ northern spotted owl/ dusky-footed woodrat/
California: Humboldt County

Abstract: The authors investigated vegetative and topographic characteristics of forest landscapes surrounding northern spotted owl (*Strix occidentalis caurina*) nest sites on managed timberlands in northwestern California. Nest sites occurred primarily in young (31-60-year old) forests of redwood (*Sequoia sempervirens*) and Douglas-fir (*Pseudotsuga menziesii*). They compared 60 northern spotted owl nest landscapes (0.8-km radius circle centered on the nest site) with 60 randomly selected landscapes. Vegetative type and age class were used to classify forest stands within the landscape. Landscape features differed between nest sites and random sites (Wilks' $F = 6.073$, $p < 0.001$) suggesting that nest-site selection was correlated with landscape level features. Nest landscapes had greater amounts of forest in the 31-45 and 46-60 year old age classes, and a greater amount of total edge. In addition, nest sites were located lower on slopes. In the study area, dusky-footed woodrats (*Neotoma fuscipes*) were the major prey species. Edges may provide opportunities for owls to prey on woodrats that are abundant in early seral habitats. The coastal forests of the redwood zone have unique characteristics that contribute to rapid development of northern spotted owl habitat. These include coppice growth (i.e., vegetative reproduction) of redwoods and several hardwood species, favorable growing conditions, and the occurrence of major prey species in young seral habitats. Despite differences in habitat types and age classes, northern spotted owl nest-site selection in these young, managed forests showed some consistent patterns with other portions of the owls' range.

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1121. Landscape connectivity and biological corridors.

Laurance, Susan G.

In: Agroforestry and biodiversity conservation in tropical landscapes/ Schroth, G. Fonseca G. A. da Harvey C. A. Gascon C. Vasconcelos H. L. Izac A. M., 2004.

Notes: 1559633565 (ISBN).

Descriptors: commercial activities/ conservation measures/ terrestrial habitat/ comprehensive zoology: forestry/ biological corridors creation to counteract habitat fragmentation/ agroforestry role/ overview/ habitat management/ forest and woodland

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1122. Landscape effects on breeding songbird abundance in managed forests.

Lichstein, Jeremy W.; Simons, Theodore R.; and Franzreb, Kathleen E.

Ecological Applications 12(3): 836-857. (2002)

NAL Call #: QH540.E23 ; ISSN: 1051-0761

Descriptors: Passeriformes/ Aves/ terrestrial ecology/ partial-regression analysis/ breeding ecology/ clearcuts/ conservation biology/ habitat fragmentation/ habitat management/ land cover/ landscape composition/ landscape effects/ landscape patterns/ managed forests/ distribution/ forests/ ecosystems/ North Carolina/ Pisgah National Forest/ status/ Tennessee/ communities/ habitat use/ land zones/ birds/ abundance/ dispersion/ forest/ landscape/ habitat

Abstract: We examined the relationship between songbird relative abundance and local and landscape-scale habitat variables in two predominately mid- to late-successional managed National Forests in the southern Appalachian

Mountains, USA. We used partial-regression analysis to remove correlations between habitat variables measured at different spatial scales (local habitat and square landscape regions with sides of 0.5, 1, and 2 km) and between landscape composition (proportion of different land cover types) and pattern (spatial arrangement of land cover) variables. To account for spatial autocorrelation, we used autoregressive models that incorporated information on bird abundance in the spatial neighborhood surrounding each sample point. Most species, especially Neotropical migrants, were significantly correlated with at least one landscape variable. These correlations included both composition and pattern variables at 0.5-2 km scales. However, landscape effects explained only a small amount of the variation in bird abundance that could not be explained by local habitat. Our results are consistent with other studies of songbird abundance in large managed forests that have found weak or moderate landscape effects. These studies suggest that songbird abundance in forested landscapes will primarily reflect the quantity of different habitats in the landscape rather than the spatial arrangement of those habitats. Although some studies have suggested consolidating clearcuts in large managed forests to reduce edge and landscape heterogeneity, much of the current evidence does not support this management recommendation. An important future challenge in avian conservation is to better understand how the importance of landscape effects varies in relation to (1) the amount of suitable habitat in the landscape, and (2) land use patterns at broader spatial scales.

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1123. Landscape-level effects of forest management on bird species in the Ozarks of southeastern Missouri.

Clawson, Richard L.; Faaborg, John; Gram, Wendy K.; and Porneluzi, Paul A.

In: Proceedings of the Second Missouri Ozark Forest Ecosystem Project Symposium: Post-treatment Results of the Landscape Experiment, General Technical Report-NC 227/ Shifely, S. R. and Kabrick, J. M.; St. Paul, MN: North Central Forest Experiment Station, Forest Service, U.S. Department of Agriculture, 2002. pp. 147-160.

Notes: 0363-616X (ISSN).

Descriptors: conservation measures/ reproduction/ ecology/ population dynamics/ terrestrial habitat/ land zones/ habitat management/ forest management/ population density/ reproductive success/ reproductive productivity/ Missouri/ Ozarks/ Aves/ birds/ chordates/ vertebrates

Abstract: This study was designed as an experiment to test how bird populations in an extensively forested landscape respond to small (group and single-tree selection) and large (clearcut) openings. Our objectives are to test the landscape-level effects of even-aged and uneven-aged forest management relative to no-harvest management on population density and reproductive success for forest-interior and early-successional bird species. Pre-treatment data were gathered during the period 1991 through 1995, treatments were applied in 1996 and early 1997, and post-treatment data have been collected from 1997 through the present. Immediately following treatment, populations of forest-interior species declined on all study sites. Post-treatment, forest-interior species responded both positively and negatively to the even-aged and uneven-aged treatments. For early successional species, changes in density were positive in response to both even-aged and

uneven-aged treatment types. Neither nest predation rates nor nest parasitism rates increased following treatment. From a landscape-level perspective, our findings indicate that the short-term effects of even-aged management are mixed, positive, and negative, for forest-interior species and that the response by early-successional species is greater for even-aged than for uneven-aged management.
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1124. A landscape perspective of bird nest predation in a managed boreal black spruce forest.

Boulet, M.; Darveau, M.; and Belanger, L.

Ecoscience 7(3): 281-289. (2000)

NAL Call #: QH540.E366; ISSN: 1195-6860

Descriptors: *Tamiasciurus hudsonicus/ Corvidae/ Passeriformes/ Perisoreus canadensis/ Aves/ behavior/ birds/ black spruce/ ecosystems/ forestry practices/ forests, boreal/ habitat alterations/ habitat management/ mammals/ nest predation/ nests-nesting/ predators/ wildlife-habitat relationships/ nestbox/ predation/ silviculture/ gray jay/ red squirrel/ cover/ Picea mariana*

Abstract: Several landscape level studies have reported that bird nest predation increases as forest cover decreases. These studies have mainly been conducted in agricultural or urban regions. However, few studies have explored relationships between forest cover and nest predation in boreal forests managed for timber harvesting. In 1997 and 1998, the authors evaluated bird nest predation in a mosaic of clearcuts and forest remnants dominated by black spruce (*Picea mariana* [Mill.] B.S.P.) and located north of Lake Saint-Jean, Quebec. They used a 7 km x 9 km grid of sampling points to determine nest predation at four landscape scales (local vegetation, and 250 m, 500 m, and 1000 m radii around sampling points). Artificial nests (ground and arboreal) containing a common quail (*Coturnix coturnix* L.) egg and a plasticine egg were used to calculate predation pressure and to identify nest predators. Nest predation was high over the entire study area. Dominant predators were the gray jay (*Perisoreus canadensis* L.) and the red squirrel (*Tamiasciurus hudsonicus* Erxleben). Depredation by squirrels was influenced by local variables in 1997 and by landscape variables in 1998. In the latter case, depredation by squirrels increased as spruce cover increased. Depredation by gray jays was positively related to water body area and jack pine (*Pinus banksiana* Lamb.) cover. Squirrels preyed more on ground nests than on arboreal nests, while gray jays preyed almost exclusively on arboreal nests. The authors conclude that these predators probably impose different threats to different songbird species in boreal black spruce forests. Their results show that, in the short term, timber harvesting did not seem to increase predation in a boreal black spruce forest.

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1125. Landscape-scale disturbances and changes in bird communities of boreal mixed-wood forests.

Drapeau, Pierre; Leduc, Alain; Giroux, Jean-Francois; Savard, Jean-Pierre; Bergeron, Yves; Vickery, William L.; and Savard J. P.

Ecological Monographs 70(3): 423-444. (2000)

NAL Call #: 410 Ec72; ISSN: 0012-9615

Descriptors: *Aves/ agricultural practices/ birds/ communities/ ecosystems/ forestry practices/ forests, boreal/ forests, mixed/ habitat alterations/ habitat*

management/ succession/ wildlife-habitat relationships/ biocenosis/ habitat change/ landscape/ silviculture/ agriculture/ settlement/ Canada/ Quebec

Abstract: Bird community response to both landscape-scale and local (forest types) changes in forest cover was studied in three boreal mixed-wood forest landscapes modified by different types of disturbances: (1) a pre-industrial landscape where human settlement, agriculture, and logging activities date back to the early 1930s, (2) an industrial timber managed forest, and (3) a forest dominated by natural disturbances. Birds were sampled at 459 sampling stations distributed among the three landscapes. Local habitat and landscape characteristics of the context surrounding each sampling station (500-m and 1-km radius) were also computed. Bird communities were influenced by landscape-scale changes in forest cover. The higher proportion of early-successional habitats in both human-disturbed landscapes resulted in significantly higher abundances of early-successional bird species and generalists. The mean number of mature forest bird species was significantly lower in the industrial and pre-industrial landscapes than in the natural landscape. Landscape-scale conversion of mature forests from mixed-wood to deciduous cover in human-disturbed landscapes was the main cause of changes in mature forest bird communities. In these landscapes, the abundance of species associated with mixed and coniferous forest cover was lower, whereas species that preferred a deciduous cover were more abundant. Variation in bird community composition determined by the landscape context was as important as local habitat conditions, suggesting that predictions on the regional impact of forest management on songbirds with models solely based on local scale factors could be misleading. Patterns of bird species composition were related to several landscape composition variables (proportions of forest types), but not to configuration variables (e.g., interior habitat, amount of edge). Overall, the authors' results indicated that the large-scale conversion of the southern portion of the boreal forest from a mixed to a deciduous cover may be one of the most important threats to the integrity of bird communities in these forest mosaics. Negative effects of changes in bird communities could be attenuated if current forestry practices are modified toward maintaining forest types (deciduous, mixed-wood, and coniferous) at levels similar to those observed under natural disturbances.

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1126. Landscape-scale forest habitat relationships to tassel-eared squirrel populations: Implications for ponderosa pine forest restoration.

Dodd, N. L.; Schweinsburg, R. E.; and Boe, S.

Restoration Ecology 14(4): 537-547. (2006)

NAL Call #: QH541.15.R45R515; ISSN: 10612971.

Notes: doi: 10.1111/j.1526-100X.2006.00165.x.

Descriptors: *Arizona/ forest restoration/ habitat relationships/ landscape/ Pinus ponderosa/ ponderosa pine/ population dynamics/ Sciurus aberti/ tassel-eared squirrels/ thresholds*

Abstract: *Pinus ponderosa* (ponderosa pine) forest ecosystem restoration is a growing emphasis in the southwestern United States to address over 120 years of forest structure change, decreased forest health, and increased potential for disease and wildfire. Restoration treatments replicating pre-settlement conditions may

reduce tree density by 98%, are detrimental to canopy-dependent wildlife such as tassel-eared squirrel (*Sciurus aberti*), particularly at the patch scale, and are of concern when applied at the landscape scale. We examined *S. aberti* population dynamics in north-central Arizona, U.S.A., from 1999 to 2002 at nine 280-ha sites oriented along a landscape gradient of varying proportions (4.6-99.2%) of unlogged, high-quality (HQ) habitats within a matrix of intensively thinned low-quality habitat. Our objectives were to estimate *S. aberti* density, juvenile recruitment, and survival across this gradient; quantify patch- and landscape-scale habitat relationships to populations; evaluate possible habitat thresholds in squirrel population response; and develop forest management recommendations. In regression models, both patch-scale and landscape-scale parameters influenced squirrel populations. At the patch scale, number of interlocking canopy trees was added most frequently, whereas the proportion of HQ habitat was the landscape-scale variable added in five of seven models. Recruitment and survival at dense, HQ plots were inversely related to number of small, sapling-sized trees. Nonlinear thresholds in density and recruitment occurred when the proportion of HQ habitat at study sites was between 24 and 42%. Our study points to the importance of maintaining HQ habitat in mesoreserves on the landscape at or above this threshold range, as well as pursuing a mix of forest management prescriptions in the matrix surrounding mesoreserves to achieve wildlife, forest restoration, and fire risk reduction objectives. © 2006 Society for Ecological Restoration International. © 2008 Elsevier B.V. All rights reserved.

1127. Large-scale management experiments in the moist maritime forests of the Pacific Northwest.

Monserud, Robert A.

Landscape and Urban Planning 59(3): 159-180. (2002)

NAL Call #: QH75.A1L32; ISSN: 0169-2046

Descriptors: commercial activities/ conservation measures/ terrestrial habitat/ land and freshwater zones/ comprehensive zoology: forestry/ silviculture/ conservation measures/ biodiversity preservation/ habitat management/ wildlife habitat enhancement/ forest and woodland/ moist maritime forests/ conservation tools/ United States/ Pacific Northwest/ large scale forest management

Abstract: Several large, integrated forest management experiments have been initiated in the Pacific Northwest this past decade, partially in response to contentious resource management debates. Their goal is to use alternative silviculture treatments to enhance wildlife habitat, biodiversity, or the conservation of aquatic resources in a manner that is socially acceptable. Seven of these large-scale multi-resource silvicultural experiments are examined and evaluated, in light of previous experience with large-scale experiments. All seven employ randomized block designs with replicated treatment units large and practical enough to be commercially operational (most treatment units are 13-20 ha). Because the large-scale context is designed into these experiments, results can be directly interpreted at the scale of management that produced the manipulation, eliminating a change-of-scale bias common in smaller management experiments. The considerable advantages of large, operational treatments are accompanied by their own problems, however. Because of the great expense (\approx US\$ 106/block) and size (50-200 ha) of the experimental blocks, sample size is small ($n < 7$ blocks) on all but one experiment. This means

that statistical power (the probability of correctly rejecting the null hypothesis) will be weak across blocks. With few replicates and high variability both within and among these large-scale treatments, investigators face the possibility that differences might only be detectable at untraditionally high significance levels. A second problem with large-scale experiments is pseudoreplication (lack of independence across replicates), which results in the strength of the experimental evidence being overstated. This is a concern for three of the experiments because their blocks are located in relatively small geographic areas. Meta-analysis (a joint hypothesis test across experiments) is proposed as an effective way to increase sample size-and, therefore, power-while accounting for the different degrees of variation across studies. Looking for commonality, all seven studies are examining the effect of alternative silvicultural on both wildlife habitat and biodiversity. A test of a common hypothesis about ecosystem management would greatly increase not only the power of the test but the return on investment from these rather expensive experiments. In addition to small sample sizes, large variability, and pseudoreplication, other problems common to large-scale experiments are evident. Forest growth experiments are inherently long-term because they are dominated by slow processes with strong transient dynamics. Investigators are faced with institutional and academic demands for short-term results that not only are publishable but also can justify the large investments. The realities of the timber-sale process delayed or eliminated several blocks on at least three of the experiments. Randomization becomes a serious concern for the forest manager, because a clearcut or heavy removal treatment could be assigned to a highly visible location that might be socially unacceptable. © Thomson Reuters Scientific

1128. Leaf-litter decomposition and macroinvertebrate communities in boreal forest streams linked to upland logging disturbance.

Kreutzweiser, David P.; Good, Kevin P.; Capell, Scott S.; and Holmes, Stephen B.

Journal of the North American Benthological Society 27(1): 1-15. (Mar. 2008)

NAL Call #: QL141.F7

Descriptors: macroinvertebrates/ leaf litter/ forests/ forestry practices

Abstract: Leaf-litter decomposition and associated macroinvertebrate communities were compared in standardized leaf packs across forest streams in recently clearcut ($n = 9$) and reference ($n = 12$) low-order catchments on the Boreal Shield in northeastern Ontario, Canada. Logging was conducted under best management practices that included application of 30- to 100-m-wide no-harvest buffer zones on both sides of each stream. No significant differences were detected between sites in logged and reference streams for any reach- or catchment-level characteristics (except % area logged) or water-quality variables. Coarse-mesh leaf-pack mass loss was significantly lower (t-test, $p = 0.003$), and the ratio of fine-mesh to coarse-mesh leaf-pack mass loss was significantly higher (t-test, $p = 0.008$) in logged than in reference streams, but no difference in fine-mesh leaf-pack mass loss was detected between logged and reference streams. A stepwise multiple regression model of coarse-mesh leaf-pack mass loss on 15 reach- and catchment-level characteristics indicated that only logging presence/absence ($r = -0.524$) and average reach velocity ($r = 0.397$) were significantly and independently associated

with leaf-litter decomposition. Macroinvertebrate communities on leaf packs in logged streams were different from those in reference streams. Taxonomic richness was significantly lower in logged than in reference streams. A multivariate ordination and analysis of similarity separated logged from reference streams, and abundances of the 3 most discriminating taxa were significantly lower in logged than in reference streams. A multivariate BVSTEP routine indicated that macroinvertebrate community structure was most strongly associated with logging presence/absence among the suite of site characteristics. Leaf-litter decomposition and aquatic macroinvertebrate community structure were successful bioindicators of catchment logging impacts, even when logging was conducted under best management practices. Effects on litter decomposition and leaf-pack macroinvertebrate communities seem to have been caused by upland logging disturbances because riparian areas were undisturbed in logged catchments.
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1129. Legacy retention versus thinning: Influences on small mammals.

Wilson, Suzanne M. and Carey, Andrew B.
Northwest Science 74(2): 131-145. (2000)
NAL Call #: 470 N81; ISSN: 0029-344X
Descriptors: *Clethrionomys gapperi/ Microtus oregoni/ Neurotrichus gibbsii/ Peromyscus maniculatus/ Peromyscus oreas/ Sorex monticolus/ Sorex trowbridgii/ Sorex vagrans/ communities/ ecosystems/ forestry practices/ forests, coniferous/ forests, old-growth/ habitat alterations/ habitat management/ mammals/ management/ snags/ species diversity/ succession/ wildlife/ creeping vole/ montane shrew/ Trowbridge's shrew/ southern red-backed vole/ deer mouse/ meadow mouse/ American shrew mole/ Columbian mouse/ Washington*
Abstract: Management strategies for promoting late-seral attributes in second-growth forest need evaluation for their efficacy in maintaining biodiversity, including complete forest-floor, small-mammal communities. Two common strategies in the Pacific Northwest are (1) management with thinnings to promote large trees with developed understories and (2) retention of legacies, defined as live trees, logs, and snags from the preceding forest, at harvest, followed by protection but not thinnings of the new stand. The authors compared small-mammal communities resulting from >65 years of application of these strategies in the Puget Trough, Washington. They also compared these communities with the small-mammal communities found in old-growth, naturally young, and extensively managed forests elsewhere in western Washington. Forests managed with thinnings had 1.5 times the individual mammals and 1.7 times the mammal biomass of forests managed with legacies of coarse woody debris and snags - differences similar to those between old-growth and naturally young forest (1.2 times more individuals in old-growth) and old-growth and extensively managed forest (1.6 times more in old-growth). Management strategy had a profound impact on community structure, with the Columbian mouse (*Peromyscus oreas*), the small mammal most associated with old growth, much reduced in Puget Trough forests (absent from most stands) and the creeping vole (*Microtus oregoni*) (a species commonly associated with early seral stages, but found in all seral stages in Washington) third-ranked in thinned stands but seventh ranked in legacy stands. The montane shrew (*Sorex*

monticolus) was second-ranked, after Trowbridge's shrew (*S. trowbridgii*), in marked contrast to codominance by the southern red-backed vole (*Clethrionomys gapperi*), *S. monticolus*, and *P. oreas* in old growth. Thus, neither strategy produced communities typical of late-seral forests.
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1130. Linking shade coffee certification to biodiversity conservation: Butterflies and birds in Chiapas, Mexico.

Mas, A. H. and Dietsch, T. V.
Ecological Applications 14(3): 642-654. (2004)
NAL Call #: QH540.E23; ISSN: 10510761
Descriptors: *biodiversity/ certification/ Chiapas, Mexico/ coffee agroecosystems/ forest birds/ fruit-feeding butterflies/ intensity gradient/ market-based conservation/ shade coffee/ agricultural ecosystem/ agricultural practices/ biodiversity/ certification/ coffee/ conservation management/ ecolabeling/ ecological economics/ North America/ Aves/ Papilionoidea*
Abstract: Shade coffee certification programs have emerged over the past six years to verify that coffee marketed as "shade grown" is actually grown on farms that provide higher quality habitat for biodiversity. In spite of good intentions and an increasing market, little consensus exists on whether current criteria can successfully identify coffee farms of conservation significance. This paper provides the first ecological evaluation and comparison of shade-grown coffee criteria used by major certification programs. Using vegetative data, we evaluated criteria developed by the Rainforest Alliance, the Smithsonian Migratory Bird Center (SMBC), and the Specialty Coffee Association of America across a range of coffee agroecosystems in Chiapas, Mexico, to determine which management practices each program would certify. Fruit-feeding butterflies and forest bird species found in these coffee agroecosystems were compared with nearby forest reserves as indicators of biodiversity and conservation potential. These agroecosystems fall into three categories: rustic, commercial polyculture, and shaded monoculture. The rustic system contained significantly higher fruit-feeding butterfly diversity and an avifauna more similar to that found in forest reserves than the other systems. This was also the only agroecosystem that met the criteria for all certification programs, while the shaded monoculture fell short of all sets of criteria. This suggests that certification programs are succeeding in discriminating between the extremes of shade coffee production. Certification programs differed, however, in their treatment of the intermediate, commercial polyculture systems, reflecting different philosophies for conservation in managed ecosystems. Programs promoted by SMBC use high standards that would exclude all but the most diverse commercial polyculture or rustic systems to certify only those systems that support high levels of biodiversity. The program supported by the Rainforest Alliance only excludes the shaded monoculture while engaging the others in the move toward greater sustainability. The merits of each approach should be put to rigorous debate, and their ability to contribute to biodiversity conservation should be reflected in product marketing. This study suggests that further research can provide a stronger scientific basis and independent verification for the certification of green products that claim to enhance biodiversity conservation in tropical agroecosystems.
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1131. A literature review of management practices to support increased biodiversity in intensively managed Douglas-fir plantations.

Zobrist, Kevin W. and Hinckley, Thomas M.
 Pullman, WA: Rural Technology Initiative, 2005.
Notes: See related document at
<http://www.ncseonline.org/NCSSF/cms.cfm?id=683>;
 Literature review; Final Technical Report to the National Commission on Science for Sustainable Forestry (NCSSF).
<http://www.ncseonline.org/ewebeditpro/items/O62F7175.pdf>
Descriptors: Pseudotsuga menziesii/ Douglas fir/ biodiversity/ forest management/ management practices/ wildlife

1132. A literature review of management practices to support increased biodiversity in intensively managed loblolly pine plantations.

Zobrist, Kevin W.; Hinckley, Thomas M.; and Andreu, Michael G.
 Pullman, WA: Rural Technology Initiative, 2005.
Notes: See related document at
<http://www.ncseonline.org/NCSSF/cms.cfm?id=683>;
 Literature review; Final Technical Report to the National Commission on Science for Sustainable Forestry (NCSSF).
http://www.ruraltech.org/pubs/working/ncssf/tech_c/index.asp
Descriptors: Pinus taeda/ loblolly pine/ biodiversity/ forest management/ management practices/ wildlife

1133. Litter invertebrate responses to variable density thinning in western Washington forest.

Schowalter, T. D.; Zhang, Y. L.; and Rykken, J. J.
Ecological Applications 13(5): 1204-1211. (2003)
 NAL Call #: QH540.E23 ; ISSN: 1051-0761
Descriptors: conservation measures/ ecology/ terrestrial habitat/ land zones/ Invertebrata: habitat management/ variable density thinning/ forest/ effects on litter fauna/ community structure/ forest litter/ effects of forest thinning/ forest and woodland/ Douglas fir forest/ variable density thinning effects on litter fauna/ Litter habitat/ Washington/ Ft Lewis Military Reservation/ forest thinning effects on litter fauna/ invertebrates
Abstract: We evaluated the response of forest floor invertebrates to variable density thinning (VDT) of the Douglas-fir (*Pseudotsuga menziesii* (Mirb.) Franco) forest overstory at Ft. Lewis, Washington, during 2000 and 2001 (7-8 years, post-thinning). We placed pitfall traps at 8-12 random grid points in each of four thinned units and four control (unthinned) units in each of two sites (blocks) representing different management histories. Most taxa showed significant seasonal trends, with peak abundances during summer. ANOVA indicated strongly significant effects of site for 9 of 39 species and combined taxa, probably reflecting factors associated with management history; only two taxa showed significant responses to the thinning treatment or to blockxreatment interactions. Indicator analysis revealed three spider species as potential indicators of thinning treatment. Detrended correspondence analysis (DCA) and cluster analysis for 85 species indicated that the thinning treatments altered the invertebrate assemblage in different ways, depending on initial structure. Multiresponse permutation procedure (MRPP) confirmed that species assemblages, but not combined taxa or functional groups, in treated units differed

significantly from those in control units and from each other. Therefore, VDT affected forest floor invertebrates in the short term, but the effect was strongly modified by site (block) factors, especially management history. These results indicated that previous management history is an important determinant of treatment effect and that compensatory shifts in relative importance among species within functional groups may maintain ecological function during environmental changes.
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1134. Little trees, big benefits.

DeWitt, Bob
Missouri Conservationist 64(8)(2003); ISSN: 0026-6515
Descriptors: wildlife/ succession/ mammals/ habitat management/ forests/ forestry practices/ forest/ wildlife relationships/ food supply/ ecosystems/ ecosystem management/ birds/ Missouri
Abstract: Trees follow the same cycle of birth, growth, reproduction, and death that governs all living things. These changes during its lifetime are referred to as succession. The ability of trees to provide wildlife habitat varies throughout their life cycle. When mature trees are removed, sun reaches the soil surface and stimulates new vegetation. This new growth is made up of several types including woody plants that sprout from shoots and roots of removed trees. The period of regrowth of a forest is called regeneration, which can last up to 20 years. The regeneration stage provides many things to different species of animals. Its abundant foliage provides browse for mammals and insects. Its insects form high-protein food source for many bird species. The fruits and seeds of plants provide food for birds during fall and winter. Species that prefer areas of forest regeneration include quail, turkey, deer, and numerous songbirds. Maintaining an adequate amount of forests in the regenerative condition requires harvesting timber. Several projects are implemented to create suitable habitat for wildlife. The River Hills Forest Habitat Project, was formed to create sufficient successional habitat to increase the numbers of ruffed grouse in east central Missouri. The forest management standard is to preserve 10 percent of forest cover in regeneration condition. Woodland improvement and woody edge enhancement are the practices that can be implemented to provide young forest habitat. During woodland improvement undesirable tree species are removed. The process of woody edge enhancement creates small openings in large blocks of mature forest to stimulate forest regeneration.
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1135. Long-term effects of even-aged management on bird communities in central Pennsylvania.

Yahner, R. H.
Wildlife Society Bulletin 28(4): 1102-1110. (2000)
 NAL Call #: SK357.A1W5; ISSN: 00917648
Descriptors: bird community/ clearcutting/ even-aged management/ forest/ nest predation/ nesting success/ Pennsylvania/ avifauna/ brood parasitism/ community composition/ community structure/ deciduous forest/ nesting success/ predation/ wildlife management/ United States/ Pipilo erythrophthalmus/ Poecile atricapillus/ Seiurus aurocapillus

Abstract: Long-term studies are a prerequisite for understanding the impacts of even-aged management on bird communities of the eastern deciduous forest. In this paper, I synthesize the results obtained from a series of studies dealing with the structure and composition of wintering and breeding bird communities and the impacts of predation and brood parasitism on avian nesting success over a 22-year period (1974-1995) on a study area affected by even-aged management in central Pennsylvania. Fourteen wintering species were noted on the study area; 8 (57%) were present on treated (managed) and reference (uncut) sectors. Species richness of wintering birds remained relatively constant over time, but trunk-bark foraging species, e.g., black-capped chickadee (*Poecile atricapillus*), predominated on the study area. Forty-seven breeding species were recorded on the study area; 37 (79%) occupied both sectors. Unlike in winter, species richness fluctuated widely over time, perhaps due to chance or short-term response to habitat changes created by even-aged management. Early successional species, e.g., eastern towhee (*Pipilo erythrophthalmus*), tended to be most common on the study area; however, as plant succession progressed, forest-interior species, e.g., ovenbird (*Seiurus aurocapillus*), became abundant. Nest predation declined over time, in part because of probable reductions in abundance of avian nest predators. Incidences of brood parasitism remained relatively low throughout the study period. A comprehensive, long-term study on a localized area, such as this study in central Pennsylvania, provides important insight into the effects of small-scale, even-aged management on bird communities in a managed forested landscape.

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1136. Long-term impacts of even-aged timber management on abundance and body condition of terrestrial amphibians in northwestern California.

Karraker, N. E. and Welsh, H. H.

Biological Conservation 131(1): 132-140. (2006)

NAL Call #: S900.B5; ISSN: 0006-3207

Descriptors: commercial activities/ conservation measures/ whole animal physiology/ ecology/ population dynamics/ terrestrial habitat/ land zones/ Amphibia: forestry/ even aged timber management/ long term impact on abundance and body condition/ habitat management/ even aged silvicultural systems/ physiological condition/ body condition/ long term impact of even aged timber management/ population size/ abundance/ forest and woodland/ abundance and body condition/ California/ Amphibia/ amphibians/ chordates/ vertebrates

Abstract: Conservation needs for amphibians in managed timberlands may differ based upon the species present and the timber harvesting methods employed. Clearcuts have been documented to be detrimental to amphibians but the impacts of associated silvicultural edges and alternative harvesting treatments are not well understood. The primary objective of this study was to determine if amphibian abundances and body condition differed in thinned forests and intact forests, and in clearcuts and associated silvicultural edges. We also examined which environmental attributes were important in explaining observed differences. We sampled clearcuts, silvicultural edges, and adjacent late-seral forests at 10 sites in northwestern California from October 1999 to July 2002. Clearcuts at these sites ranged in age from 6 to 25 years. Five of these

forest stands were intact and five had been commercially thinned at least 10 years prior to our study. Amphibian abundances were similar in thinned and unthinned forests, but body condition of the most common species was lower in thinned forests. Abundances of amphibians were nearly twice as high in forests and at silvicultural edges than in clearcuts. Clearcutting at these sites appears to have affected amphibian numbers up to 25 years post-harvest, however, silvicultural edges were suitable habitats for amphibians. While commercial thinning did not reduce amphibian numbers, it is an intermediate treatment followed by clearcutting. Where conservation of amphibians is a concern, even-aged silvicultural systems may not provide the most appropriate method for maintaining viable populations on managed forestlands in the northwestern US.

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1137. Long-term prescribed burning regime has little effect on springtails in pine stands of southern Arkansas.

Renschin, Michele L.; Thompson, Lynne C.; and Shelton, Michael G.

In: Proceedings of the 12th Biennial Southern Silvicultural Research Conference, General Technical Report-SRS 71/ Connor, Kristina F.; Asheville, NC: Southern Research Station, Forest Service, U.S. Department of Agriculture, 2004. pp. 79-81.

<http://www.treesearch.fs.fed.us/pubs/6304>

Descriptors: commercial activities/ ecology/ terrestrial habitat/ abiotic factors/ physical factors/ land zones/ Collembola: forestry/ prescribed burning/ community structure/ prescribed burning effects/ forest and woodland/ pine forest habitat/ fire/ Arkansas/ Ashley County/ Crossett Experimental Forest/ Insecta/ arthropods/ insects/ invertebrates

Abstract: Concerns regarding the impacts of prescribed fires on faunal communities in pine stands have led to numerous studies. One soil/litter insect that may be influenced by fire is springtails, an important member of the forest floor community. A study was conducted in burned and unburned loblolly/shortleaf pine stands in southeastern Arkansas to examine whether springtail abundance, composition, and diversity were different between areas burned every 2 to 3 years over the past 20 years and areas not burned at all. Litterbags were used to collect springtails periodically over a 10-month period. Comparisons of springtail populations for the two treatments were analyzed by abundance, diversity, and similarity. A total of 5,528 individuals were collected, but only 92 percent could be identified to family; identified specimens represented 24 genera and 10 families. The prescribed fires significantly affected only one genus, *Orchesella*, which occurred in burned areas more frequently than in unburned areas. Springtail diversity was not affected by burning. Dendrograms based on Jaccard and Sorenson (Bray-Curtis) similarity indices showed no distinct grouping of the treatments. These results indicate that springtail populations on the sites are influenced more by other environmental factors than by prescribed fire.

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1138. Long-term responses of ecosystem components to stand thinning in young lodgepole pine forest, Part I: Population dynamics of northern flying squirrels and red squirrels.

Ransome, D. B.; Lindgren, P. M.; Sullivan, D. S.; and Sullivan, T. P.

Forest Ecology and Management 202(1-3): 355-367. (2004)
NAL Call #: SD1.F73; ISSN: 03781127.

Notes: doi: 10.1016/j.foreco.2004.08.002.

Descriptors: Glaucomys sabrinus/ lodgepole pine/ old-growth attributes/ population dynamics/ pre-commercial thinning/ Tamiasciurus hudsonicus/ ecosystems/ growth kinetics/ population statistics/ sampling/ late-seral forests/ population dynamics/ pre-commercial thinning/ forestry/ forest management/ old-growth forest/ population dynamics/ rodent/ thinning/ ecosystems/ forestry/ Pinus/ Sampling/ Glaucomys/ Glaucomys sabrinus/ Pinus contorta/ Sciuridae/ Tamiasciurus hudsonicus

Abstract: A new paradigm in forest management is managing second-growth forests to accelerate development of structural characteristics associated with late-seral forests. A key uncertainty is whether those wildlife species associated with these structural characteristics will respond positively to their development in thinned young seral forests. This study was designed to test the hypothesis that population dynamics (abundance, breeding condition, and survival) of northern flying squirrels (*Glaucomys sabrinus*) and red squirrels (*Tamiasciurus hudsonicus*) would be maintained at levels recorded in old-growth forests by large-scale pre-commercial thinning of young (17-27 years old) lodgepole pine (*Pinus contorta*) forests. Replicated study areas were located near Penticton, Kamloops, and Prince George in south-central British Columbia, Canada. Each study area had three young pine stands thinned to densities of ~500 (low), ~1000 (medium), and ~2000 (high) stems/ha, with unthinned (4300-7600 stems/ha) and old-growth stands for comparison. Populations of *G. sabrinus* and *T. hudsonicus* were sampled intensively from 2000 to 2002 corresponding to 12-14 years after thinning. Abundance of *G. sabrinus* was significantly higher in the high-density stand and lowest in the low-density and unthinned stands. Intermediate densities were found in the medium-density and old-growth stands. Adult male body mass was significantly greater in old-growth than high-density stands. We failed to detect significant differences among treatments for recruitment, movement, and survival for *G. sabrinus* and all parameters measured for *T. hudsonicus*. Survival increased significantly in 2002 from previous years for *G. sabrinus*, while survival decreased significantly for *T. hudsonicus* during this period. Our results support the hypothesis that population dynamics of *G. sabrinus* and *T. hudsonicus* would be maintained at levels recorded in old-growth forests by large-scale pre-commercial thinning of young lodgepole pine forests. Abundance of *G. sabrinus* in high-density stands exceeded levels recorded in old-growth stands.

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1139. Long-term responses of ecosystem components to stand thinning in young lodgepole pine forest, Part II: Diversity and population dynamics of forest floor small mammals.

Sullivan, T. P.; Sullivan, D. S.; Lindgren, P. M.; and Ransome, D. B.

Forest Ecology and Management 205(1-3): 1-14. (2005)
NAL Call #: SD1.F73; ISSN: 03781127

Descriptors: abundance/ Clethrionomys gapperi/ forest-floor small mammals/ lodgepole pine/ population dynamics/ pre-commercial thinning/ species diversity

Abstract: A variety of silvicultural practices may be used to diversify second-growth forests that have regenerated from clearcut harvesting. These young stands are structurally simple and amenable to practices such as variable-density and conventional thinnings to accelerate ecosystem development. This study was designed to test the hypotheses that (i) abundance and diversity of forest floor small mammals, and (ii) population dynamics (reproduction, recruitment, and survival) of the southern red-backed vole (*Clethrionomys gapperi*) would be maintained at levels recorded in old-growth forest, by large-scale thinning to various densities in young lodgepole pine (*Pinus contorta*) forest. Replicate study areas were located near Penticton, Kamloops, and Prince George in south-central British Columbia, Canada. Each study area had three stands thinned to densities of ~500 (low), ~1000 (medium), and ~2000 (high) stems/ha, with an unthinned young pine and old-growth pine stand for comparison. Forest floor small mammal communities were sampled intensively in 2000, 2001, and 2002 at 12-14-years after the pre-commercial thinning treatment. Mean total abundance of small mammals was similar among stands with the highest overall numbers recorded in 2002. Mean species richness and diversity of small mammals were similar among stands. Mean abundance of *C. gapperi* was similar among stands and increased significantly with time. This pattern of abundance of *C. gapperi* will likely be consistent except perhaps in years of high numbers when productivity of this species may be highest in old-growth forest. Reproduction, recruitment, and early juvenile survival of *C. gapperi* was similar among stands; Jolly-Seber summer survival was higher in the thinned than unthinned stands with no difference in winter survival among stands. Our results supported hypotheses (i) and (ii) that abundance and diversity of forest floor small mammals and the demographic attributes of *C. gapperi* populations would be maintained in young managed lodgepole pine stands (thinned or unthinned) at levels recorded in old-growth forest.

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1140. Long-term responses of ecosystem components to stand thinning in young lodgepole pine forest, Part IV: Relative habitat use by mammalian herbivores.

Sullivan, T. P.; Sullivan, D. S.; Lindgren, P. M. F.; and Ransome, D. B.

Forest Ecology and Management 240(1-3): 32-41. (2007)
NAL Call #: SD1.F73; ISSN: 03781127.

Notes: doi: 10.1016/j.foreco.2006.11.020.

Descriptors: Alces alces/ Lepus americanus/ lodgepole pine/ Odocoileus hemionus/ pre-commercial thinning/ relative habitat use

Abstract: Pre-commercial thinning (PCT) is a silvicultural practice that can provide diverse understory and overstory vegetation conditions. We tested the hypothesis that relative habitat use by snowshoe hare (*Lepus americanus*), mule deer (*Odocoileus hemionus*), and moose (*Alces alces*) would increase in response to enhanced abundance of herbs and shrubs, and species diversity and structural diversity of conifers, in heavily thinned (≤ 1000 stems/ha) stands, at 12-15 years post-thinning. Replicate study areas were located near Penticton, Kamloops, and Prince George in south-central British Columbia, Canada. Each study area had three young pine stands thinned to densities of ~500 stems/ha (low), ~1000 stems/ha (medium), and ~2000 stems/ha (high), with an unthinned young pine and old-growth pine stand for comparison. Relative habitat use, based on counts of fecal pellets and pellet-groups, was similar among the five treatment stands for hares ($P = 0.24$), deer ($P = 0.23$), and moose ($P = 0.16$). However, low-density stands (~500 stems/ha) had ca. 3-20 times as many deer pellet-groups, and ca. 2-4 times as many moose pellet-groups, than other stands. Low-density stands had significantly greater canopy openness, volume of shrubs < 2 m, and horizontal hiding cover < 1.6 m than other treatments. Relative habitat use by deer and moose was positively related to understory characteristics such as enhanced abundance of forage and security cover. These results support our hypothesis that deer and moose responded positively to enhanced volume of herbs and shrubs as well as to species diversity and structural diversity of conifers and overall vegetation in heavily thinned (≤ 1000 stems/ha) stands at 12-15 years post-thinning. Our results suggest that ungulate management would be enhanced if greater emphasis was placed on forage enhancement throughout the year, which differs from current management recommendations which tend to focus on winter range and snow-interception cover.
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1141. Longleaf pine restoration: Implications for landscape-level effects on bird communities in the Lower Gulf Coastal Plain.

Tucker, J. W.; Hill, G. E.; and Holler, N. R.
Southern Journal of Applied Forestry 27: 107-121.
(May 2003)
NAL Call #: SD1.S63

Descriptors: *Pinus palustris*/ ecological restoration/ analysis of variance/ forest habitats/ wildlife habitats/ forest ecosystems/ ecosystem management/ wild birds/ statistical analysis/ prescribed burning/ forest plantations/ coastal forests/ Gulf of Mexico region/ Florida/ Eglin Air Force Base/ neotropical migrants/ resident birds/ migratory birds/ sandhills/ natural resources, environment, general ecology, and wildlife conservation/ forestry related
This citation is from AGRICOLA.

1142. Managed forest landscape structure and avian species richness in the southeastern US.

Loehle, C.; Wigley, T. B.; Rutzmoser, S.; Gerwin, J. A.; Keyser, P. D.; Lancia, R. A.; Reynolds, C. J.; Thill, R. E.; Weih, R.; White, D.; and Wood, P. B.
Forest Ecology and Management 214(1-3): 279-293. (2005)
NAL Call #: SD1.F73; ISSN: 03781127.
Notes: doi: 10.1016/j.foreco.2005.04.018.

Descriptors: avian diversity/ forest management/ landscape heterogeneity/ species accumulation curves/ biodiversity/ biomarkers/ biomass/ data acquisition/ distance measurement/ landforms/ spatial variables measurement/ watersheds/ landscapes/ species composition/ stem density/ sustainable forest programs/ forestry/ avifauna/ breeding population/ species richness/ stand structure/ biodiversity/ biomass/ birds/ forest products/ forests/ indicators/ sustainable forest management/ watersheds/ Arkansas/ Aves
Abstract: Forest structural features at the stand scale (e.g., snags, stem density, species composition) and habitat attributes at larger spatial scales (e.g., landscape pattern, road density) can influence biological diversity and have been proposed as indicators in sustainable forestry programs. This study investigated relationships between such factors and total richness of breeding birds based on data from four studies within highly forested landscapes in the southeastern United States (Arkansas, South Carolina, and West Virginia) that were managed for commercial forest products. Habitat attributes were developed from forest inventory data and other information at the stand level and in circular buffers with radii of 250, 500 m, and 1 km around each sample point. Species accumulation curves for all study sites indicated greater richness in the youngest stands, with greater landscape age heterogeneity, and with proximity of sample points to roads. However, bird richness was not related to distance to nearest water or stream density at any scale. Pine forests had the most species at two of three sites where pine forests occurred. Stand biomass and basal area were generally not predictive of avian richness. Watersheds within the Arkansas site under more intensive management showed greater bird diversity. Overall, forest management appeared to have a positive effect on total bird richness.
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1143. Managed forests and migratory bird populations: Evaluating spatial configurations through simulation.

Goldstein, M. I.; Corson, M. S.; Lacher, T. E.; and Grant, W. E.
Ecological Modelling 162(1-2): 155-175. (2003)
NAL Call #: QH541.15.M3E25; ISSN: 03043800
Descriptors: connectivity/ habitat fragmentation/ Industrial forestry/ neotropical migrant birds/ spatially explicit simulation/ avifauna/ ecological modeling/ forest management/ habitat fragmentation/ migratory species/ simulation/ species richness/ succession/ *Pinus echinata*/ *Pinus taeda*

Abstract: We developed a simulation model of forest succession in managed loblolly pine (*Pinus taeda*) short-leaf pine (*Pinus echinata*) plantations to explore factors that influence temporal variability in avian richness. We simulated 16 unique landscapes through a full harvest rotation (i.e. 25 years from planting to harvest). In the model, Neotropical migrant birds colonized tree stands based on habitat parameters such as vegetation type, stand size and configuration, and amount of edge. The model predicted species richness and abundance for each stand and across the landscape. Results demonstrated how stand size, stand configuration, and habitat fragmentation may play a substantial role in landscape suitability concerns for Neotropical migrant birds. An intermediate level of landscape fragmentation appeared to

decrease variation in total bird abundance and to provide greater overall species richness, the latter an important consideration when the concern lies with optimizing multiple species management.

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1144. Managing changing landscapes on the northern prairies: Using functional groups and guilds.

Radenbaugh, T. A.

Prairie Forum 30(1): 157-170. (2005); ISSN: 03176282

Descriptors: ecosystem function/ ecosystem management/ guild/ landscape change/ prairie/ Canada/ North America/ Aves

Abstract: This article reviews how the northern prairie landscapes have changed since European agricultural settlement at the broad ecosystem level. Society has developed a broad-scale relationship with this landscape that is complex, causal, and non-linear, and investigating human-environment interactions needs to be addressed in terms of ecological functions and hierarchies. Ecosystem functions are examined in terms of changes in both landscape level vegetation and breeding bird guilds. Human land use has increasingly sculptured the landscape to the point where society now influences all ecological levels of the region, altering not only species assemblages but also how the entire ecosystem functions. Thus, we must also look at our management of the system at the ecosystem level. Using this approach, some general strategies are outlined to manage northern prairie ecosystems, with an emphasis on using changes in biotic guilds as an overall indication of ecosystem health.

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1145. Managing firebreak fuels to promote habitat of an imperiled moth (Massachusetts).

Haggerty, Sarah A. and Sievert, Paul R.

Ecological Restoration 23(1): 67-68. (2005);

ISSN: 1522-4740

Descriptors: conservation measures/ terrestrial habitat/ land zones/ *Hemileuca maia*: habitat management/ firebreak management/ Conservation implications/ woodland and scrub/ forest and woodland/ Pitch pine/ scrub oak barrens/ scrub/ Massachusetts/ Martha's Vineyard/ Insecta, Lepidoptera, Glossata, Heteroneura, Bombycoidea, Saturniidae/ arthropods/ insects/ invertebrates/ Lepidopterans

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1146. Managing for wildlife habitat in Westside production forests.

Harrington, Timothy B. and Nicholas, Gretchen E.

Portland, OR: Pacific Northwest Research Station, Forest Service, U.S. Department of Agriculture; General Technical Report-PNW 695, 2007. 135 p.

Notes: Meeting paper: Managing for wildlife habitat in Westside production forests, October 18, 2006, held in Vancouver, WA.

Descriptors: commercial activities/ conservation measures/ terrestrial habitat/ land zones/ comprehensive zoology: forestry/ wildlife habitat management in production forests/ managing for wildlife habitat in westside production forests/ habitat management/ forest management strategies/ forest and woodland/ production forests/ wildlife habitat management/ Pacific Northwest/ Washington/ Vancouver

Abstract: The purpose of the workshop was to provide prescriptions and guidelines for people who manage Westside forests (those west of the Cascade Mountains' crest) primarily for wood production, but because of mandate or personal preference, want to integrate wildlife values. The audience included over 150 professionals from forest industry, consulting firms, and public and tribal forest and wildlife management agencies. This proceedings includes ten papers based on oral presentations at the workshop plus a synthesis paper summarizing workshop themes, discussions, and related information. Topics include a history of wildlife management research in the Pacific Northwest, elements of habitat and how to manage for them, the challenges of appropriately implementing ecosystem management, and economic implications to private forestland owners.

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1147. Managing forestlands for wildlife.

Yahner, Richard H.; Mahan, Carolyn G.; and Rodewald, Amanda D.

In: *Techniques for wildlife investigations and management*/ Braun, C.; 6th.

Bethesda, MD: Wildlife Society, 2005; pp. 898-919.

Notes: ISBN: 0933564155.

Descriptors: commercial activities/ conservation measures/ terrestrial habitat/ comprehensive zoology: forestry/ forest management for wildlife/ habitat management/ forest and woodland/ habitat management for wildlife

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1148. Managing forests for wildlife.

Dickson, J. G. and Wigley, T. B.

In: *Wildlife of southern forests habitat and management.*

Blaine, WA: Hancock House Publ., 2001; pp. 83-94.

http://www.srs.fs.usda.gov/pubs/ja/ja_dickson003.pdf

Descriptors: forest habitat/ habitat management/ riparian habitat/ edge habitat/ herbicides/ Alabama/ Arkansas/ Florida/ Georgia/ Kentucky/ Louisiana/ Mississippi/ North Carolina/ Texas/ South Carolina/ Oklahoma/ Tennessee

Abstract: In this chapter we present some information about habitat relationships and management options at a scale broader than the stand level, such as discussion of edge and streamside zones. But we treat wildlife habitat relationships primarily at the stand level, which is the basic management unit. We approach this by treating suitability of stand structure and composition for wildlife communities and present information about how common management practices affect that suitability as wildlife habitat for wildlife communities. Each species has different habitat requirements, so conditions or manipulations that favor some species likely will be negative for others. Forest and stand suitability for wildlife should be considered in regard to alternative land uses and also how they fit into the broader landscape context. In recent years pine plantations have increased in extent in the South, there is much interest in pine plantations as wildlife habitat, and much of this chapter focuses on those relationships.

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1149. Managing forests for wildlife and nontimber products.

McEvoy, Thom

In: Positive Impact Forestry: A Sustainable Approach to Managing Woodlands/ McEvoy, Thom.

Washington, DC: Island Press, 2004; pp. 171-191.

NAL Call #: SD387.S87 M389 2004

Descriptors: wildlife/ forest management/ silvicultural practices/ habitat management

1150. Managing forests with prescribed fire: implications for a cavity-dwelling bat species.

Boyles, Justin G. and Aubrey, Doug P.

Forest Ecology and Management 222(1-3): 108-115. (2006)

NAL Call #: SD1.F73; ISSN: 0378-1127

Descriptors: Chiroptera/ Vespertilionidae/ Nycticeius humeralis/ Microchiroptera/ environmental factors/ habits-behavior/ behavior/ canopy light penetration/ cavity-dwelling bat species/ deciduous forest management/ habitat use/ fires-burns/ forests/ ecosystems/ land zones/ Missouri/ North America/ prescribed forest burns/ radiotelemetry/ roosts/ roosting/ roosting preference/ roosting site selection/ site selection/ Taney County, Drury Conservation Area/ terrestrial ecology/ microchiroptera/ tree hole/ sleeping place/ habitat/ forest/ landscape management/ fire

Abstract: Prescribed burning is used as a restoration and management technique in many deciduous forests of eastern North America. The effects of fire have been studied on habitat selection of many vertebrate species, but no studies have reported the effect of fire on bat roosting habitat. Fire initially leads to an influx of dead and dying trees, an increase of light availability, and a decrease of canopy and sub-canopy tree density. These characteristics are beneficial to many forest-dwelling vertebrates including cavity-roosting bats. We evaluated evening bat (*Nycticeius humeralis*) roost-site selection at the stand-scale in order to determine roosting preferences as they relate to prescribed burning. Standard radiotelemetry techniques were used to locate evening bat roost trees. Canopy light penetration and overstory tree density were measured in both burned and unburned forests. Sixty-three trees used as roosts by both male and female evening bats were located during both the summer and winter and all 63 roosts were located in the burned portion of the study area. Canopy light penetration was higher and canopy tree density was lower in the burned forest than unburned forest. An increase in light availability may release bats from one of the constraints suggested for many forest-dwelling bat species in roost tree selection-sun-exposure. This should increase the abundance of trees with characteristics suitable for roosting and may allow bats to roost throughout the interior of the forest as opposed to only on forest edges, thereby allowing bats to roost closer to foraging grounds and possibly lessening predation rates. Lower tree density may allow for ease of flight within the forest as well as more efficient locating of roost trees. In addition, there were a significantly higher proportion of dead trees, which evening bats commonly use as roost trees, in burned forests compared to unburned forests. Prescribed burning appears to initially lead to creation or restoration of favorable cavity-dwelling bat habitat and its continual implementation perpetuates an open sub-canopy. Therefore, we suggest that prescribed

burning may be a suitable tool for management of roosting habitat for cavity-roosting bats. © 2005 Elsevier B.V. All rights reserved.

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1151. Managing habitat for dispersing northern spotted owls: Are the current management strategies adequate?

Buchanan, J. B.

Wildlife Society Bulletin 32(4): 1333-1345. (2004)

NAL Call #: SK357.A1W5; ISSN: 00917648.

Notes: Section: "In My Opinion"; doi: 10.2193/0091-7648(2004)032[1333:IMOMHF]2.0.CO;2.

Descriptors: habitat management/ management practices/ raptors/ Strigiformes/ *Strix occidentalis caurina*
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1152. Managing pines for wild turkeys.

Burhans, B.

Forest Landowner 62(2): 58-59. (2003)

NAL Call #: SD144.A15F67; ISSN: 10879110

Descriptors: biodiversity/ ecosystems/ hardwoods/ harvesting/ herbicides/ timber/ prescribed fire/ understory/ forestry/ birds/ forestry/ forests/ hardwoods/ harvesting/ Pinus/ plantations/ prescribed burning/ thinning/ wildlife

Abstract: The practices used for the management of pine forests to provide a natural habitat for wild turkeys are discussed. Prescribed fire can be used as an effective tool to manage the forest understory, as thick understories are unattractive to wild turkeys. Selective herbicides can also effectively kill hardwoods and keep the understory in a pine stand open and turkey friendly. The need to maintain the forest in at least 10% openings, especially in pine dominated landscapes is also elaborated.

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1153. Managing young upland forests in southeast Alaska for wood products, wildlife, aquatic resources, and fishes: Problem analysis and study plan.

Wipfli, M. S.; Deal, R. L.; Hennon, P. E.; Johnson, A. C.; De Santo, T. L.; Hanley, T. A.; Schultz, M. E.; Bryant, M. D.; Edwards, R. T.; Orlikowska, E. H.; and Gomi, T.

Portland, OR: Pacific Northwest Research Station, Forest Service, U.S. Department of Agriculture; General Technical Report-PNW 558, 2002. 46 p.

Notes: 08874840 (ISSN).

<http://www.fs.fed.us/pnw/pubs/gtr558.pdf>

Descriptors: fish/ invertebrates/ red alder/ vegetation/ wildlife/ young-growth management/ ecosystem management/ forest management/ nitrogen fixation/ riparian forest/ trophic interaction/ United States/ *Alnus*/ *Alnus rubra*/ *Aves*/ *Betulaceae*/ *Coniferophyta*/ *Invertebrata*/ *Pisces*/ *Riparia*

Abstract: Red alder (*Alnus rubra* Bong.) appears to influence the productivity of young-growth conifer forests and affect the major resources (timber, wildlife, and fisheries) of forested ecosystems in southeast Alaska. We propose an integrated approach to understanding how alder influences trophic links and processes in young-growth ecosystems. The presence of red alder is expected to increase understory biomass, and aquatic, riparian, and terrestrial invertebrate abundance, providing more food for herbivores, fish, and birds. We predict that most red alder trees will die standing, and woody debris will be small and

mobile in streams. Nitrogen fixation by red alder in mixed stands may result in larger, more commercially valuable conifers. Inclusion of red alder in the regenerating stand may therefore mitigate some negative impacts of clearcutting, and may increase total wood production from the landscape.

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1154. Measuring edge effects on nest predation in forest fragments: Do finch and quail eggs tell different stories?

Niehaus, A. C.; Heard, S. B.; Hendrix, S. D.; and Hillis, S. L. *American Midland Naturalist* 149(2): 335-343. (Apr. 2003)
NAL Call #: 410 M58

Descriptors: edge effect/ habitat fragmentation/ nest predation/ passerines/ predation risk/ Coturnix/ *Poephila guttata*

Abstract: Experiments assessing rates of avian nest predation often find that nests near forest edges are at high risk of predation, suggesting the importance of forest fragmentation in recent population declines of ground-nesting passerines. However, the use of quail (*Coturnix* spp.) eggs in nest predation experiments may confound conclusions about edge effects because only large-mouthed predators are able to consume these relatively large eggs, but both large and small-mouthed predators consume smaller passerine eggs. We directly compared predation rates on artificial nests baited with quail eggs or with zebra finch (*Poephila guttata*) eggs; the latter are similar in size to the eggs of many neotropical passerines. In 1998 and 1999 we placed 392 artificial ground nests at edge and interior locations in two east-central Iowa forest fragments. Predation on these nests varied with egg type (quail or finch) and location (edge or interior) and there was a significant interaction between egg type and location: predation on quail eggs was greater at edges than in the interior, whereas finch egg predation was high in both edge and interior locations. Based on tooth imprints in clay eggs, we determined that large-mouthed predators were six times more active at edges, whereas activity of small-mouthed nest predators was evenly distributed between edge and interior locations. We suggest that the use of only quail eggs can exaggerate edge effects and that finch eggs or clay eggs used in conjunction with quail eggs in artificial nests can be used to estimate relative predation rates by large- and small-mouthed predators.

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1155. Mesocosm experiments on habitat choice by an endemic lizard: Implications for timber management.

Tiebout, Harry M. and Anderson, Roger A. *Journal of Herpetology* 35(2): 173-185. (2001)
NAL Call #: QL640.J6; ISSN: 0022-1511

Descriptors: *Sceloporus woodi*/ amphibians and reptiles/ behavior/ habitat use/ wildlife-habitat relationships/ habitat alterations/ forestry practices/ social behavior/ intraspecies relationships/ endemic/ habitat management

Abstract: The authors investigated the impacts of various logging practices on habitat choice by the endemic Florida scrub lizard (*Sceloporus woodi*) in the Florida scrub of Ocala National Forest (ONF). They used large outdoor mesocosms as a novel means to evaluate lizard preferences for habitats with different structural features produced by standard forestry practices. Captive lizards were offered a choice between two adjoining habitats

(= sides of a mesocosm) created using one of two substratum treatments [SAND = 75% open sand; WOOD = 75% coarse woody debris (CWD)] coupled with one of two insolation treatments (LIGHT = ambient sunlight; DARK = 45% ambient sunlight). The mesocosms proved to be an effective technique for evaluating lizard habitat preferences. Lizards were easily observed and remained active and healthy throughout the experiment. Sighting frequencies differed significantly among the four mesocosm sides, yielding an overall preference ranking of DARK SAND > LIGHT SAND > DARK WOOD > or = LIGHT WOOD. Analysis of sighting frequencies by treatment factors (substratum and isolation) and of dissimilarity matrices both indicated that habitat choice was based primarily on substratum composition and only weakly determined by insolation level. In addition, size- and gender-specific preferences suggest that social interactions may help shape patterns of habitat used in conjunction with individual preferences. The authors conclude that the least favored mesocosm side (LIGHT WOOD) represents a habitat type that could potentially serve as a population sink for scrub lizards and recommend several methods to reduce the accumulation of CWD or to ameliorate its potential thermal stress on lizards. In addition, the most favored mesocosm side (DARK SAND) represents a shaded sandy habitat type not currently found in ONF timber stands. They present several alternative harvesting and site preparation methods that could produce such habitats and recommend further research on their potential value for enhancing populations of scrub lizards and other open-habitat scrub endemics.
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1156. A method for landscape analysis of forestry guidelines using bird habitat models and the Habplan harvest scheduler.

Loehle, C.; Van Deusen, P.; Wigley, T. B.; Mitchell, M. S.; Rutzmoser, S. H.; Aggett, J.; Beebe, J. A.; and Smith, M. L. *Forest Ecology and Management* 232(1-3): 56-67. (2006)
NAL Call #: SD1.F73; ISSN: 03781127.

Notes: doi: 10.1016/j.foreco.2006.05.040.

Descriptors: avian richness/ biodiversity/ extended rotations/ forest management/ habitat model/ Habplan/ harvest scheduler/ riparian zone/ sustainable forestry initiative

Abstract: Wildlife-habitat relationship models have sometimes been linked with forest simulators to aid in evaluating outcomes of forest management alternatives. However, linking wildlife-habitat models with harvest scheduling software would provide a more direct method for assessing economic and ecological implications of alternative harvest schedules in commercial forest operations. We demonstrate an approach for frontier analyses of wildlife benefits using the Habplan harvest scheduler and spatially explicit wildlife response models in the context of operational forest planning. We used the Habplan harvest scheduler to plan commercial forest management over a 40-year horizon at a landscape scale under five scenarios: unmanaged, an unlimited block-size option both with and without riparian buffers, three cases with different block-size restrictions, and a set-asides scenario in which older stands were withheld from cutting. The potential benefit to wildlife was projected based on spatial models of bird guild richness and species probability of detection. Harvested wood volume provided a measure of scenario costs, which provides an indication of

management feasibility. Of nine species and guilds, none appeared to benefit from 50 m riparian buffers, response to an unmanaged scenario was mixed and expensive, and block-size restrictions (maximum harvest unit size) provided no apparent benefit and in some cases were possibly detrimental to bird richness. A set-aside regime, however, appeared to provide significant benefits to all species and groups, probably through increased landscape heterogeneity and increased availability of older forest. Our approach shows promise for evaluating costs and benefits of forest management guidelines in commercial forest enterprises and improves upon the state of the art by utilizing an optimizing harvest scheduler as in commercial forest management, multiple measures of biodiversity (models for multiple species and guilds), and spatially explicit wildlife response models.

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1157. Microhabitat associations of northern flying squirrels in burned and thinned forest stands of the Sierra Nevada.

Meyer, Marc D.; Kelt, Douglas A.; and North, Malcolm P. *American Midland Naturalist* 157(1): 202-211. (2007)
NAL Call #: 410 M58; ISSN: 0003-0031

Descriptors: Rodentia/ Scuridae/ Glaucomys sabrinus/ California/ forest and woodland/ forestry/ habitat utilization/ Sierra Nevada, south/ commercial activities/ ecology/ land zones/ terrestrial habitat/ biogeography/ geographical range/ microhabitat association/ burned forest stand/ thinned forest stand/ control

Abstract: Prescribed burning and mechanical thinning are used to manage fuels within many western North American forest ecosystems, but few studies have examined the relative impacts of these treatments on forest wildlife. We sampled northern flying squirrels (*Glaucomys sabrinus*) and microhabitat variables in burned, thinned and control stands of mixed-conifer forest of the southern Sierra Nevada at the Teakettle Experimental Forest. We used this information to determine the effects of burning and thinning on the microhabitat associations of flying squirrels. Across pretreatment stands, the probability of flying squirrel capture increased with decreasing distance to a perennial creek and increasing litter depth. The probability of flying squirrel capture also was greater with increased canopy cover in thinned stands and increased litter depth in burned stands. Greater canopy cover may provide protection from predators, thicker litter layers may harbor a greater abundance of truffles, a primary food of northern flying squirrels, and creeks may provide squirrels with food sources, drinking water and nest trees. Results from this study underscore the need for more information on the effects of forest management on northern flying squirrels near the southern extent of the species' geographic range.

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1158. Modeling habitat occupancy of orange-crowned warblers in managed forests of Oregon and Washington, USA.

Kroll, Andrew J.; Duke, Steven D.; Runde, Douglas E.; Arnett, Edward B.; and Austin, Kelly A. *Journal of Wildlife Management* 71(4): 1089-1097. (2007)
NAL Call #: 410 J827; ISSN: 0022-541X

Descriptors: Parulidae/ Passeriformes/ *Vermivora celata*/ study methods/ techniques/ forests/ ecosystems/ habitat management/ habitat occupancy model/ habitat use/

Oregon/ Washington/ conservation/ wildlife management/ land zones

Abstract: As part of a habitat management planning process for commercially managed forests, we developed and evaluated habitat occupancy models for the orange-crowned warbler (*Vermivora celata*), a conservation priority species in Oregon and Washington, USA. We used repeated surveys to classify a random sample of managed conifer stands at the McKenzie, PeEll, and Tolt study sites in western Oregon and Washington as either occupied or unoccupied during 1994-1995. We modeled occupancy and detection probabilities as a function of stand-level habitat characteristics subject to manipulation by management activities. The best-fitting model indicated that orange-crowned warblers were 2 times (95% CI: 0.99-5.1) and 3.8 times (95% CI: 1.5-6.1) as likely to occupy a stand for every 5% increase in evergreen shrub cover and 5-m decrease in canopy lift (lit to lowest live branch), respectively.

Management actions that maintain evergreen shrub cover >10% and permit development of low canopy lifts (4-10 m) should promote habitat occupancy by the orange-crowned warbler in commercial forests in western Oregon and Washington.

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1159. Modeling potential outcomes of fire and fuel management scenarios on the structure of forested habitats in northeast Oregon, USA.

Wales, B. C.; Suring, L. H.; and Hemstrom, M. A. *Landscape and Urban Planning* 80(3): 223-236. (2007)
NAL Call #: QH75.A1L32; ISSN: 01692046

Descriptors: forest restoration/ fuels management/ habitat modeling/ Interior Northwest landscape Analysis System (INLAS)/ *Lynx canadensis*/ wildlife habitat

Abstract: Thinning and prescribed fire are being used extensively across the interior western United States to reduce the risk of large, severe wildfires. However, the full ecological consequences of implementing these management practices on the landscape have not been completely evaluated. We projected future vegetation trends resulting from four management scenarios and compared vegetation trends against the natural range of variability (NRV) using a state and transition model that included natural disturbances (e.g., wildfires, insect outbreaks) on a study area in northeast Oregon. We tracked the area of forests with large trees to assess potential trends of habitat for wildlife species closely associated with these forest structures and evaluated land allocations that restricted management practices on national forests (i.e., riparian and old-growth forests). We also specifically analyzed habitat available for Canada lynx (*Lynx canadensis*), a species listed as threatened under the USA Endangered Species Act. This included an evaluation of implementing and not implementing current management practices designed to protect Canada lynx habitat. We found that the area of forests in large-diameter (≥ 52.5 cm) trees is currently well below the estimated NRV, and that it might take >100 years to return to more natural levels regardless of the management scenario implemented. In addition, fuels management activities (i.e., thinning, prescribed fire) resulted in total area of closed-canopy large- and medium-diameter (≥ 40 cm) forests well below that predicted under a natural disturbance regime, particularly in cool-moist and cold forests.

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1160. Modeling the influence of dynamic zoning of forest harvesting on ecological succession in a northern hardwoods landscape.

Zollner, P. A.; Gustafson, E. J.; He, H. S.; Radeloff, V. C.; and Mladenoff, D. J.

Environmental Management 35(4): 410-425. (2005)

NAL Call #: HC79.E5E5; ISSN: 0364152X.

Notes: doi: 10.1007/s00267-003-0217-9.

Descriptors: American marten/ dynamic zoning/ LANDIS/ landscape pattern/ ruffed grouse/ simulation model/ succession/ biodiversity/ computer simulation/ ecology/ hardwoods/ harvesting/ mathematical models/ zoning/ forest harvesting/ landscape/ forestry/ ecological impact/ ecological modeling/ forest management/ succession/ timber harvesting/ ecosystem/ biodiversity/ ecology/ forest management/ hardwoods/ lumber/ mathematical models/ wildlife/ Chequamegon National Forest/ Wisconsin/ Bonasa umbellus/ Martes americana/ Populus sp.

Abstract: Dynamic zoning (systematic alteration in the spatial and temporal allocation of even-aged forest management practices) has been proposed as a means to change the spatial pattern of timber harvest across a landscape to maximize forest interior habitat while holding timber harvest levels constant. Simulation studies have established that dynamic zoning strategies produce larger tracts of interior, closed canopy forest, thus increasing the value of these landscapes for interior-dependent wildlife. We used the simulation model LANDIS to examine how the implementation of a dynamic zoning strategy would change trajectories of ecological succession in the Great Divide Ranger District of the Chequamegon-Nicolet National Forest in northern Wisconsin over 500 years. The components of dynamic zoning strategies (number of zones in a scenario and the length of the hiatus between successive entries into zones) and their interaction had highly significant impacts on patterns of forest succession. Dynamic zoning scenarios with more zones and shorter hiatus lengths increased the average amount of the forest dominated by early successional aspen (*Populus* sp.). Dynamic zoning scenarios with two zones produced more late successional mature northern hardwoods than scenarios with four zones. Dynamic zoning scenarios with very short (30 years) or very long (120 years) hiatus lengths resulted in more late successional mature northern hardwoods than scenarios with intermediate hiatus lengths (60 and 90 years). However, none of the dynamic scenarios produced as much late successional mature northern hardwoods as the static alternative. Furthermore, the amounts of all habitat types in all dynamic zoning scenarios fluctuated greatly in time and space relative to static alternatives, which could negatively impact wildlife species that require a stable amount of habitat above some minimum critical threshold. Indeed, implementing dynamic zoning scenarios of different designs would have both positive and negative effects on wildlife species and for other objectives of forest management. © 2005 Springer Science+Business Media, Inc.

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1161. Monitoring for adaptive management in coniferous forests of the northern Rockies.

Young, Jock S.; Hoffland, John R.; and Hutto, Richard 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. 405-411.

Notes: 0196-2094 (ISSN).

Descriptors: conservation measures/ ecology/ terrestrial habitat/ land zones/ Aves: habitat management/ monitoring adaptive management in coniferous forest/ community structure/ population dynamics/ habitat utilization/ forest and woodland/ Coniferous forest/ monitoring adaptive management/ North America/ northern Rockies/ Aves/ birds/ chordates/ vertebrates

Abstract: Monitoring can and should be much more than the effort to track population trends; it can be a proactive effort to understand the effects of human activities on bird populations. It should be an integral part of the adaptive management process. With this in mind, the Northern Region Landbird Monitoring Program has a dual focus: (1) to monitor long-term bird population trends, and (2) to study bird-habitat relationships and management effects. By conducting permanent, longterm monitoring transects every other year, we are free to use the intervening years to study the effects of specific management activities. The coordination and funding is in place to achieve an impressive degree of replication in such studies. These alternate-year monitoring efforts have great potential to get management-orientated results into the hands of managers in the short term, so planning can be improved before long-term trends might reveal a problem. We have conducted several such projects, including the effects of partial-cut logging in coniferous forests, and the effects of grazing on willow-riparian bird communities. We discuss here another such project that we initiated in 2001, on bird responses to dry-forest restoration in the northern Rockies. Ponderosa pine (*Pinus ponderosa*) stands have been greatly altered from historical conditions due to logging and fire suppression. Active treatment of ponderosa pine forests to reverse historical trends is a recent management direction involving well-financed, regionally coordinated restoration efforts. The widespread distribution and abundance of planned treatments provided a unique opportunity for a controlled research design (with high replication), including pre- and post-treatment surveys. We present some preliminary results and discuss their relevance to adaptive management.

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1162. Moth diversity in a fragmented habitat: Importance of functional groups and landscape scale in the boreal forest.

Schmidt, B. C. and Roland, J.

Annals of the Entomological Society of America: 1110-1120. (Nov. 2006)

Descriptors: Lepidoptera/ moths/ insect communities/ species diversity/ community structure/ phytophagous insects/ ecological function/ host plants/ Malacosoma disstria/ parasitoids/ forest habitats/ boreal forests/ habitat fragmentation/ spatial variation/ forest fragmentation/ spatial scale/ landscape structure/ pests of plants insects/ forestry related/ animal ecology and behavior/ entomology related

Abstract: One of the leading concerns for both conservation biology and forestry has been how forest fragmentation affects biodiversity, and how forestry practices can be altered to mitigate diversity losses. However, the effects of habitat fragmentation on ecological functional groups within diverse taxa such as Lepidoptera are poorly known, particularly in boreal forests. We assessed landscape-level changes in moth species richness and abundance in relation to forest fragmentation, measured at multiple scales. We assessed fragmentation effects on three functional tree- and shrub-feeding species, grass- and forb-feeding species, and species that act as hosts for parasitoids of an important forest defoliator, *Malacosoma disstria* Hubner (Lepidoptera: Lasiocampidae). Total species richness showed a significant decline as a function of fragmentation at all measured spatial scales; both polynomial and threshold models tended to explain more variation than linear models, suggesting that there is little to no change in overall moth diversity between low and moderately fragmented stands. However, changes in diversity patterns within functional groups showed that total diversity measures may mask changes in community structure. Changes in overall diversity were driven largely by a decrease in species richness of tree- and shrub-feeding moths, although forb- and grass-feeding moths also showed marginally lower species richness at high fragmentation levels. Most species of the parasitoid host group decreased in abundance with increasing fragmentation. These findings show that overall diversity measures can mask important community changes, and that the optimal landscape scale at which these changes are measured is taxon dependent. Finally, the decrease in host availability to *M. disstria* parasitoids in fragmented forests may exacerbate population outbreaks of *M. disstria*. This citation is from AGRICOLA.

1163. Movement patterns and relative abundance of coastal tailed frogs in clearcuts and mature forest stands.

Matsuda, Brent M. and Richardson, John S.
Canadian Journal of Forest Research 35(5): 1131-1138. (2005)
NAL Call #: SD13.C35; ISSN: 0045-5067
Descriptors: Anura/ Leiopelmatidae/ Lissamphibia/ *Ascaphus truei*/ tailed frogs/ clearcutting/ forest management/ habitat management/ riparian habitat/ forestry practices
Abstract: Age-specific movements, abundance, and capture rates of coastal tailed frogs (*Ascaphus truei* Stejneger) were compared between clearcuts and mature forests in southwestern British Columbia, Canada, during 1998 and 1999 using pitfall traps and drift-fence arrays. Total frog abundance was similar in both habitat types. More adults were caught in mature stands than in clearcuts, but there was no significant difference for immatures. Analysis of numbers of frogs captured indicated that the direction of movement did not differ between habitat types for any age-class. Frogs were captured at similar frequencies across distance from stream in both habitats. These findings suggest that there are age-specific differences in tailed frog abundance in clearcuts along streams without riparian reserves relative to mature forests. Variation among sites had a greater influence than habitat

type on the number of immatures. Low proportions of adults in clearcuts suggested that immatures may be transient or that they incurred high rates of mortality. Age-specific differences in habitat use by tailed frogs indicated that total numbers alone are insufficient to determine the effect of forest management on habitat suitability for tailed frogs.
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1164. Movements, foraging habits, and habitat use strategies of northern woodland caribou during winter: Implications for forest practices in British Columbia.

Johnson, Chris J.; Parker, Katherine L.; Heard, Douglas C.; and Seip, Dale R.
British Columbia Journal of Ecosystems and Management 5(1): 23-35. (2004)
NAL Call #: SD146.B7 B34; ISSN: 1488-4674.
http://www.forrex.org/JEM/ISS25/vol5_no1_art4.pdf
Descriptors: commercial activities/ conservation measures/ nutrition/ feeding behavior/ ecology/ terrestrial habitat/ land zones/ North America/ Canada/ *Rangifer tarandus*/ caribou: forestry/ forestry practices/ habitat management/ forest management practices/ foraging/ foraging habits/ distribution within habitat/ movements/ habitat utilization/ forest and woodland/ tundra/ British Columbia/ foraging habits and habitat use/ forestry practice implications/ forest and tundra/ Mammalia, Artiodactyla, Cervidae/ chordates/ mammals/ ungulates/ vertebrates
Abstract: Land managers face increasing challenges as they try to balance timber harvesting with the habitat requirements of wildlife, including those of woodland caribou in north-central British Columbia. With the aim of conserving caribou by improving forest practices, we employed a hierarchical, scale-explicit approach to study the processes governing movement and distribution of the northern woodland caribou ecotype. Investigations of foraging sites north of Prince George, British Columbia revealed that caribou in forested and alpine areas cratered at locations with relatively low snow depths and relatively large amounts of terrestrial lichens. When snow depth, snow hardness, and snow density increased, caribou fed more frequently at trees supporting abundant arboreal lichens. Feeding activities of caribou in forested foraging patches were positively related to the biomass of several terrestrial lichen species and to decreasing snow depth; the number of arboreal feeding sites increased as snow depth and hardness increased. We identified three scales of habitat selection based on movement rates of caribou fitted with GPS collars. For all scales, caribou selected pine-lichen woodland and windswept rocky slopes. Predation risk was greatest for caribou travelling between habitat patches, was lowest for caribou in alpine habitats, and had no apparent influence on intra-patch movements. Land use plans should address the needs of northern woodland caribou by ensuring that large patches of widely distributed pine-lichen woodland are maintained on the landscape, recognize the limiting effects of deep snow (i.e., > 50-180 cm), and encourage silvicultural strategies that minimize the creation of early seral-stage forests adjacent to caribou movement routes.
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1165. Movements of Allegheny woodrats in relation to timber harvesting.

Castleberry, Steven B.; Ford, W. Mark; Wood, Petra Bohall; Castleberry, Nikole L.; and Mengak, Michael T. *Journal of Wildlife Management* 65(1): 148-156. (2001)
NAL Call #: 410 J827; ISSN: 0022-541X

Descriptors: Neotoma magister/ habits-behavior/ distribution/ food supply/ foods-feeding/ forestry practices/ habitat alterations/ land use/ mammals/ mast/ techniques/ telemetry/ wildlife-habitat relationships/ cutting/ distance/ forest practices/ habitat management for wildlife/ home range/ mast yield/ movements/ rats, wood/ statistics/ timber/ Allegheny woodrat

Abstract: The Allegheny woodrat (*Neotoma magister*) occurs in the Appalachian Mountains, forming colonies in rock outcrops, cliffs, and caves. Populations on the northern and western peripheries of the range have experienced drastic declines in the past 20-30 years. Dependence upon rock outcrops makes Allegheny woodrats vulnerable to land-use practices that alter habitats surrounding colonies. To examine the impacts of timber harvesting on Allegheny woodrat behavior, we radiotracked 37 adults during summer 1998 and 1999 in clearcut, diameter-limit, and intact forest stands in the central Appalachians of West Virginia. Home range size and foraging movements generally were greatest at diameter-limit sites and smallest in intact forests in 1998, following a poor mast crop. We detected no differences among harvest methods in 1999 when mast was abundant. We believe that when hard mast was scarce, woodrats increased foraging movements and home range size to locate mast or sufficient alternative foods. Additionally, woodrats used clearcut and adjacent forested areas in proportion to availability. Our results suggested that clearcutting has minimal impact on woodrat movements, home range and habitat use if sufficient intact forest is retained adjacent to colonies. Harvesting methods that selectively remove important mast-producing species may represent the greatest disturbance to Allegheny woodrats from forest management.

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1166. Movements of female white-tailed deer (*Odocoileus virginianus*) in relation to timber harvests in the central Appalachians.

Campbell, Tyler A.; Laseter, Benjamin R.; Ford, W. Mark; and Miller, Karl V.

Forest Ecology and Management 199(2-3): 371-378. (2004)
NAL Call #: SD1.F73; ISSN: 0378-1127

Descriptors: Cervidae/ Artiodactyla/ *Odocoileus virginianus*/ biogeography/ clearcut habitat/ deer movement/ timber harvest/ distribution/ forests/ ecosystems/ forestry practices/ habitat alterations/ habitat management/ Randolph County/ West Virginia/ wildlife-human relationships/ commercial enterprises/ conservation/ wildlife management/ disturbances/ habitat use/ land zones

Abstract: Deer movements in relation to timber harvests have not been studied within nonmigratory white-tailed deer (*Odocoileus virginianus*) populations. We compared home range and core area size and overlap, deer movements during timber harvests, and habitat use before and after harvests for deer associated and not associated with clearcuts. We radio-monitored 83 adult female deer pre- (3 months prior to), during, and post- (3 months after)

timber harvest. Change in home range and core area size and overlap did not differ between control deer (home ranges comprised entirely of mature forest during all time periods) and treatment deer (≥ 1 telemetry location within a harvested stand during any time period). During timber harvests, treatment deer were located outside their pre-harvest home ranges more often than control deer and generally were located closer to clearcuts than in other time periods. During both the pre- and post-timber harvest time periods, deer used clearcut habitats (stands ≤ 5 years-old) in greater proportion than availability. Lack of significant changes in white-tailed deer movements before, during, and after timber harvest suggests habitat management aimed at attracting deer away from problem areas (e.g., areas with low regeneration success) or toward browse supplies during severe winters would likely be unsuccessful in the central Appalachians of West Virginia.

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1167. Moving towards a new paradigm for woody detritus management.

Harmon, Mark E.

Ecological Bulletins 49: 269-278. (2001); ISSN: 0346-6868

Descriptors: commercial activities/ conservation measures/ ecology/ terrestrial habitat/ comprehensive zoology/ forestry/ habitat management/ woody detritus in boreal forests/ ecological function considerations and new management paradigm/ ecology/ Importance and ecological functions of woody detritus in boreal forests/ management implications/ forest and woodland/ boreal forests/ management of woody detritus/ ecological function considerations and new approach

Abstract: Woody detritus has become an important focus of many scientific and management questions in forests. Perspectives of the role of this part of the ecosystem have greatly changed over time. Today forest managers are moving away from a "blanket" removal of all the woody detritus possible to retaining and even enhancing the amounts in forests. To understand how much woody detritus is required to sustain ecosystem functions, we need to develop a dynamic and specific objective-oriented approach. This can be based on existing data on tree mortality and decomposition, but these will have to be coupled with process and species responses to coarse wood quantities as well as a landscape perspective.

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1168. Natural landscape features, human-related attractants, and conflict hotspots: A spatial analysis of human-grizzly bear conflicts.

Wilson, S. M.; Madel, M. J.; Mattson, D. J.; Graham, J. M.; Burchfield, J. A.; and Belsky, J. M.

Ursus 16(1): 117-129. (2005)

NAL Call #: QL737.C27 I573; ISSN: 15376176

Descriptors: attractants/ beehives/ grizzly bear/ livestock/ management practices/ Montana/ private landowners/ ranches/ *Ursus arctos*

Abstract: There is a long history of conflict in the western United States between humans and grizzly bears (*Ursus arctos*) involving agricultural attractants. However, little is known about the spatial dimensions of this conflict and the relative importance of different attractants. This study was undertaken to better understand the spatial and functional components of conflict between humans and grizzly bears on privately owned agricultural lands in Montana. Our

investigations focused on spatial associations of rivers and creeks, livestock pastures, boneyards (livestock carcass dump sites), beehives, and grizzly bear habitat with reported human-grizzly bear conflicts during 1986-2001. We based our analysis on a survey of 61 of 64 livestock producers in our study in the Rocky Mountain East Front, Montana. With the assistance of livestock and honey producers, we mapped the locations of cattle and sheep pastures, boneyards, and beehives. We used density surface mapping to identify seasonal clusters of conflicts that we term conflict hotspots. Hotspots accounted for 75% of all conflicts and encompassed approximately 8% of the study area. We also differentiated chronic (4 or more years of conflicts) from non-chronic hotspots (fewer than 4 years of conflict). The 10 chronic hotspots accounted for 58% of all conflicts. Based on Monte Carlo simulations, we found that conflict locations were most strongly associated with rivers and creeks followed by sheep lambing areas and fall sheep pastures. Conflicts also were associated with cattle calving areas, spring cow-calf pastures, summer and fall cattle pastures, and boneyards. The Monte Carlo simulations indicated associations between conflict locations and unprotected beehives at specific analysis scales. Protected (fenced) beehives were less likely to experience conflicts than unprotected beehives. Conflicts occurred at a greater rate in riparian and wetland vegetation than would be expected. The majority of conflicts occurred in a small portion of the study area, where concentrations of attractants existed that overlapped with bear habitat. These hotspots should be the target of management and conservation efforts that focus on removing or protecting attractants using non-lethal techniques.

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1169. Nest box use and productivity of great crested flycatchers in prescribed-burned longleaf pine forests.

White, Donald H. and Seginak, John T.

Journal of Field Ornithology 71(1): 147-152. (2000)

NAL Call #: 413.8 B534; ISSN: 0273-8570

Descriptors: Passeriformes/ Tyrannidae/ Myiarchus crinitus/ habits-behavior/ birds/ ecosystems/ fires-burns/ habitat alterations/ habitat management/ longleaf pine/ management/ nest boxes/ nest predation/ nests-nesting/ productivity/ snags/ wildlife/ great crested flycatcher/ South Carolina/ Carolina Sandhills National Wildlife Refuge

Abstract: Managing for the endangered red-cockaded woodpecker (*Picoides borealis*) on federal lands requires burning large tracts of mature pine forests every three-to-five years. Many cavity trees that serve as potential nest sites for primary and secondary hole-nesting birds are destroyed by fire. The authors assessed the efficacy of a nest box program for the great crested flycatcher (*Myiarchus crinitus*) at Carolina Sandhills National Wildlife Refuge, an area intensively managed for red-cockaded woodpeckers. During 1996-1998, the authors installed and monitored 330 (30 in each of 11 sites) nest boxes in mature (>60 yr) longleaf pine (*Pinus palustris*) tracts that were burned either in April-June (warm season) or December-March (cool season). Prescribed-burned sites were nearly devoid of snags; it was estimated only 0.8/ ha in cool-season burns and 1.7 /ha in warm-season burns. Great crested flycatchers built nests in 20% of the boxes available to them. Clutch sizes were larger in warm-season burns than in cool-season burns, but fledging success (fledglings/nest hatching >or=1 egg) was lower. Twenty-

two of 59 great crested flycatcher nests were depredated and the proportions in each burn class were similar. The authors recommend the installation of nest boxes for great crested flycatchers in prescribed-burned pine forests, but additional research is needed in these habitats on nest depredation rates and causes.

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1170. Nest predation in riparian buffer strips in a balsam fir forest in western Newfoundland (*Coturnix japonica*, *Xexcalfactoria chinensis*, *Perisoreus canadensis*, *Tamiasciurus hudsonicus*).

Lewis, Keith Peter. Memorial University of Newfoundland (Canada), 2000.

Notes: Advisor: Montevicchi, William A.

Descriptors: forestry/ wildlife/ *Abies balsamea*/ *Abies* spp./ *Aves*/ forests/ trees/ conservation/ habitat alteration/ buffer strips/ nest predation/ Newfoundland

Abstract: Logging pressures on boreal forests have increased in recent decades and carry with them increased concerns for wildlife and habitat conservation. Buffer strips mitigate some of the negative impacts of logging on riparian habitat and associated wildlife. Given the widespread use of buffer strips, the subsequent increase of clear-cut/forest edge, and the decline of many forest birds, I investigated how buffer strips and habitat edges influence avian nesting success. Nest predation is the most common cause of nest failure among song birds. Therefore, artificial nests are a useful research tool for investigating the influences of habitat alteration on nest predation. Japanese Quail (*Coturnix japonica*) eggs are often used in artificial nest studies, although these eggs may be too large to detect predation by small mammals. My primary objectives were to determine (1) if nest predation differs between intact riparian forest and (a) buffer strips and (b) clear-cut forest edges, and (2) if Japanese Quail eggs are appropriate to use in artificial nest studies in western Newfoundland.

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1171. Nest survival of forest birds in the Mississippi Alluvial Valley.

Twedt, D. J.; Wilson, R. R.; Henne-Kerr, J. L.; and Hamilton, R. B.

Journal of Wildlife Management 65(3): 450-460. (2001)

NAL Call #: 410 J827; ISSN: 0022-541X

Descriptors: nests/ survival/ riparian environments/ forests/ breeding success/ wildlife management/ ecological effects/ birds/ nesting/ riparian land/ *Aves*/ birds/ Mississippi Alluvial Valley

Abstract: In the Mississippi Alluvial Valley, flood control has led to a drastic reduction in the area of forest habitat and altered the patchwork of forest cover types. Silvicultural management of the remaining fragmented forests has changed to reflect the altered hydrology of the forests, current economic conditions of the area, and demand for forest products. Because forest type and silvicultural management impact forest birds, differences in avian productivity within these forests directly impact bird conservation. To assist in conservation planning, we evaluated daily nest survival, nest predation rates, and brood parasitism rates of forest birds in relation to different forest cover types and silvicultural management strategies within this floodplain. Within bottomland hardwood forests, nest success of blue-gray gnatcatcher (*Poliophtila caerulea*, 13%), eastern towhee (*Pipilo erythrophthalmus*, 28%),

indigo bunting (*Passerina cyanea*, 18%), northern cardinal (*Cardinalis cardinalis*, 22%), and yellow-billed cuckoo (*Coccyzus americanus*, 18%) did not differ from that within intensively managed cottonwood plantations. However, average daily survival of 542 open-cup nests of 19 bird species in bottomland hardwoods (0.9516 ± 0.0028 , similar to 27% nest success) was greater than that of 543 nests of 18 species in cottonwood plantations (0.9298 ± 0.0035 , similar to 15% nest success). Differences in daily nest survival rates likely resulted from a combination of differences in the predator community - particularly fire ants (*Solenopsis invicta*) - and a marked difference in species composition of birds breeding within these 2 forest types. At least 39% of nests in bottomland hardwood forests and 65% of nests in cottonwood plantations were depredated. Rates of parasitism by brown-headed cowbirds (*Molothrus ater*) were greater in managed cottonwoods (24%) than in bottomland hardwoods (9%). Nest success in planted cottonwood plantations for 18 species combined (similar to 14%), and for yellow-breasted chat (*Icteria virens*, 7%), eastern towhee (14%), indigo bunting (14%), and northern cardinal (17%) did not differ from nest success in cottonwood plantations that were coppiced from root sprouts following pulpwood harvest. Within bottomland hardwood forests, uneven-aged group-selection timber harvest reduced the combined daily nest survival of all species from 0.958 to 0.938, which reduced nest success by about 14%. Specifically, timber harvest reduced nest success of species that nest in the forest midstory and canopy, such as Acadian flycatcher (*Empidonax virescens*) - from 32% before harvest to 14% after harvest. Conversely, those species that nest primarily in the shrubby understory - such as northern cardinal - were not affected by timber harvest and maintained an overall nest success of about 33%. Thus, birds nesting in the understory of bottomland hardwood forests are not adversely impacted by selective timber harvest, but there is a short-term reduction in nest success for birds that nest in the canopy and midstory.

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1172. Nest usurpation is an 'edge effect' for Carolina chickadees *Poecile carolinensis*.

Doherty, P. F. and Grubb, T. C.

Journal of Avian Biology 33(1): 77-82. (2002);
ISSN: 09088857.

Notes: doi: 10.1034/j.1600-048X.2002.330112.x.

Descriptors: edge effect/ fragmentation/ nest site/ nesting success/ passerines/ United States/ Carolinensis/ Paridae/ *Parus carolinensis*/ Passeriformes/ *Poecile*/ *Poecile carolinensis*/ Troglodytes aedon/ Troglodytes troglodytes/ Troglodytinae

Abstract: During 1995-1997, we monitored Carolina chickadee *Poecile carolinensis* nests in a fragmented forest landscape in northcentral Ohio, USA. Nest success was positively correlated with woodlot area and most nest loss was due to nest destruction by house wrens *Troglodytes aedon*. During 1998 and 1999, we conducted an experiment in both large (> 6.8 ha) and small (< 6.8 ha) woodlots in which we gave chickadees a choice of nesting on edges of woodlots (preferred wren habitat) or in the center of woodlots. We found no difference in nest success between large and small Woodlots, but regardless of woodlot size, nest success was lower on edges than in the center. In the experiment, 100% of nest loss was due to

nest destruction by house wrens. Given a choice, Carolina chickadees preferred to nest centrally more often than on edges. These results suggest that in fragmented landscapes where house wrens are common, nest destruction by house wrens is a major cause of nest failure in the Carolina chickadee. Such edge-dependent interspecific nest-site usurpation has not been previously recognized as a potentially important selective factor in nest site selection.

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1173. Nesting habitat of eastern wild turkeys (*Meleagris gallopavo sylvestris*) in east Texas.

Eichler, B. G. and Whiting, R. M.

Texas Journal of Science 56(4): 405-414. (2004)

NAL Call #: 470 T31; ISSN: 00404403

Descriptors: meleagris gallopavo/ poaceae/ Texas/ meleagris gallopavo sylvestris/ turkeys/ nest site selection
Abstract: Eastern wild turkeys (*Meleagris gallopavo sylvestris*) captured in Iowa and Georgia were relocated to the Pineywoods of east Texas where they were radio-marked and released. During the 1995 and 1996 nesting seasons, nest sites of radio-marked hens were located and characteristics of the habitat surrounding the sites and of randomly selected sites in the same vegetation type were evaluated using paired t-tests. Of 24 nest located, 6 were successful. Most nests were in mature pine-hardwood stands or pine regeneration areas. Nest sites had higher densities of living and dead grasses and higher screening cover values than did random sites ($P < 0.05$). Other habitat characteristics did not differ between nest and random sites ($P > 0.05$). These results suggest that herbaceous ground cover is the most important habitat variable which hens use when selecting nest sites. Habitat characteristics surrounding nests located in this study were similar to those documented in other studies in the southeast. Although nesting habitat probably is adequate in east Texas, land managers could increase such habitat by mowing utility rights-of-way on a two to three-year schedule, implementing a three to five-year prescribed burning regime, thinning pine stands at or before canopy closure, retaining slash after logging operation, and delaying site preparation in regeneration areas until after the nesting season.

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1174. Nesting success of Acadian flycatchers (*Empidonax virescens*) in floodplain forest corridors.

Chapa-Vargas, Leonardo and Robinson, Scott K.

Auk 124(4): 1267-1280. (Oct. 2007)

NAL Call #: 413.8 AU4

Descriptors: habitat fragmentation/ wildlife/ wildlife corridors/ Acadian flycatchers/ Illinois

Abstract: Reconnecting forest patches, including those of floodplain forest, often involves the creation of long, narrow corridors that have the potential to act as ecological traps for wildlife. We examined the effect of forest width and habitat composition of the landscapes immediately around nest patches on survival and parasitism of 359 Acadian Flycatcher (*Empidonax virescens*) nests in the Cache River Bioreserve in southern Illinois. Nests were distributed among 19 floodplain forest corridors along a small river system that is being restored and reconnected along its original floodplain. The corridors spanned a range of widths (80-3,170 m) and varied with the presence or absence of

natural water-related habitats (beaver ponds, backwater swamps, and creeks). Although nest success varied slightly between stages of the breeding cycle, confidence intervals overlapped, which suggests constant nest success throughout the breeding cycle. Nest survival was relatively high by regional standards but did not vary significantly with any of the landscape variables measured. Contrary to predictions, probabilities of brood parasitism decreased with increasing proportions of anthropogenic habitats surrounding nests. Probabilities of brood parasitism also decreased, but only slightly, as the breeding season progressed. Finally, Acadian Flycatcher nests were located significantly more often near natural (forest-water interface) edges than expected at random. Narrow corridors such as those along floodplain restoration projects do not necessarily create ecological traps for all forest species. Acadian Flycatchers, however, are one of the only forest-nesting Neotropical migrants that nest in narrow corridors and, therefore, may be less vulnerable to negative effects of fragmentation.

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1175. Nesting success of birds in different silvicultural treatments in southeastern U.S. pine forests.

Barber, David R.; Martin, Thomas E.; Melchior, M. Anthony; Thill, Ronald E.; and Wigley, T. Bently
Conservation Biology 15(1): 196-207. (2001)

NAL Call #: QH75.A1C5 ; ISSN: 0888-8892.

Notes: doi: 10.1046/j.1523-1739.2001.97294.x.

Descriptors: nesting success/ silviculture/ Corvidae/ Fringillidae/ Passeriformes/ Vireonidae/ Corvus brachyrhynchos/ Cyanocitta cristata/ Icteria virens/ Molothrus ater/ Spizella pusilla/ Vireo griseus/ United States

Abstract: We examined nesting success and levels of nest predation and cowbird parasitism among five different silvicultural treatments: regenerating (three-six years old), mid-rotation (12-15 years old), and thinned (17-23 years old) pine plantations, single-tree selection, and late-rotation pine-hardwood stands in the Ouachita Mountains of Arkansas from 1993 to 1995. We monitored 1674 nests. Differences in daily mortality and daily predation rate among two or more treatments were found for four and three of 12 species, respectively. These differences were lost following Bonferroni adjustments, but thinned stands had higher levels of predation than single-tree selection stands when predation levels were averaged across species. Daily predation rates were positively correlated with the relative abundance of birds, suggesting that nest predators respond to prey availability (i.e., nests) in a density-dependent manner. The relative abundance of cowbirds differed among treatments, with the highest densities in regenerating, thinned, and single-tree selection stands. Field sparrows (*Spizella pusilla*) and yellow-breasted chats (*Icteria virens*) experienced higher levels of parasitism in thinned than regenerating plantations, whereas white-eyed vireos (*Vireo griseus*) experienced higher parasitism in regenerating plantations than in mid-rotation or thinned plantations. Several shrub-nesting and one ground-nesting species had lower nesting success in thinned and regenerating plantations than has been reported in previously published studies. Thus, some seral stages of even-aged management may provide low-quality nesting habitat for several early-successional bird species. In contrast, many species nesting in mid-rotation and

single-tree selection stands had nesting success similar to or greater than that found in previous studies, suggesting that some silvicultural treatments, when embedded in a largely forested landscapes, may provide suitable habitat for forest land birds without affecting their reproductive success.

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1176. New hope for western bluebirds? Effect of forest restoration being studied.

Germaine, Heather L. and Germaine, Stephen S.
Bluebird 23(1): 13-15. (2001)

Descriptors: Sialia mexicana/ video tapes/ study methods/ restoration/ productivity/ population ecology/ ponderosa pine/ nests-nesting/ nestlings/ nesting sites/ monitoring/ habitat use/ habitat management/ habitat alterations/ forests, coniferous/ food supply/ fires-burns/ ecosystem management/ conservation/ birds/ behavior/ western bluebird/ Arizona, Northwestern

Abstract: The authors studied the effects of forest restoration and conservation on western bluebirds in the ponderosa pine forests of northwestern Arizona. Historically these birds were confined to open forest areas but due to the removal of large degenerating trees and increased competition for nest sites decline of western bluebirds has been noted in many parts of their range. Also, these open forests have become dense forests dominated by young trees containing few nest cavities and containing a low number of insects. Efforts to restore southwestern forests are gaining momentum due to poor nutrient cycling, increased potential for high-intensity, stand-replacing fires, and a reduced ability of pine forests to support wildlife species. Restoration of 4000 acres of forest in northwestern Arizona have been cooperatively being done by scientists from Northern Arizona University's (NAU) Ecological Restoration Institute and the Arizona Strip District of the Bureau of Land Management (BLM). Treatments included mechanical thinning of trees, slash manipulation, and burning and reseeded of native grasses and plants. A study was conducted to compare western bluebird reproductive success between dense forests and restoration-treated open forests. The authors monitored the number of nestlings that survived to fledge, nest predation rates, nestling parasitism, and parental provisioning rates. Sixty-four active western bluebird nests were monitored during the summers of 1998, 1999, and 2000. Nest success has been higher in restoration treated forests than dense forests. This data suggests that bluebird populations will increase only if their young survive and, therefore, it is important to study their survival rates in treated forest areas.

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1177. North American grassland birds: An unfolding conservation crisis?

Brennan, L. A. and Kuvlesky, W. P.

Journal of Wildlife Management 69(1): 1-13. (2005)

NAL Call #: 410 J827; ISSN: 0022541X.

Notes: doi: 10.2193/0022-541X(2005)069

<0001:NAGBAU>2.0.CO;2.

Descriptors: Breeding Bird Survey/ grass-shrub birds/ grassland birds/ North American Bird Conservation Initiative/ North American Waterfowl Management Plan/ Partners in Flight/ prairie grouse/ quail/ afforestation/ avifauna/ conservation management/ fragmentation/

grassland/ population decline/ species conservation/ North America/ Anas/ Anatidae/ Anser/ Aves/ Phasianidae
Abstract: The widespread and ongoing declines of North American bird populations that have affinities for grassland and grass-shrub habitats (hereafter referred to as grassland birds) are on track to become a prominent wildlife conservation crisis of the 21st century. There is no single cause responsible for the declines of grassland birds. Rather, a cumulative set of factors such as afforestation in the eastern United States, fragmentation and replacement of prairie vegetation with a modern agricultural landscape, and large-scale deterioration of western U.S. rangelands are the major causes for these declines. The North American Bird Conservation Initiative (NABCI) is a set of comprehensive and coordinated strategic actions modeled on the Joint Venture initiatives that were used to successfully implement the North American Waterfowl Management Plan. The NABCI is emerging as a potential broad-scale solution for conserving populations of grassland birds. Coordinating grassland bird conservation efforts with initiatives to stabilize and increase upland game birds that have strong affinities for grassland habitats - such as quail and prairie grouse - presents additional opportunities to leverage funding and resources that will positively impact virtually all species of North American grassland birds.

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1178. Northern bobwhite population and habitat response to pine-grassland restoration.

Cram, D. S.; Masters, R. E.; Guthery, F. S.; Engle, D. M.; and Montague, W. G.

Journal of Wildlife Management 66(4): 1031-1039. (2002)
 NAL Call #: 410 J827; ISSN: 0022541X

Descriptors: Arkansas/ Colinus virginianus/ disc of vulnerability/ forest management/ northern bobwhite/ *Picoides borealis*/ pine-grassland restoration/ prescribed fire/ red-cockaded woodpecker/ usable space/ abundance/ grassland/ habitat restoration/ mixed forest/ United States/ Colinus virginianus/ *Picoides borealis*/ *Pinus echinata*

Abstract: We compared northern bobwhite (*Colinus virginianus*) abundance and habitat characteristics in unmanaged mixed shortleaf pine (*Pinus echinata*)-hardwood stands and restored pine-grassland stands managed for the red-cockaded woodpecker (*Picoides borealis*) on the Ouachita National Forest, Arkansas, USA. To determine northern bobwhite (hereafter, bobwhite) population response in untreated control, thinned, and thinned and burned stands either 1, 2, or 3 growing seasons (Mar to mid-Oct) post-burn, we used whistling-male counts and covey-call counts as indices of population abundance. We estimated woody stem density, understory and overstory canopy cover, conifer and hardwood basal area, and the disc of vulnerability to characterize habitat response. Relative abundance of whistling males in the spring was greatest in thinned stands 3 growing seasons post-burn and in thinned but unburned stands. These stands had the smallest disc of vulnerability and the greatest understory shrub cover <2 m in height compared with other treatments. A threshold-like increase in bobwhite abundance was observed as a function of woody structure <2 m. Pine-grassland restoration provided suitable structure for bobwhites in spring, summer, and fall, but may not be adequate in winter. Further, data suggested that bobwhite density within a stand also was related to the

amount of suitable habitat surrounding the stand. Bobwhite management efforts in similar shortleaf pine forests should include thinning to reduce midstory and overstory cover and frequent fire to maintain open woodland conditions - i.e., low basal area stands with limited midstory.
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1179. Northern hawk owls and recent burns: Does burn age matter?

Hannah, Kevin C. and Hoyt, Jeff S.

Condor 106(2): 420-423. (2004)
 NAL Call #: QL671.C6; ISSN: 0010-5422

Descriptors: *Surnia ulula*/ Strigiformes/ Strigidae/ wildlife management/ burned forest habitat/ conifer-dominated boreal forest/ Alberta/ burned and unburned conifer dominated boreal forest/ fires-burns/ forests/ ecosystems/ habitat management/ Mariana Lake region/ status/ environmental factors/ Canada/ communities/ conservation/ wildlife management/ habitat use/ land zones/ burned forest/ clearcut logging/ fire/ northern hawk owl/ *Surnia ulula*/ breeding/ habitat/ forest/ silviculture/ abundance/ dispersion/ ecological requirements

Abstract: The Northern Hawk Owl (*Surnia ulula*) remains one of the least-studied birds in North America. Although hawk owls use burned forest, reports of this association have been primarily anecdotal and outside the breeding season. We present the first comparison of hawk owl relative abundance between burned and unburned conifer-dominated boreal forest in North America. Hawk owls were detected only in postfire forest and were not detected in nearby unburned coniferous forest. There was a significant negative exponential relationship between hawk owl abundance and burn age, suggesting that burns were only suitable up to 8 years postfire. A conservative estimate of a peak in breeding density was three nests per 100 km² for a 2-year-postfire forest. Wildfire and newly burned forests may be an important feature for hawk owls in the Nearctic boreal forest. This raises the question whether management of this species through improved forestry techniques is a sufficient conservation measure.

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1180. Northwest Forest Plan: The first 10 years (1994-2003) - Synthesis of monitoring and research results.

Haynes, Richard W.; Bormann, Bernard T.; Lee, Danny C.; and Martin, Jon R.

Portland, OR: Pacific Northwest Research Station, Forest Service, U.S. Department of Agriculture; General Technical Report-PNW 651, 2006. 292 p.

Notes: 0363-6224 (ISSN).

Descriptors: conservation measures/ terrestrial habitat/ land zones/ comprehensive zoology: habitat management/ old growth forest management plan/ synthesis of monitoring and research results/ forest and woodland/ old growth forest/ management plan/ Pacific Northwest/ United States

Abstract: It has been 10 years since the Northwest Forest Plan (the Plan) came into being at the direction of President Clinton. This report synthesizes the status and trends of five major elements of the Plan: older forests, species, aquatic systems, socioeconomics, and adaptive management and monitoring. It synthesizes new science that has resulted from a decade of research. The report also contains key management implications for federal agencies. This report is a step in the adaptive management approach adopted by the Plan, and there is the expectation

that its findings will lead to changes in the next decade of Plan implementation. Although most of the monitoring has been underway for less than a decade and many of the Plan's outcomes are expected to evolve over decades, the monitoring is already producing a wealth of data about the status and trends in abundance, extent, diversity, and ecological functions of older forests, the species that depend on them, and how humans relate to them. Conditions did change over the decade. Watershed conditions improved, increase in acreage of late-successional old growth exceeded expectations, new species now pose threats, and there is greater appreciation of the need to share habitat protection among land ownerships. The Plan anticipated greater timber harvests and more treatments to reduce fuel in fire-prone stands than have actually occurred. Monitoring showed human communities are highly variable, and it is difficult to disentangle overall growth in regional economies from the impacts of reduced timber harvests on federal land.

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1181. Oak regeneration using the shelterwood-burn technique: Management options and implications for songbird conservation in the southeastern United States.

Lanham, J. Drew; Keyser, Patrick D.; Brose, Patrick H.; and Van Lear, David H.

Forest Ecology and Management 155(1-3): 143-152. (2002)
NAL Call #: SD1.F73; ISSN: 0378-1127.

Notes: Special issue: Forest ecology in the next millennium: Putting the long view into practice / edited by A.C. Dibble. Paper presented at a workshop held June 27-30, 1999, Orono, Maine. Includes references.

Descriptors: commercial activities/ conservation measures/ land zones/ North America/ Passeriformes: forestry/ shelterwood/ burn techniques/ oak regeneration/ habitat management/ United States, southeastern region/ Aves/ birds/ chordates/ vertebrates

Abstract: Shelterwood silviculture is commonly used to regenerate oaks in upland stands. However, competition from other species such as tulip-poplar (*Liriodendron tulipifera*) may deter oak regeneration when these traditional shelterwood techniques are used. The shelterwood-burn technique is a relatively new tool for regenerating oak-dominated stands on some upland sites while simultaneously minimizing undesirable hardwood intrusion with prescribed fire. Once successful oak regeneration has been achieved, three options are available which will result in different vegetative structure and composition within a stand and subsequently different habitats for songbirds. These options are: complete or partial canopy retention, post-harvest prescribed burning and complete canopy removal. Canopy retention, burning and removal treatments will create, respectively, two-age stands that are likely to harbor a diverse mixture of mature forest and early successional species; park-like woodlands with open woodland species; or early-successional habitats with shrubland species. We suggest that shelterwood-burn systems and the management options associated with them offer viable alternatives for managing both songbird and timber resources where oak-dominated stands are the desired goal in upland southeastern sites.

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1182. Observations of bat activity during prescribed burning in West Virginia.

Rodrigue, Jane L.; Schuler, Thomas M.; and Menzel, Michael A.

Bat Research News 42(2): 48-49. (2001)

NAL Call #: QL737.C5 B328; ISSN: 0005-6227

Descriptors: Myotis/ Lasiurus borealis/ mammals/ behavior/ habitat use/ habitat alterations/ fires-burns/ habitat management/ movements/ ecosystems/ forests, deciduous/ oak/ little brown bat/ red bat/ Acacia spp./ Acer rubrum/ Acer spp./ West Virginia: Tucker County

Abstract: During the week of 30 April 2001, the USDA Forest Service conducted a series of prescribed burns on the Monongahela National Forest, Tucker County, West Virginia, in conjunction with an ongoing study of regeneration of oak (*Quercus* spp.). Burn units were located in the Allegheny Mountain and Plateau physiographic province, at elevations ranging from 615 to 800 m. The forest primarily consisted of chestnut oak (*Q. prinus*), hickory (*Carya* spp.), red maple (*Acer rubrum*), and black locust (*Robinia pseudo-acacia*) in the overstory, with striped maple (*Acer pennsylvanicum*) and mountain laurel (*Kalmia latifolia*) in the shrub layer. On 30 April, at ca. 1210 h, a myotis bat (*Myotis* sp.) flew from a snag that had ignited at its base, as the fire rapidly moved up the slope. The bat flew ca. 7-10 m to a live serviceberry (*Amelanchier arborea*), where it clung to the uppermost, leafed-out branches. The bat remained in the serviceberry for ca. 30 seconds, before it flew straight to unburned forest across the cleared fireline. Similar behavior was observed on 1 May 2001 on another burn unit in the same general area. At ca. 1330 h, as the prescribed fire moved up a slope, two red bats (*Lasiurus borealis*) flew rapidly out of the burning unit, across a wildlife opening, and into an unburned area of forest. The short and long-term negative and positive impacts of prescribed burning on bats in forested landscapes of the East are poorly known. Red bats that readily roost in leaf litter on the forest floor or in tree foliage are subjected to heat and dense smoke (Saughey et al., 1998, *J. Arkansas Acad. Sci.*, 52:92-98; Moorman et al., 1999, *Bat Research News*, 40:74-75), and other bats roosting in snags consumed by fire undoubtedly are displaced in the short-term. Nonetheless, because most prescribed fires in these Allegheny forests are short in duration and relatively cool, few snags probably are consumed and fire-related mortality of subcanopy, suppressed trees could result in a net gain of potential bat roosts (Menzel et al., in press, *Forest Ecology and Management*)

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1183. Observations on amphibians and reptiles in burned and unburned forests on the upper coastal plain of Virginia.

Mitchell, Joseph C.

Virginia Journal of Science 51(3): 199-203. (2000);
ISSN: 0042-658X

Descriptors: commercial activities/ conservation measures/ terrestrial habitat/ abiotic factors/ land and freshwater zones/ Amphibia/ Reptilia: forestry/ habitat management/ forest and woodland/ fire/ prescribed burning/ forest fauna/ Virginia/ Caroline County/ Fort A.P. Hill/ Amphibia/ amphibians/ chordates/ reptiles/ vertebrates

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1184. Observations on the use of stubs by wild birds: A 10 year update.

Harris, Brian

British Columbia Journal of Ecosystems and Management 1(1): 1-5. (2001)

NAL Call #: SD146.B7 B34.

http://www.forrex.org/jem/ISS1/vol1_no1_art3.pdf

Descriptors: commercial activities/ conservation measures/ reproductive behavior/ terrestrial habitat/ land zones/ Canada/ Aves: forestry/ logging/ lodgepole pines/ stub use patterns/ long-term research projects/ habitat management/ wildlife-tree management/ breeding sites/ nesting sites/ habitat utilization/ mixed forest/ British Columbia/ Kelowna/ Rendell Creek Valley/ birds/ chordates/ vertebrates

Abstract: In British Columbia, many species of wildlife depend on dead or dying trees; however, current Workers' Compensation Board regulations require that such trees be felled. In 1990, in an effort to resolve workers' safety with wildlife habitat needs, Pope and Talbot Limited proposed the creation of a number of tall stumps (3-5 m tall) in their logging operations. In the study cutblock, approximately 170 lodgepole pine stumps ("stubs") were cut. Since their establishment, the stubs were monitored for bird nesting each spring. A total of 86 active nests have been counted in 10 years. Ninety-five percent of this nesting occurred in stubs in the clearcut portion of the block, versus 5% in the selectively logged portion. Approximately 16% of the stubs were used for nesting at least once during the 10 years of observations. In general, the greater the diameter of the stub, the greater likelihood that it would be used for nesting. All nesting occurred in reworked holes; no new nest holes were drilled in these stubs. Stub creation should continue to be a part of the wildlife tree management strategy in any logging operation, irrespective of the species of tree being harvested. The average density should be at least one stub per hectare, but preferably much higher to ensure that suitable nest stubs are retained. Stubs that are not used for nesting may provide perching or feeding sites, and contribute to the area's coarse woody debris when they fall. Stub creation involves little extra cost and little volume is lost. Therefore, all forest companies should be encouraged to create stubs as part of responsible forest stewardship.

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1185. Occurrence and nest survival of four thrush species on a managed central Appalachian forest.

Dellinger, Rachel L.; Bohall Wood, Petra.; and

Keyser, Patrick D.

Forest Ecology and Management 243(2-3): 248-258. (2007)

NAL Call #: SD1.F73; ISSN: 0378-1127

Descriptors: commercial activities/ conservation measures/ reproduction/ reproductive behavior/ ecology/ terrestrial habitat/ land zones/ *Catharus fuscescens*/ *Catharus guttatus*/ *Hylocichla mustelina*/ *Turdus migratorius*: forestry/ forest management/ Effect on habitat utilization and nest site selection/ habitat management/ breeding site/ nest site selection/ forest management effects/ habitat utilization/ forest and woodland/ management effects on habitat utilization and nest site selection/ West Virginia/ Randolph County/ forestry management effects on habitat utilization and nest site selection/ Aves, Passeriformes, Turdidae/ birds/ chordates/ vertebrates

Abstract: The wood thrush (*Hylocichla mustelina* Gmelin) is a species of concern in the central Appalachians, and is sympatric there with three related species, the American

robin (*Turdus migratorius* Linnaeus), hermit thrush (*Catharus guttatus* Pallas), and veery (*Catharus fuscescens* Stephens). Our objectives were to quantify use of mature forests and areas subjected to even-aged harvesting and partial harvesting by these four species by measuring their frequency of occurrence, nest survival, and nest site characteristics. We also compared microhabitat characteristics among the landcover types. During 2001-2003 we conducted point count surveys, monitored nests, and collected nest habitat data on a managed forest in West Virginia. Land cover was digitized into five categories: deciduous and mixed mature forest, deciduous and mixed partial harvest, and even-aged regeneration harvest. Chi-square goodness-of-fit analysis with Bonferroni 95% confidence intervals indicated that deciduous partial harvests were more likely to be inhabited by wood thrushes. The other three species were less likely to occur in deciduous partial harvests, and veery had lower nest survival in partial harvests than in mature forest. Contrary to many published descriptions that suggest thrushes will not nest in even-aged harvests, a small number of all species but hermit thrushes did nest in this cover type, often near a residual canopy tree. Hermit thrushes were less likely to inhabit mature deciduous forest, even-aged harvests, and harvested edges but chose nesting areas in mature mixed forest that was disturbed by road building and the seeding of landings and skid trails >10 years ago. Microhabitat characteristics of landcovers did not differ overall. Our results suggest a relationship with partial harvesting that is positive for wood thrush but negative for the other three species. © 2007 Elsevier B.V. All rights reserved. © Thomson Reuters Scientific

1186. One hundred fifty years of change in forest bird breeding habitat: Estimates of species distributions.

Schulte, L. A.; Pidgeon, A. M.; and Mladenoff, D. J.

Conservation Biology 19(6): 1944-1956. (2005)

NAL Call #: QH75.A1C5; ISSN: 08888892.

Notes: doi: 10.1111/j.1523-1739.2005.00254.x.

Descriptors: avian ecology/ conservation planning/ habitat suitability modeling/ historical range of variability/ landscape ecology/ pre-Euro-American settlement/ Wisconsin

Abstract: Evaluating bird population trends requires baseline data. In North America the earliest population data available are those from the late 1960s. Forest conditions in the northern Great Lake states (U.S.A.), however, have undergone succession since the region was originally cut over around the turn of the twentieth century, and it is expected that bird populations have undergone concomitant change. We propose pre-Euro-American settlement as an alternative baseline for assessing changes in bird populations. We evaluated the amount, quality, and distribution of breeding bird habitat during the mid-1800s and early 1990s for three forest birds: the Pine Warbler (*Dendroica pinus*), Blackburnian Warbler (*D. fusca*), and Black-throated Green Warbler (*D. virens*). We constructed models of bird and habitat relationships based on literature review and regional data sets of bird abundance and applied these models to widely available vegetation data. Original public-land survey records represented historical habitat conditions, and a combination of forest inventory and national land-cover data represented current conditions. We assessed model robustness by comparing current habitat distribution to actual breeding bird locations from the Wisconsin Breeding Bird Atlas. The model showed

little change in the overall amount of Pine Warbler habitat, whereas both the Blackburnian Warbler and the Black-throated Green Warbler have experienced substantial habitat losses. For the species we examined, habitat quality has degraded since presettlement and the spatial distribution of habitat shifted among ecoregions, with range expansion accompanying forest incursion into previously open habitats or the replacement of native forests with pine plantations. Sources of habitat loss and degradation include loss of conifers and loss of large trees. Using widely available data sources in a habitat suitability model framework, our method provides a long-term analysis of change in bird habitat and a presettlement baseline for assessing current conservation priority. ©2005 Society for Conservation Biology.
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1187. Options for managing early-successional forest and shrubland bird habitats in the northeastern United States.

DeGraaf, R. M. and Yamasaki, M.
Forest Ecology and Management 185(1-2): 179-191. (2003)
NAL Call #: SD1.F73; ISSN: 03781127
Descriptors: disturbance-dependent species/ early-successional habitats/ even-age management/ opening size/ silvicultural systems/ agriculture/ biodiversity/ floods/ regenerators/ wind/ shrubland/ forestry/ avifauna/ conservation management/ disturbance/ forest management/ shrubland/ silviculture/ succession/ United States/ *Castor canadensis*
Abstract: Historically, forests in the northeastern United States were disturbed by fire, wind, Native American agriculture, flooding, and beavers (*Castor canadensis*). Of these, wind and beavers are now the only sources of natural disturbance. Most disturbance-dependent species, especially birds, are declining throughout the region whereas species affiliated with mature forests are generally increasing or maintaining populations. Disturbance must be simulated for conservation of early-successional species, many of which are habitat specialists compared to those associated with mature forests. Both the maintenance of old fields and forest regeneration are needed to conserve brushland species. Regenerating forest habitats are more ephemeral than other woody early-successional habitats. The types and amounts of early-successional habitats created depend on the silvicultural system used, patch size selected, time between regeneration cuts, and rotation age. We recommend that group selection and patch cuts should be at least 0.8 ha, and patches should be generated approximately every 10-15 years depending on site quality. Regeneration of intolerant and mid-tolerant tree species should be increased or maintained in managed stands. Also, frost pockets, unstocked, or poorly-stocked stands can provide opportunities to increase the proportion of early-successional habitats in managed forests.
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1188. Pairing season habitat selection by Montezuma quail in southeastern Arizona.

Bristow, K. D. and Ockenfels, R. A.
Journal of Range Management 57(5): 532-538. (2004)
NAL Call #: 60.18 J82 ; ISSN: 0022409X
Descriptors: Arizona/ *Cyrtonyx montezumae*/ grazing/ habitat selection/ livestock/ Madrean evergreen woodland/ Montezuma quail/ gamebird/ grazing/ habitat availability/

habitat quality/ habitat selection/ livestock/ *Cyrtonyx montezumae*/ *Quercus*
Abstract: Montezuma quail (*Cyrtonyx montezumae* Vigors) are closely associated with oak woodlands (*Quercus* spp.). Livestock grazing and cover availability are considered important factors affecting Montezuma quail distribution and density. While habitat conditions during pairing season (April-June) are thought to be important to Montezuma quail survival and reproduction, information on habitat selection during that time is limited. We investigated habitat selection by Montezuma quail in grazed and ungrazed areas within the Huachuca and Santa Rita mountain foothills in southeastern Arizona. We used pointing dogs to locate quail during the pairing seasons of 1998 and 1999, and measured habitat characteristics at 60 flush sites and 60 associated random plots (within 100 m of flush sites). We recorded information on landform, substrate, vegetation, and cover. Montezuma quail selected ($P < 0.10$) areas with higher grass canopy cover and more trees than randomly available. Short (< 50 cm tall) visual obstruction (cover), usually associated with bunch grass, was greater ($P < 0.10$) at use sites than at random plots. Land management practices that reduce grass and tree cover may affect Montezuma quail habitat quality and availability in southeastern Arizona. Based on habitat selection patterns of Montezuma quail, we recommend that oak woodland habitats should contain a minimum tree canopy of 26%, and 51-75% grass canopy cover at the 20-cm height to provide optimum cover availability.
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1189. Partial cutting of woodlots in an agriculture-dominated landscape: Effects on forest bird communities.

Holmes, S. B.; Burke, D. M.; Elliott, K. A.; Cadman, M. D.; and Friesen, L.
Canadian Journal of Forest Research 34(12): 2467-2476. (2004)
NAL Call #: SD13.C35; ISSN: 00455067.
Notes: doi: 10.1139/X04-130.
Descriptors: agriculture/ biodiversity/ harvesting/ bird community/ landscapes/ maple forests/ silviculture guidelines/ wood/ avifauna/ community dynamics/ community structure/ forest management/ logging (timber)/ *Acer*/ agriculture/ basal area/ biodiversity/ birds/ harvesting/ silviculture/ Canada/ North America/ Ontario/ *Acer*/ *Aves*/ *Certhia americana*/ *Dendroica pensylvanica*/ *Indigofera*/ *Molothrus ater*/ *Myiarchus crinitus*/ *Passerina cyanea*/ *Setophaga ruticilla*
Abstract: We studied the short-term effects of partial cutting on the forest bird communities of mixed maple forests in an agriculture-dominated landscape in southwestern Ontario. Blocks that had been recently harvested were grouped according to provincial silvicultural guidelines (standard and heavy cuts) and compared with blocks that had been uncut for at least 24 years (old cuts). We found significant differences in forest bird community structure between standard and heavy cuts and between heavy and old cuts, but not between standard and old cuts. Heavy cuts had more species and more individuals than old cuts, the result primarily of greater numbers of early-successional species. Brown creeper (*Certhia americana* Bonap.) was the only species to show a significant negative response to harvesting and was the best indicator of old cuts, while indigo bunting (*Passerina cyanea* L.), brown-

headed cowbird (*Molothrus ater* Bodd.), chestnut-sided warbler (*Dendroica pensylvanica* L.), American redstart (*Setophaga ruticilla* L.), and great crested flycatcher (*Myiarchus crinitus* L.) were all significant indicators of heavy cuts. Our research suggests that it is possible to protect native bird communities in southwestern Ontario by using the single-tree selection system to meet the minimum basal area targets and harvest intensities recommended in provincial silvicultural guidelines. © 2004 NRC Canada. © 2008 Elsevier B.V. All rights reserved.

1190. Pinyon-juniper woodland restoration studies: A watershed scale, multi-disciplinary approach.

Jacobs, Brian E.; Gatewood, Richard G.; Hastings, Brian K.; Julius, Christian; Kleintjes, Paula K.; Fetting, Stephen M.; and Allen, Craig D.
Ecological Society of America Annual Meeting, Proceedings 87 (2002)
 NAL Call #: QH540.E365.
 Notes: Conference: 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.
 Descriptors: biodiversity/ conservation/ terrestrial ecology: ecology, environmental sciences/ mechanical restoration treatment/ applied and field techniques/ mechanical thinning/ applied and field techniques/ slash mulching/ applied and field techniques/ age class/ biological diversity/ biomass/ canopy cover/ drought/ fire history/ grazing/ historical record/ multi disciplinary approach/ pinyon juniper woodland restoration/ plant cover/ ponderosa pine savanna displacement/ sediment loss/ soil exposure/ soil microtopography/ soil moisture/ species abundance/ species richness/ summer monsoon/ tree age/ understory vegetation suppression/ watershed scale/ woodland density
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1191. Planning for bats on forest industry lands in North America.

Wigley, T. Bently; Miller, Darren A.; and Yarrow, Greg K.
 In: *Bats in Forests: Conservation and Management*/ Lacki, M. J.; Hayes, J. P.; and Allen Kurta, A. Baltimore, MD: Johns Hopkins University Press, 2007; pp. 293-318 .
 Notes: Literature review; ISBN: 9780801884993 or 0801884993.
 Descriptors: commercial activities/ conservation measures/ terrestrial habitat/ land zones/ Chiroptera: forestry/ habitat management/ harvested forest management/ forest and woodland/ forest industry lands/ North America/ Mammalia/ Bats/ chordates/ mammals/ vertebrates
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1192. Planning open spaces for wildlife, I: Selecting focal species using a Delphi survey approach.

Hess, George R. and King, Terri J.
Landscape and Urban Planning 58(1): 25-40. (2002)
 NAL Call #: QH75.A1L32; ISSN: 0169-2046
 Descriptors: Mammalia/ barred owl/ broad-winged hawk/ eastern box turtle/ loggerhead shrike/ northern bobwhite/ pileated woodpecker/ Aves/ wildlife management/ Delphi survey approach/ suburban development/ habitat management/ habitat use/ North Carolina/ suburban wildlife space planning/ Triangle region/ urban habitat/ ecosystems/ conservation/ wildlife management/ land zones/ artificial

structures/ open space planning/ green space planning/ umbrella species/ focal species/ keystone species/ wildlife conservation/ wildlife habitat/ delphi survey/ amphibians/ birds/ ecological requirements/ forest/ habitat change/ indicator/ landscape/ mammals/ reptiles/ road/ settlement
Abstract: In a world being transformed by human population growth, conservation biology has emerged as one discipline focused on preventing, mitigating, and reversing the loss of species, ecosystems, and landscapes. Because of the need to act quickly with incomplete information, conservation biologists have developed shortcuts that rely on identifying key species to be focused on during planning efforts. We describe a process that can be used to select those species, using a suburbanizing region in the United States as an example. The Triangle region of North Carolina, USA - Raleigh-Durham-Chapel Hill and surroundings - is undergoing rapid suburbanization, resulting in land-use changes that will alter wildlife communities and might result in the loss of some species. We are developing a wildlife conservation plan for the region based on a combination of landscape and focal species approaches. The objective of the research described in this paper was to identify focal species to be used for conservation planning in the region; our effort focused on amphibians, birds, mammals, and reptiles. In theory, habitat conserved by planning for a few carefully chosen focal species is expected to encompass habitat for many other species with similar requirements. To identify focal species, we used a three-part Delphi survey, administered to a panel of experts. The panel identified six landscape types and nine associated focal species: extensive undisturbed habitat (bobcat, eastern box turtle); riparian and bottomland forest (barred owl, beaver); upland forest (ovenbird, broad-winged hawk); mature forest (pileated woodpecker); pastures and grassy fields (loggerhead shrike); and open and early successional forest (northern bobwhite). The panelists generally agreed that a combined landscape-[focal species] approach was reasonable, but noted a number of problems to be expected during the planning phase. The most critical of these problems are that the approach has not been well tested, required data are often unavailable, and implementation will be difficult in the face of extreme economic pressures to develop land. Administering the Delphi survey was more labor-intensive, and took longer, than we anticipated; it might have been more effective had it been completed more quickly. Nevertheless, we believe this process can be applied to a broad range of conservation problems, which are often characterized by a high degree of uncertainty and the need to act quickly.
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1193. Planning open spaces for wildlife, II: Modeling and verifying focal species habitat.

Rubino, Matthew J. and Hess, George R.
Landscape and Urban Planning 64(1-2): 89-104. (2003)
 NAL Call #: QH75.A1L32; ISSN: 0169-2046
 Descriptors: Castoridae/ Rodentia/ Felidae/ Carnivora/ Chelonia/ wildlife habitat/ modeling/ North Carolina
Abstract: In the face of human population growth that is transforming the Earth, scientists, land managers, and planners are working to prevent, mitigate, and reverse the consequent loss of species, ecosystems, and landscapes. Because of the need to act quickly with incomplete data, a number of shortcuts have been developed that rely on

identifying key species for planning efforts. By developing conservation plans for a small set of carefully selected focal species, planners hope to create a protective umbrella for a wider array of species and functional landscapes. In an earlier paper, we described an approach for selecting a set of focal species. In this paper, we report a process for the rapid identification and verification of potential habitat for a focal species. Using the barred owl as an example, we present the process for a suburbanizing region of North Carolina, USA. The barred owl was selected to represent bottomland hardwood and forested wetland landscapes in the region. Using a geographic information system (GIS), we assembled data layers from readily available remotely sensed, conventional survey, and physiographic data to create a model of barred owl habitat. Barred owls occupy bottomland hardwood forests, which we identified using land cover, soils, and wetlands data. We eliminated from consideration bottomland forest habitat within 100 m of a road and within 60 m of open vegetative cover. Patches of the remaining bottomland forest larger than 86 ha in size were considered large enough to meet all barred owl habitat needs. Simple presence/absence surveys detected barred owls in approximately 65% of patches identified by our model as suitable habitat. We tested the barred owl's suitability as an umbrella for bottomland forest species using an existing database of rare and outstanding elements of natural diversity. Umbrella coverage for barred owl habitat (bottomland forest patches \geq 86 ha) varied with taxa from 0% for invertebrate species to 75% for vertebrate species. However, umbrella coverage for all bottomland forest, including patches $<$ 86 ha, was at or near 100% for all taxa. The relatively simple modeling and verification processes we used can be carried out with a minimal amount of data and time, making it an attractive tool in situations where time and resources are in short supply.

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1194. **Ponderosa pine restoration and turkey roost site use in northern Arizona.**

Martin, S. L.; Theimer, T. C.; and Fule, P. Z.
Wildlife Society Bulletin 33(3): 859-864. (2005)
 NAL Call #: SK357.A1W5; ISSN: 00917648.
 Notes: doi: 10.2193/0091-7648(2005)33[859:PPRATR]2.0.CO;2.

Descriptors: Meleagris gallopavo/ Pinus ponderosa/ restoration/ roost site/ adaptive management/ gamebird/ habitat restoration/ habitat use/ roost site/ Arizona/ Meleagris gallopavo/ Meleagris gallopavo merriami/
Abstract: Ecological restoration of ponderosa pine (*Pinus ponderosa*) forests in the southwestern United States is a relatively new, adaptive management practice that potentially alters wildlife habitat during and immediately after restoration treatments. To determine whether restoration treatments affected Merriam's wild turkey (*Meleagris gallopavo merriami*) use of roost sites, we relocated 91 of 120 turkey roost sites that originally had been mapped in 1985 in the Uinkaret Mountains of northern Arizona. We compared current turkey use of historical roost sites in stands that had been thinned and burned between 1995 and 2002 to adjacent ($<$ 800 m away) and distant ($>$ 800 m) stands. In 2002, 23 historical roosts were still in use, and in 2003, 13 were still in use, 5 of which had not been used in 2002. The number of historical roost sites still in use among treated, adjacent, and distant stands did not

differ from that expected based on the total number of historical roosts in each stand type. We also searched for new roosts while traveling between historical roost sites and found 2.2 new roosts per hour searched in treated stands, 1.5 in adjacent stands, and 1.0 in distant stands. As expected, active roost sites in treated stands had significantly lower basal area, fewer stems, and less canopy cover compared to roost sites in untreated areas. However, roost trees in treated and untreated stands did not differ in diameter at breast height, height, or distance to the lower limb, indicating that treatment did not affect these characteristics. Several factors unique to our study site may have influenced our results: treated areas represented only 5% of total habitat available, treatments occurred primarily on flat areas and not on ridges or slopes, and treatments were implemented over several years.

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1195. **Ponderosa pine snag dynamics and cavity excavation following wildfire in northern Arizona.**

Chambers, C. L. and Mast, J. N.
Forest Ecology and Management 216(1-3): 227-240. (2005)
 NAL Call #: SD1.F73; ISSN: 03781127.
 Notes: doi: 10.1016/j.foreco.2005.05.033.

Descriptors: cavities/ cavity-nesting birds/ ponderosa pine/ snags/ standing dead trees/ wildfire/ wildlife/ biodiversity/ fires/ probability/ forestry/ coniferous forest/ forest fire/ nest site/ treehole/ wildfire/ birds/ holes/ Pinus ponderosa/ Arizona/ Animalia/ Aves

Abstract: Snags are important components of wildlife habitat, providing nesting and feeding sites for over 75 species of animals in the southwestern United States. Wildfires can increase or decrease the availability of snags to wildlife by killing live trees or incinerating snags. Our objectives were to describe dynamics and spatial patterns of fire-killed snags in ponderosa pine (*Pinus ponderosa*) forests of northern Arizona and predict the probability of snag use by cavity nesters. We established six 1-ha plots following two recent fires that occurred in northern Arizona (Hochderffer fire of 1996 [H96] and Pumpkin fire of 2000 [P00]) to determine ponderosa pine snag availability and use by wildlife as evidenced by presence of excavated cavities. For comparison, six paired 1-ha plots in nearby unburned areas were sampled with burned plots. For the twelve 1 ha plots, field methods included mapping and measuring 15 characteristics for 668 snags (630 in burned and 38 in unburned plots) 4 years post-fire on the H96 fire, and 1010 snags (996 in burned and 14 in unburned plots) 1 year post-fire on the P00 fire. We remeasured characteristics of all snags in 2003. Most burned snags were standing 3 years after fire, but 7 years after fire, 41% had fallen. Snags in burned plots were clumped when initially measured and remeasured. After 7 years, snags in burned plots that were still standing were straight, large diameter trees in denser clumps. Density of excavated cavities was similar between burned (3.0 ha⁻¹) and unburned (2.2 ha⁻¹) plots, even though burned areas produced much higher densities of snags. Snags (both burned and unburned) that were most likely to contain excavated cavities were large diameter with broken tops. This evidence of cavity nester use indicates that in ponderosa pine forests in the southwest, retaining large diameter snags is important to cavity nesters regardless of snag origin. If salvage logging is to occur in severely

burned ponderosa pine in the southwest, retaining straight, large diameter snags in clumps will help maintain snags for cavity-excavating species.

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1196. Population increase in Kirtland's warbler and summer range expansion to Wisconsin and Michigan's Upper Peninsula, USA.

Probst, J. R.; Donner, D. M.; Bocetti, C. I.; and Sjogren, S. *ORYX* 37(3): 365-373. (2003); ISSN: 00306053.

Notes: doi: 10.1017/S0030605303000632.

Descriptors: carrying capacity/ colonization/ *Dendroica kirtlandii*/ dispersal/ jack pine/ Michigan/ population expansion/ Wisconsin/ endangered species/ habitat management/ passerines/ population growth/ range expansion/ Aves/ *Dendroica kirtlandii*/ *Pinus banksiana*
Abstract: The threatened Kirtland's warbler *Dendroica kirtlandii* breeds in stands of young jack pine *Pinus banksiana* growing on well-drained soils in Michigan, USA. We summarize information documenting the range expansion of Kirtland's warbler due to increased habitat management in the core breeding range in the Lower Peninsula of Michigan during 1990-2000. We collected records and conducted searches for the species in Michigan's Upper Peninsula and Wisconsin over 1978-2000. During that time 25 males were found in Wisconsin and 90 males in the Upper Peninsula. We documented colonization of Michigan's Upper Peninsula by six ringed males from the Lower Peninsula of Michigan. Four ringed birds also moved back to the core breeding range, including two males that made two-way movements between the core breeding range and the Upper Peninsula. Thirty-seven females were observed with males from 1995 to 2000, all in Michigan. Nesting activities were noted for 25 pairs and at least nine nests fledged young. One male ringed as a fledgling returned to breed in two subsequent years. After a 19-year period of population stability, the Kirtland's warbler population increased four-fold during 1990-2000, most likely in response to a tripling in habitat area. This increase in sightings and documented breeding may be related to habitat availability in Michigan's Upper Peninsula and to saturation of habitat in the main breeding range. The increase in extra-limital records during 1995-1999 corresponds to the time when the population went from the minimum to the maximum projected population densities, and a decline in natural wildfire habitat was just offset by new managed habitat for the Kirtland's warbler. © 2003 FFI. © 2008 Elsevier B.V. All rights reserved.

1197. Potential effects of groundcover restoration on breeding bird communities in longleaf pine stands.

Rutledge, B. T. and Conner, L. M.

Wildlife Society Bulletin 30(2): 354-360. (2002)

NAL Call #: SK357.A1W5; ISSN: 00917648

Descriptors: avian community/ Conservation Reserve Program/ CRP/ ecosystem management/ Georgia/ longleaf pine/ native groundcover/ *Pinus palustris*/ restoration/ species diversity/ avifauna/ breeding population/ forest ecosystem/ ground cover/ restoration ecology/ United States/ *Aimophila aestivalis*/ *Contopus virens*/ *Dendroica pinus*/ *Dumetella carolinensis*/ *Molothrus ater*/ *Passerina cyanea*/ *Pinus palustris*
Abstract: The longleaf pine (*Pinus palustris*) ecosystem is one of the most endangered ecosystems in the United States. Recent incentives have led to increased interest in

longleaf pine restoration. These restoration efforts often emphasize reestablishing native groundcovers, yet there have been no studies that address the role of native groundcover on breeding bird communities within longleaf pine forests. Therefore, we studied breeding bird communities in mature longleaf pine stands with either native or disturbed groundcovers to determine the likely effects of groundcover reestablishment associated with longleaf pine reforestation. Avian species richness and diversity did not differ ($P=0.823$, $P=0.571$, respectively), and avian community similarity was high (Morisita's index=0.98) between native and disturbed groundcover. However, pine warblers (*Dendroica pinus*), gray catbirds (*Dumetella carolinensis*), eastern wood-pewees (*Contopus virens*), brown-headed cowbirds (*Molothrus ater*), and Bachman's sparrows (*Aimophila aestivalis*) were more abundant ($P\leq 0.10$) in areas with native groundcover, whereas indigo buntings (*Passerina cyanea*) were more abundant ($P=0.058$) in areas with disturbed groundcover. Although groundcover restoration may benefit some avian populations, overall avian species richness, diversity, and community composition may be unaffected. Restoration of native groundcover may be best justified for aesthetic values and as a tool to facilitate long-term stand management using prescribed fire.

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1198. Potential indicators of the impacts of forest management on wildlife habitat in northeastern Ontario: A multivariate application of wildlife habitat suitability matrices.

Malcolm, Jay R.; Campbell, Brian D.; Kuttner, Ben G.; and Sugar, Alissa

Forestry Chronicle 80(1): 91-106. (2004)

NAL Call #: 99.8 F7623; ISSN: 0015-7546

Descriptors: commercial activities/ conservation measures/ ecology/ terrestrial habitat/ land zones/ North America/ Canada/ Amphibia/ Aves/ Mammalia/ Reptilia: forestry/ forest management/ Impacts on wildlife habitat/ potential indicators/ habitat management/ environmental indicators/ forest management impacts on wildlife habitat/ forest and woodland/ boreal forests/ Ontario/ Amphibia/ amphibians/ birds/ chordates/ mammals/ reptiles/ vertebrates
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1199. Precommercial thinning reduces snowshoe hare abundance in the short term.

Griffin, Paul C. and Mills, L. Scott

Journal of Wildlife Management 71(2): 559-564. (2007)

NAL Call #: 410 J827; ISSN: 0022-541X

Descriptors: Carnivora/ Felidae/ Lagomorpha/ Leporidae/ *Lepus americanus*/ *Lynx canadensis*/ food supply/ forests/ ecosystems/ forestry practices/ habitat alterations/ forestry thinning techniques/ habitat management/ habitat use/ *Lepus americanus*/ *Lynx canadensis*/ predators/ mammals/ foods-feeding/ mammalian prey abundance/ Montana/ precommercial thinning/ young montane and subalpine forests/ wildlife-human relationships/ commercial enterprises/ conservation/ wildlife management/ diets/ disturbances/ land zones/ nutrition/ predation
Abstract: Management of young forests is not often considered in conservation plans, but young forests provide habitat for some species of conservation concern. Snowshoe hares (*Lepus americanus*), critical prey of forest carnivores including the United States federally threatened

Canada lynx (*Lynx canadensis*), can be abundant in young montane and subalpine forests with densely spaced saplings and shrub cover. Precommercial thinning (PCT) is a silvicultural technique that reduces sapling and shrub density on young forest stands. We tested for effects of PCT on snowshoe hare abundance for 2 years after experimental treatment at 3 replicate study areas. We also tested the effectiveness of a precommercial thinning with reserves (PCT-R) prescription, where 20% of the total stand was retained in uncut quarter-hectare patches. All stands were in montane-subalpine coniferous forests of western Montana, USA, where there is a persistent population of Canada lynx. Posttreatment changes in abundance were strongly negative on stands treated with standard PCT prescriptions (100% of the stand was treated), relative to both controls and stands treated with PCT-R. Trapping, snowtrack, and winter fecal-pellet indices indicated that snowshoe hares used the quarter-ha retention patches more than thinned portions of the PCT-R-treated stands in winter. We suggest that managing forest landscapes for high snowshoe hare abundance will require adoption of silvicultural techniques like PCT-R for stands that will be thinned, in addition to conservation of structurally valuable early and late-successional forest stands.

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1200. Predicting the impacts of forest management on woodland caribou habitat suitability in black spruce boreal forest.

Brown, G. S.; Rettie, W. J.; Brooks, R. J.; and Mallory, F. F. *Forest Ecology and Management* 245(1-3): 137-147.

(June 2007)

NAL Call #: SD1.F73

Descriptors: forest habitats/ wildlife habitats/ Rangifer tarandus/ habitat preferences/ boreal forests/ forest management/ optimization/ timber management/ timber supply/ logging/ simulation models/ spatial data/ anthropogenic activities/ wildlife management/ Ontario/ resource selection function/ natural resources, environment, general ecology, and wildlife conservation/ animal ecology and behavior/ forestry production harvesting and engineering/ computer and library sciences/ forestry production general

This citation is from AGRICOLA.

1201. The preliminary effects of wildlife stand improvements and low intensity prescribed burns on bat populations on the Buffalo Ranger District, Ozark National Forest, Arkansas.

Jackson, Jeremy L.; Wilhide, J. D.; and Prescott, Shane *Bat Research News* 42(4): 162. (2001)

NAL Call #: QL737.C5 B328; ISSN: 0005-6227

Descriptors: habitat management/ prescribed burns/ forest management/ bats/ Ozark National Forest/ Arkansas

Abstract: The effects of forest management on bat populations is a concern in many of our National Forests. Wildlife stand improvements (WSI) and low intensity prescribed burns can alter the age and condition of the forest, and this can affect the abundance and diversity of bat species. These management practices were investigated on the Buffalo Ranger District, Ozark National Forest in northwestern Arkansas. The habitat consists primarily of deciduous hardwoods with small compartments of conifers scattered throughout the district. The district is

approximately 241,000 acres of which 30,000 acres are designated wilderness areas. For this investigation on the effects of these management practices on the bat population, observations were made in areas where WSI's and low intensity prescribed burns will be conducted in the fall of 2001 and spring of 2002, respectively. Two controls were chosen in areas where WSI's and low intensity prescribed burns have been conducted in the past.

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1202. Prescribed burning effects on summer elk forage availability in the subalpine zone, Banff National Park, Canada.

Sachro, L. L.; Strong, W. L.; and Gates, C. C.

Journal of Environmental Management 77(3):

183-193. (2005)

NAL Call #: HC75.E5J6 ; ISSN: 0301-4797

Descriptors: conservation measures/ nutrition/ terrestrial habitat/ land zones/ North America/ Canada/ Cervus elaphus: habitat management/ prescribed burning/ food availability/ summer forage availability/ effects of prescribed burning habitat management/ forest and woodland/ Coniferous forest/ Alberta/ Banff National Park/ Mammalia, Artiodactyla, Cervidae/ chordates/ mammals/ ungulates/ vertebrates

Abstract: The effects of prescribed burning on forage abundance and suitability for elk (*Cervus elaphus*) during the snow-free season was evaluated in east-central Banff National Park, Canada. Six coniferous forest and mixed shrub-herb plant communities (n = 144 plots), and 5223 ha of burned (n = 13 1) vegetation 12 years old were sampled using a stratified semi-random design. Sampling units represented various combinations of vegetation, terrain conditions, and stand ages that were derived from digital biophysical data, with plant communities the basic unit of analysis. Burning coniferous forest stands reduced woody biomass and increased herbaceous forage from 146 to 790 kg/ha. Increases commonly occurred in the percent cover of hairy wild rye (*Leymus innovatus* (Beal) Pigler) and fireweed (*Chamerion angustifolium* (L.) Holub.). The herbaceous components of mixed shrub-herb communities increased from 336747 kg/ha to 517-1104 kg/ha in response to burning (P 0.025, Mann-Whitney U-test). Browse biomass (mostly *Salix* spp. and *Betula nana* L.) increased $\geq 220\%$ (P = 0.003, Mann-Whitney U-test) from 653 kg/ha in deciduous shrub types. Elk preferences for unburned and burned vegetation-types were assessed as low and moderate, respectively. Potential summer carrying capacity, based on forage availability, increased from eight to 28 elk/100 km² within burned areas, whereas spring grazing potential rose from 13 to 45 elk/100 km². Most of the increase (73%) was attributable to changes within burned Engelmann Spruce stands, which composed 58% of the burned area. © 2005 Elsevier Ltd. All rights reserved. © Thomson Reuters Scientific

1203. Prescribed burning to restore mixed-oak communities in southern Ohio: Effects on breeding-bird populations.

Artman, Vanessa L.; Sutherland, Elaine K.; and Downhower, Jerry F.

Conservation Biology 15(5): 1423-1434. (2001)

NAL Call #: QH75.A1C5; ISSN: 0888-8892

Descriptors: birds/ ecosystems/ forests, deciduous/ oak/ forests, mixed/ fires-burns/ habitat management/

restoration/ breeding/ communities/ density/ population ecology/ *Quercus* spp./ Ohio, Southern

Abstract: Fire is being experimentally reintroduced to the forests of southern Ohio to determine its effectiveness in restoring and maintaining mixed-oak (*Quercus* spp.) forest communities. The authors studied the effects of repeated burning (one to four years of annual burning) and recovery (one year after burning) on the breeding bird community. Burning resulted in incremental but temporary reductions in the availability of leaf litter, shrubs, and saplings, but it did not affect trees, snags, or understory vegetation cover. Of 30 bird species monitored, four were affected negatively and two were affected positively by burning. Population densities of ovenbirds (*Seiurus aurocapillus*), worm-eating warblers (*Helmitheros vermivorus*), and hooded warblers (*Wilsonia citrina*) declined incrementally in response to repeated burning and did not recover within one year after burning, suggesting a lag time in response to the changes in habitat conditions. Densities of northern cardinals (*Cardinalis cardinalis*) fluctuated among years in the control units, but remained low in the burned units. Densities of American robins (*Turdus migratorius*) and eastern wood-pewees (*Contopus virens*) increased in response to burning, but these increases were apparent only after several years of repeated burning. In general, burning resulted in short-term reductions in the suitability of habitat for ground- and low-shrub-nesting birds, but it improved habitat for ground- and aerial-foraging birds. Overall, there were no changes in the composition of the breeding-bird community. Total breeding bird population levels were also unaffected by burning. The authors' results suggest that prescribed burning applied on a long-term basis or across large spatial scales is likely to have adverse effects on ground- and low-shrub-nesting bird species, but other changes in the composition of the breeding-bird community are likely to be minimal as long as the closed-canopy forest structure is maintained within the context of prescribed burning.

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1204. Prescribed fire and raccoon use of longleaf pine forests: Implications for managing nest predation?

Jones, D. D.; Conner, L. M.; Storey, T. H.; and Warren, R. J.

Wildlife Society Bulletin 32(4): 1255-1259. (2004)

NAL Call #: SK357.A1W5; ISSN: 00917648.

Notes: doi: 10.2193/0091-7648(2004)032

[1255:PFARUO]2.0.CO;2.

Descriptors: Georgia/ nest predation/ predation management/ prescribed fire/ *Procyon lotor*/ raccoon/ radiotelemetry/ carnivore/ management practices/ nest predation/ nesting success/ predator control/ prescribed burning/ Aves/ *Pinus palustris*/ *Procyon*/ *Procyon lotor*/ *Quercus*

Abstract: If nest predation at least partially results from incidental encounters between predators and nests, then management practices that reduce the probability of such encounters could increase nest success. Therefore, we studied effects of prescribed fire on raccoon (*Procyon lotor*; a documented nest predator) use of longleaf pine (*Pinus palustris*) and mixed longleaf pine-hardwood (*Quercus* spp.) forests in southwestern Georgia during the nesting seasons of ground- and shrub-nesting birds (i.e., mid-April-mid-August) of 1999 and 2000. Forested stands that had been burned since the previous growing season were 52%

and 80% less likely to be used by raccoons than unburned stands during 1999 and 2000, respectively. Overall, prescribed fire after the previous growing season resulted in a 62% reduction in probability of use by raccoons during the nesting season. Prescribed fire may serve as a tool to reduce incidental encounters between raccoons and nests, but further work is needed to determine the overall effect of prescribed fire on nest success.

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1205. Presence and absence of bats across habitat scales in the upper coastal plain of South Carolina.

Ford, W. Mark; Menzel, Jennifer M.; Menzel, Michael A.; Edwards, John W.; and Kilgo, John C.

Journal of Wildlife Management 70(5): 1200-1209. (2006)

NAL Call #: 410 J827; ISSN: 0022-541X

Descriptors: Vespertilionidae/ Chiroptera/ Microchiroptera/ loblolly pine/ longleaf pine/ *Myotis austroriparius*/ *Pinus palustris*/ *Pinus taeda*/ southeastern myotis/ habitat use/ environmental restoration/ foods-feeding/ foraging habitat relationship/ forestry practices/ habitat alterations/ ecosystems/ habitat clutter/ habitat conservation/ insect abundance/ land zones/ nutrition/ riparian zone proximity/ South Carolina/ upper coastal plain/ wildlife management/ acoustical sampling/ bat foraging/ Carolina Bay/ echolocation/ habitat model/ pine savanna/ microchiroptera/ abundance/ distribution/ dispersion/ field technique/ vocalization/ ultra-infrasound

Abstract: During 2001, we used active acoustical sampling (Anabat II) to survey foraging habitat relationships of bats on the Savannah River Site (SRS) in the upper Coastal Plain of South Carolina. Using an a priori information-theoretic approach, we conducted logistic regression analysis to examine presence of individual bat species relative to a suite of microhabitat, stand, and landscape-level features such as forest structural metrics, forest type, proximity to riparian zones and Carolina bay wetlands, insect abundance, and weather. There was considerable empirical support to suggest that the majority of the activity of bats across most of the 6 species occurred at smaller, stand-level habitat scales that combine measures of habitat clutter (e.g., declining forest canopy cover and basal area), proximity to riparian zones, and insect abundance. Accordingly, we hypothesized that most foraging habitat relationships were more local than landscape across this relatively large area for generalist species of bats. The southeastern myotis (*Myotis austroriparius*) was the partial exception, as its presence was linked to proximity of Carolina bays (best-approximating model) and bottomland hardwood communities (other models with empirical support). Efforts at SRS to promote open longleaf pine (*Pinus palustris*) and loblolly pine (*P. taeda*) savanna conditions and to actively restore degraded Carolina bay wetlands will be beneficial to bats. Accordingly, our results should provide managers better insight for crafting guidelines for bat habitat conservation that could be linked to widely accepted land management and environmental restoration practices for the region.

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1206. Presence of cavities in snags retained in forest cutblocks: Do management policies promote species retention?

Everett, Kim T. and Otter, Ken A.

Canadian Field Naturalist 118(3): 354-359. (2004)

NAL Call #: 410.9 Ot8; ISSN: 0008-3550

Descriptors: commercial activities/ conservation measures/ ecology/ terrestrial habitat/ land zones/ Canada/ Vertebrata: forestry/ conservation/ habitat management/ snag retention/ forest cutblocks/ species retention/ habitat utilization/ snag cavity use/ forest and woodland/ British Columbia, Prince George area/ chordates/ vertebrates

Abstract: Tree cavities, which are frequently excavated by primary cavity nesters, are typically used by a number of avian and non-avian species and are thus important components in maintaining biodiversity in forest ecosystems. One way to provide these habitat opportunities in harvested areas is through the retention of snags. In this study, we assessed the habitat and snag characteristics that promote cavity excavation, using the presence of cavities to infer activity of primary cavity excavators. Snags retained closer to the forest/cutblock edge contained a greater density of cavities than trees further from edge. However, the proportion of cavities found within cutblocks declined at a more rapid rate with distance from edge than did those in adjacent forested stands. There was also a tendency for cavities to occur more frequently in trees that were at the advanced stages of decay. The results of our study suggest management for snags in harvest areas should include the retention of snags closer to the forest edge combined with incorporating trees showing signs of advanced decay.

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1207. Prey ecology of Mexican spotted owls in pine-oak forests of northern Arizona.

Block, W. M.; Ganey, J. L.; Scott, P. E.; and King, R.

Journal of Wildlife Management 69(2): 618-629. (2005)

NAL Call #: 410 J827; ISSN: 0022541X.

Notes: doi: 10.2193/0022-541X(2005)069

[0618:PEOMSO]2.0.CO;2.

Descriptors: Brush mouse/ deer mouse/ diet/ habitat selection/ Mexican spotted owl/ Mexican woodrat/ Neotoma mexicana/ Arizona/ Peromyscus boylii/ ponderosa pine-Gambel oak forest/ prey abundance/ prey habitat/ Strix occidentalis lucida/ diet/ habitat selection/ predator-prey interaction/ prey availability/ raptors/ relative abundance/ wildlife management/ Arizona/ Cervidae/ Cricetinae/ Mammalia/ Microtus mexicanus/ Muridae/ Neotoma/ Neotoma mexicana/ Peromyscus/ Peromyscus maniculatus/ Pinus ponderosa/ Quercus gambelii/ Strigiformes

Abstract: We studied Mexican spotted owl (*Strix occidentalis lucida*) diets and the relative abundance and habitat associations of major prey species in a ponderosa pine (*Pinus ponderosa*)-Gambel oak (*Quercus gambelii*) forest in north-central Arizona, USA, from 1990 to 1993. The owl's diet was comprised of 94% mammals by biomass and consisted of primarily the deer mouse (*Peromyscus maniculatus*), brush mouse (*P. boylii*), Mexican woodrat (*Neotoma mexicana*), and Mexican vole (*Microtus mexicanus*). Spotted owl prey in our study area were smaller on average than prey in other locations, and the total biomass of potential prey was less than that reported in other areas within the owl's geographic range. Although

all prey populations exhibited seasonal fluctuations in relative abundance, only the deer mouse exhibited significant temporal variation in population abundance. The general pattern was for prey populations to rise during spring, peak during summer, decline in fall, and reach a winter low. Deer mice exhibited the greatest amplitude in population change as evidenced by the shift from a high of 12.2 mice/ha (SE = 2.3) during summer 1991 to a low of 3.3 mice/ha (SE = 0.7) during winter 1991-1992. Woodrats and brush mice used areas on slopes >20° with relatively more rocks and shrub cover than found in other areas. In contrast, deer mice were found in forests with relatively open understories and little Gambel oak. Conservation measures for the Mexican spotted owl must include management directed at sustaining or increasing prey numbers rather than assuming that managing for owl nesting and roosting habitat will provide favorable conditions for the prey as well. Management practices that increase and sustain shrub and herbaceous vegetation should receive the highest priority. This can be accomplished by thinning small diameter trees, using prescribed fire, and managing grazing pressures.
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1208. Proposed forest management changes in southern Appalachian Mountain national forests should benefit bat conservation.

Krusac, Dennis L.

Bat Research News 43(4): 157-158. (2002)

NAL Call #: QL737.C5 B328; ISSN: 0005-6227.

Notes: Conference: 32nd Annual North American Symposium on Bat Research, Burlington, VT, USA, November 06-09, 2002.

Descriptors: Chiroptera/ *Corynorhinus rafinesquii*/ *Corynorhinus townsendii*/ *Myotis leibii*/ *Myotis sodalis*/ *Vespertilionidae*/ forestry practices/ habitat alterations/ wildlife management/ prescribed burning/ U.S. Forest Service/ buffer zones/ caves/ channeled ephemeral drains/ cliffline habitats/ colony size/ forest management changes/ hibernacula/ man-made structures/ Rafinesque's big-eared bat/ Virginia big-eared bat/ eastern small-footed bat/ Indiana bat

Abstract: Currently, there are five national forests in the southern Appalachian Mountains of the eastern United States that are revising their forest management plans. The proposed management changes are a significant step forward in the U.S. forest Service's effort to conserve biological diversity. The management direction to benefit bats is a huge change from the direction in the early forest plans they are replacing. The current planning effort is an attempt to get consistent management direction in place across national forest lands stretching from northern Virginia to northern Alabama. Cliffline habitat, important to Virginia big-eared bat *Corynorhinus townsendii virginianus*, Rafinesque's big-eared bat *C. rafinesquii*, and eastern small-footed bat *Myotis leibii* will be protected with a 100 foot buffer above and a 200 foot buffer below the cliff face. The only management that will occur in the buffer zone will be done to benefit cliffline dependent species. All caves and mines are assumed to be used by federally threatened or endangered bats and protective measures are put in place until it is proven these sites are not important to listed bats or large concentrations of any bat species. Buffer zones ranging from one-quarter mile to five miles are placed around caves and mines depending on species

present and season of the year. For example, prescribed fire is prohibited within a five-mile buffer of Indiana bat *M. sodalis hibernacula* during the fall swarm to protect and avoid disturbing roosting bats. Gates or other structures are constructed and maintained at entrances to caves and mines occupied by federally listed species, rare species or significant populations of other species to minimize human disturbance. Before old buildings and other man-made structures are modified or demolished, they are surveyed for bats. If significant bat roosting is found within such structures, these structures will be maintained or alternate roosts suitable for the species and colony size will be provided before their adverse modification or destruction. Forested corridors are maintained along watercourses including channeled ephemeral drains. All immediately suitable roost trees are retained in timber harvest activities. Proposed management direction will be discussed in detail. The draft forest plan revisions will be available for public review and comment early in 2003.

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1209. Quantifying the impacts on biodiversity of policies for carbon sequestration in forests.

Matthews, S.; O'Connor, R.; and Plantinga, A. J.

Ecological Economics 40(1): 71-87. (2002)

NAL Call #: QH540.E26; ISSN: 09218009.

Notes: doi: 10.1016/S0921-8009(01)00269-5.

Descriptors: avian abundance/ carbon sequestration/ econometric models/ land-use change/ wildlife models/ afforestation/ biodiversity/ birds/ carbon sequestration/ forestry policy/ United States

Abstract: There is currently a great deal of interest in the use of afforestation (conversion of non-forest land to forest) to reduce atmospheric concentrations of carbon dioxide. To date, economic analyses have focused on the costs of forest carbon sequestration policies related to foregone profits from agricultural production. No studies have examined additional costs or benefits associated with impacts on biodiversity. The main objective of this paper is to estimate the changes in farmland and forest bird populations that are likely to occur under an afforestation policy. Econometric models of land use are used to simulate the response of private landowners to subsidies for tree planting on agricultural land. We evaluate subsidies that achieve conversion of 10% of the total agricultural land in each of three U.S. states (South Carolina, Maine, and southern Wisconsin). Bird density estimates are derived for 615 species with data from the national Breeding Bird Survey. Percentage changes in agricultural and forest land for each county are applied to county-level estimates of bird densities for farmland and forest birds. Despite considerable spatial variation in agricultural land conversion rates and farmland bird distributions within these states, statewide losses of farmland birds were relatively uniform at 10.8-12.2%. Increases in forest bird populations, however, varied substantially between states: 0.3% in Maine, 2.5% in South Carolina, and 21.8% in southern Wisconsin. Surprisingly, a net loss in total bird populations results in all three states (-2.0% in Maine, -2.3% in South Carolina, and -1.1% in southern Wisconsin), despite the prevailing wisdom as to bird-rich forests. The loss is due to the coincidence of centers of high farmland bird richness and low forest bird richness with areas economically suited to conversion. Additional gains in forest species may result, however, if afforestation within the economically optimal counties is

concentrated to fill in existing forest fragments presently suffering avian losses to edge predators. Our results thus show that assessments of the biological consequences of afforestation for carbon sequestration must consider both current land cover and the distributional patterns of organisms as well as the policy's conversion goal.

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1210. The relationship between forest management and amphibian ecology: A review of the North American literature.

DeMaynadier, P. G. and Hunter, M. L.

Environmental Reviews 3(3/4): 230-261. (1995)

NAL Call #: GE140.E59; ISSN: 1181-8700.

Notes: Literature review.

Descriptors: amphibian/ species diversity/ geographical distribution/ microhabitats/ forests/ clearcutting/ age/ natural regeneration/ forest plantations/ prescribed burning/ roads/ riparian forests/ forest management/ plant succession/ nature conservation/ North America/ species abundance/ biodiversity/ logging roads

This citation is from AGRICOLA.

1211. Relationships between avian richness and landscape structure at multiple scales using multiple landscapes.

Mitchell, M. S.; Rutzmoser, S. H.; Wigley, T. B.; Loehle, C.; Gerwin, J. A.; Keyser, P. D.; Lancia, R. A.; Perry, R. W.; Reynolds, C. J.; Thill, R. E.; Weih, R.; White, D.; and Wood, P. B.

Forest Ecology and Management 221(1-3): 155-169. (2006)

NAL Call #: SD1.F73; ISSN: 03781127.

Notes: doi: 10.1016/j.foreco.2005.09.023.

Descriptors: avian communities/ forest management/ heterogeneity/ landscape/ richness/ United States, southeastern region/ biodiversity/ mathematical models/ regression analysis/ avian communities/ landslides/ avifauna/ land management/ landscape structure/ species richness/ regression analysis/ Aves

Abstract: Little is known about factors that structure biodiversity on landscape scales, yet current land management protocols, such as forest certification programs, place an increasing emphasis on managing for sustainable biodiversity at landscape scales. We used a replicated landscape study to evaluate relationships between forest structure and avian diversity at both stand and landscape-levels. We used data on bird communities collected under comparable sampling protocols on four managed forests located across the Southeastern US to develop logistic regression models describing relationships between habitat factors and the distribution of overall richness and richness of selected guilds. Landscape models generated for eight of nine guilds showed a strong relationship between richness and both availability and configuration of landscape features. Diversity of topographic features and heterogeneity of forest structure were primary determinants of avian species richness. Forest heterogeneity, in both age and forest type, were strongly and positively associated with overall avian richness and richness for most guilds. Road density was associated positively but weakly with avian richness. Landscape variables dominated all models generated, but no consistent patterns in metrics or scale were evident. Model fit was strong for neotropical migrants and relatively weak for short-distance migrants and resident species. Our

models provide a tool that will allow managers to evaluate and demonstrate quantitatively how management practices affect avian diversity on landscapes.

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1212. Relationships between deer mice and downed wood in managed forests of southern British Columbia.

Craig, Vanessa J.; Klenner, Walt; Feller, Michael C.; and Sullivan, Thomas P.

Canadian Journal of Forest Research 36(9): 2189-2203. (2006)

NAL Call #: SD13.C35; ISSN: 0045-5067

Descriptors: commercial activities/ conservation measures/ ecology/ population dynamics/ terrestrial habitat/ land zones/ North America/ Canada/ *Peromyscus maniculatus*: forestry/ habitat management/ population density/ population structure/ survival/ habitat utilization/ downed wood in managed forest habitat/ forest and woodland/ British Columbia/ Mammalia, Rodentia, Muridae/ chordates/ mammals/ rodents/ vertebrates

Abstract: We examined the relationship between deer mice (*Peromyscus maniculatus* (Wagner)) and downed wood in a low-elevation Douglas-fir (*Pseudotsuga menziesii* (Mirb.) Franco) forest and a high-elevation Engelmann spruce (*Picea engelmannii* Parry ex Engelm.) - subalpine fir (*Abies lasiocarpa* (Hook.) Nutt.) forest in the south-central interior of British Columbia. We experimentally manipulated the volume of downed wood on clear-cut and forested sites and monitored the response of deer mice with a mark-recapture study to assess population densities and survival and reproduction rates. Populations responded positively to harvesting at the low-elevation but not the high-elevation study area. At the low-elevation study area, the population dynamics of deer mice on clear-cut and forested treatments were not positively associated with patterns of vegetation cover or increasing downed-wood volumes. Instead, populations on clearcuts appeared to increase in response to an unknown factor associated with lower volumes. No relationship was detected between population dynamics of deer mice and downed-wood volumes at the high-elevation site. The population dynamics of deer mice on forests at the high-elevation site appeared to be more closely related to vegetation cover than to downed wood. The results indicated that downed wood is not a critical habitat component for deer mice in the south-central interior of British Columbia.

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1213. Relationships between herpetofaunal community structure and varying levels of overstory tree retention in northern Alabama: First-year results.

Zachary, I. Felix; Wang, Yong; and Schweitzer, Callie Jo In: *Proceedings of the 12th Biennial Southern Silvicultural Research Conference, General Technical Report-SRS 71/ Connor, Kristina F.; Asheville, NC: Southern Research Station, Forest Service, U.S. Department of Agriculture, 2004. pp. 7-10.*

<http://www.treearch.fs.fed.us/pubs/6304>

Descriptors: commercial activities/ conservation measures/ ecology/ terrestrial habitat/ land zones/ Amphibia/ Reptilia: forestry/ overstory tree retention/ community structure effects/ habitat management/overstory tree retention effects/ forest and woodland/ upland forest habitat/ Alabama/ Jackson County/ Cumberland Plateau/ Amphibia/ amphibians/ chordates/ reptiles/ vertebrates

Abstract: Forest managers are increasingly considering the effects their decisions have on the biodiversity of an area. However, there is often a lack of data upon which to evaluate these decisions. We conducted research to examine the relationship between silvicultural techniques, particularly shelterwood cuts with varying levels of basal area retention, and the community structure of amphibians and reptiles in the Cumberland Plateau of northern Alabama. We have implemented five levels of basal area retention at 15 plots (4 ha per site): 0 percent, 25 percent, 50 percent, 75 percent, and control (100 percent) with three replicates each. Drift fences with pitfall and funnel traps, and coverboards were used to quantify herpetofauna at each site. We predicted that plots with high basal area would provide better conditions for amphibians, sites with low basal area would be more favorable for reptiles, and sites with intermediate basal area would contain the most structurally and climatically complex habitats, and thus the highest species richness of herpetofauna. Our research will provide both a theoretical framework furthering our understanding of factors affecting the distribution and abundance of these organisms and applicable data that may be used to assist forest managers in sustaining these communities.

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1214. Relationships between small mammal community structure and varying levels of overstory tree retention in northern Alabama.

Felix, Z. I.; Wang, Y.; Schweitzer, C. Jo; and Gatens, L. J. *17th Colloquium on Conservation of Mammals in the Southeastern United States, Proceedings: 20-21. (2007).*

Notes: Conference: 17th Colloquium on Conservation of Mammals in the Southeastern United States, Destin, Florida, February 15-16, 2007.

Descriptors: fences/ microhabitat/ forest treatment/ forestry practices/ small mammals/ Alabama

Abstract: Forest managers are increasingly considering the effects their decisions have on the biodiversity of an area. However, there is often a lack of data upon which to evaluate these decisions. We conducted research to examine the relationship between silvicultural techniques, particularly shelterwood cuts with varying levels of basal area retention, and the community structure of small mammals on the Cumberland Plateau of northern Alabama. We implemented three levels of basal area retention at 15 plots (4 ha/site)" clearcuts, 25-50%, and 75-100% retention with three replicates each. Drift fences with pitfall traps and funnel traps were used to trap mammals at each side. A total of eight species were captured on the sites including *Peromyscus leucopus*, *P. gossypinus*, *Sorex longirostris*, *S. fumeus*, *S. hoyi*, *Blarina brevicauda*, *Cryptotis parva*, and *Microtus pinetorum*. The only species showing a statistical differences in mean relative abundance were *Cryptotis parva* and *Microtus pinetorum*, both of which were more abundant on cut plots, with *Cryptotis* especially abundant on clearcuts. other species showed noticeable trends with respect to retention treatment, but these were not significant. Species richness, evenness, or diversity did not differ by treatment. Canonical Correspondence Analysis showed several species related to microhabitat variables such as herbaceous and woody regrowth on cut plots while abundance of the two *Peromyscus* seemed to relate to high basal area and slash coverage. These data, while only collected for one year, indicate some of the unique ways

small mammals respond to a common landuse in the Cumberland Plateau and suggest interesting avenues for further study.

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1215. Reproductive success and habitat selection of Swainson's warbler in managed pine versus bottomland hardwood forests.

Henry, Donata R.

New Orleans, LA: Tulane University, 2005.

Notes: Degree: PhD; Advisor: Sherry, Thomas W.

Descriptors: birds/ economic valuation/ population density/ habitat quality/ habitat selection/ loblolly pine/ Pinus taeda/ pine plantations/ habitat use/ bottomland hardwood forests/ reproductive success

Abstract: Understanding how commercial forests can be managed to benefit wildlife has important conservation implications, as silvicultural landscapes occur globally and have high economic value. In this study, I compared two habitat types in southeastern Louisiana, even-aged loblolly pine (*Pinus taeda*) and bottomland hardwood forests, both used for breeding by Swainson's Warbler (*Limnithlypis swainsonii*; SWWA). I investigated habitat quality and habitat selection patterns of SWWA to (1) assess the conservation value of pine plantations for understory-nesting birds, (2) identify ecological factors important in habitat selection at multiple scales, and (3) contribute needed information on the natural history and status of a species of conservation concern. The density of breeding pairs, timing of nesting, clutch size, hatching rates, and reproductive success of SWWA did not differ significantly between habitats. These results, coupled with similar patterns of habitat use at the nest site, suggest that the habitats are ecologically analogous for breeding. Similarities in morphology and behavior also suggest that ecotypic variation does not account for differences in ecological success or patterns of habitat selection in the two forest types. Predictions about habitat selection mechanisms were tested based on the foraging behaviors and nesting requirements of SWWA at specific scales. I found support for four hypotheses (Foraging Substrate, Potential Nest Site, Nest Decoy, and Nest Concealment), demonstrating that SWWA use different cues at the habitat, territory, nest patch, and nest site scales, but consistently across habitat types. Vegetation characteristics contributing to the nesting and foraging needs of this species served as mechanisms for habitat selection. These results support the conclusion that SWWA has expanded its breeding range into an anthropogenic habitat that meets its basic nesting requirements, despite structural and floristic differences between the two forest types. The implication of these findings is that the conservation value of the enormous area of commercial pine plantations in the southeastern United States can be significantly augmented by appropriate management choices.

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1216. Reproductive success of forest-dependent songbirds near an agricultural corridor in south-central Indiana.

Ford, T. B.; Winslow, D. E.; Whitehead, D. R.; and Koukol, M. A.

Auk 118(4): 864-873. (2001)

NAL Call #: 413.8 AU4 ; ISSN: 00048038

Descriptors: agricultural land/ brood parasitism/ ecological

impact/ edge effect/ habitat corridor/ nest predation/ reproductive success/ songbird/ United States/ *Molothrus ater*

Abstract: Potential source populations of forest-breeding Neotropical migrant birds may be threatened by anthropogenic changes that increase brood parasitism by Brown-headed Cowbirds (*Molothrus ater*) and nest predation in heavily forested breeding areas. In south-central Indiana, corridors of agriculture and rural development, ranging from <50 m to several thousand meters in width, penetrate interior portions of the heavily forested landscape. These corridors provide habitat for cowbirds and nest predators. We monitored breeding success of six species of Neotropical migrants and one resident species near an agricultural corridor and in interior forest. We found that nest survival was lower near the agricultural corridor for most of the species in the nestling stage, but no consistent difference in nest survival was detected during the egg stage. Levels of cowbird parasitism were generally elevated near the agricultural corridor. Estimates of the number of fledglings per nesting attempt indicated that seasonal productivity was lower near the agricultural corridor for six of the seven species. Status of populations of birds in south-central Indiana as sources in the Midwest may be compromised by extensive intrusion of agricultural corridors within the contiguous, heavily forested landscape.

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1217. Reproductive success of Lewis's woodpecker in burned pine and cottonwood riparian forests.

Saab, Victoria A. and Vierling, Kerri T.

Condor 103(3): 491-501. (2001)

NAL Call #: QL671.C6; ISSN: 0010-5414

Descriptors: *Melanerpes lewis*/ birds/ productivity/ ecosystems/ ponderosa pine/ cottonwood/ riparian habitat/ fires-burns/ environmental factors/ nests-nesting/ nest predation/ predators/ wildlife-habitat relationships/ habitat alterations/ agricultural practices/ habitat management/ Lewis' woodpecker/ *Pinus ponderosa*/ *Pinus* spp./ *Populus deltoides*/ Colorado/ Idaho

Abstract: Lewis's woodpecker (*Melanerpes lewis*) has been characterized as a "burn specialist" because of its preference for nesting within burned pine forests. No prior study, however, has demonstrated the relative importance of crown-burned forests to this woodpecker species by examining its reproductive success in different forest types. The authors studied breeding Lewis's woodpeckers in cottonwood (*Populus fremontii*) riparian forest patches of Colorado and crown-burned ponderosa pine (*Pinus ponderosa*) forests of Idaho to compare their reproductive success, productivity, and potential source-sink status in the two forest types. Daily nest survival rates were significantly lower in cottonwood compared to burned pine forests. Nesting success was 46% (n = 65) in cottonwood forests and 78% (n = 283) in burned pine forests. Proportion of nests destroyed by predators was significantly higher in cottonwood forests (34%) compared to burned pine forests (16%). The authors consistently found crown-burned forests to be potential source habitat, whereas cottonwood riparian sites were more often concluded to be potential sink habitat. Cottonwood riparian forests were surrounded primarily by an agricultural landscape where the composition and abundance of nest predators was likely very different than the predator assemblage

occupying a large scale burn in a relatively natural landscape. Conversion of riparian and adjacent grassland landscapes to agriculture and prevention of wildfire in ponderosa pine forests have likely reduced nesting habitat for this species. Prescribed understory fire is the prevailing management tool for restoring ponderosa pine ecosystems. Conditions created by crown fire may be equally important in maintaining ponderosa pine systems and conserving nesting habitat for the Lewis's woodpecker.

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1218. Residual tree retention ameliorates short-term effects of clear-cutting on some boreal songbirds.

Tittler, R.; Hannon, S. J.; and Norton, M. R.

Ecological Applications 11(6): 1656-1666. (2001)

NAL Call #: QH540.E23 ; ISSN: 10510761

Descriptors: Alberta, Canada/ bird communities/ boreal mixed-wood/ clear-cut logging/ forest management/ forest songbirds/ neotropical migrants/ partial harvesting/ *Populus tremuloides*/ residual tree retention/ songbird conservation/ abundance/ clearcutting/ forest management/ songbirds/ species conservation/ Canada/ Animalia/ Aves/ Passeri/ *Populus tremuloides*

Abstract: Retention of residual trees in "cutblocks," logged blocks of forest, has been proposed as a method to conserve songbirds in landscapes fragmented by clear-cut logging. We examined songbird communities in the boreal mixed-wood forest of Alberta, Canada, to investigate the effect on songbird abundance of (1) logging and (2) retaining variable densities of residual trees in cutblocks (10-133 trees/ha or basal area of 0.50-10.65 m²). We surveyed songbirds in logged and forested, aspen-dominated, mixed-wood stands in the year before, the year after, and three years after logging. We analyzed changes in abundance of 27 common songbird species: 23 present in the forest prior to logging and four that appeared after logging. Ten species declined with logging and were termed "forest species." Ten more species did not change with logging and were called "habitat generalists." The seven species that increased with logging were called "cutblock species." When the effect of residual tree retention was examined in terms of basal area (rather than density) of residual trees, more songbird species were found to be both positively and negatively affected by residual tree retention, despite the fact that the two tree measures were highly correlated. In the first year after logging, four bird species (two forest, one generalist, and one cutblock) increased, and none decreased with increasing residual tree retention in cutblocks. In the third year after logging, again four species increased with increasing retention, but these were different species than in the first year after logging (one forest and three generalist species). Furthermore, four cutblock species decreased with increasing retention. Based on these findings, we conclude that retention of residual trees may be beneficial to some species, although conservation of unlogged reserves is also important. Most importantly, we recommend that research be continued to examine a larger range of tree retention and longer term effects on the avifauna.

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1219. Resistance of forest songbirds to habitat perforation in a high-elevation conifer forest.

Leupin, Ernest E.; Dickinson, Thomas E.; and Martin, Kathy
Canadian Journal of Forest Research 34(9): 1919-1928. (2004)

NAL Call #: SD13.C35; ISSN: 0045-5067

Descriptors: British Columbia/ communities/ forests/ ecosystems/ forestry practices/ habitat alterations/ habitat management/ high elevation conifer forest/ perforation harvest patterns/ population ecology/ Sicamous area/ wildlife-human relationships/ Canada/ commercial enterprises/ conservation/ wildlife management/ disturbances/ habitat use/ land zones

Abstract: We examined responses of songbirds breeding in high-elevation Engelmann spruce / subalpine fir (*Picea engelmannii* Parry ex Engelm. / *Abies lasiocarpa* (Hook.) Nutt.) forests to four perforation harvest patterns near Sicamous, British Columbia. Each treatment removed approximately 30% of the timber volume but varied the size of openings from 10-ha clearcuts to small gaps (<0.01 ha), where individual trees were removed. Abundance and diversity of breeding songbirds were monitored over a 4-year period, including 2 years each of pre- and post-harvest conditions. Two-thirds of the original songbird assemblage consisted of mature forest species that showed only modest changes in relative abundance following harvest. Two species showed significant responses to harvesting: golden-crowned kinglet (*Regulus satrapa* Lichtensteins) declined significantly postharvest, with the largest declines occurring in single-tree and 10-ha treatments; and dark-eyed junco (*Junco hyemalis* L.) responded positively to harvest. At high elevations, 30% volume removal allowed much of the songbird community to be accommodated immediately after harvest. Future research should address whether the apparent short-term accommodation of high-elevation birds persists across time and as more of the continuous forest cover is removed.

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1220. Response of amphibian and reptile populations to vegetation maintenance of an electric transmission line right-of-way.

Yahner, R. H.; Bramble, W. C.; and Byrnes, W. R.

Journal of Arboriculture 27(4): 215-221. (2001)

NAL Call #: SB436.J6; ISSN: 02785226

Descriptors: amphibians/ herbicides/ reptiles/ right-of-way/ salamanders/ snakes/ tree control/ turtles/ forest management/ herbicide/ relative abundance/ reptiles/ species diversity/ United States/ *Ambystoma jeffersonianum*/ *Plethodon cinereus*

Abstract: A 2-year study of amphibian and reptile populations was conducted on a 500-kV transmission line right-of-way (ROW) of PECO Energy in the Piedmont Physiographic Province, Montgomery County, Pennsylvania, U. S., from June through July 1999, September through October 1999, and March through October 2000. The objectives were to compare the diversity and relative abundance of amphibians and reptiles between the ROW and the adjacent forest, among five treatment units on the ROW, and between wire and borders zones on treatments on the ROW. Eight species were observed during the study, and the two most common species were Jefferson salamanders (*Ambystoma jeffersonianum*) and redback salamanders (*Plethodon cinereus*). All eight species were noted on the ROW, but only Jefferson and

redback salamanders occurred in the adjacent forest. The number of species ranged from six species in the mowing plus herbicide unit to three each in the stem-foliage spray and foliage spray units. All species were found in the wire zones compared to only five species in the border zones. The ROW contained a greater diversity of amphibian and reptile species than the adjacent forest. Because forest-management practices can have negative impacts on populations of amphibians and reptiles, this study provides valuable information on forest-management practices required for the conservation of amphibians and reptiles.
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1221. Response of amphibians to partial cutting in a coastal mixed-conifer forest: Management practices for retaining amphibian habitat in the Vancouver forest region.

Dupuis, Linda A. and Waterhouse, F. Louise
Vancouver Forest Region Forest Research Extension Note EN-005: 1-12. (2001).

<http://www.for.gov.bc.ca/RCO/research/wildlifereports/en005.pdf>

Descriptors: commercial activities/ conservation measures/ ecology/ terrestrial habitat/ land zones/ Canada/ habitat management/ forest habitat retention practices/ community structure/ timber harvest practices/ population dynamics/ forest and woodland/ coastal mixed conifer forest/ abundance/ British Columbia/ Vancouver Forest Region/ population responses/ Amphibia/ amphibians/ chordates/ vertebrates

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1222. Response of avian bark foragers and cavity nesters to regeneration treatments in the oak-hickory forest of northern Alabama.

Wang, Yong; Schweitzer, Callie Jo; and Lesak, Adrian A. In: *Proceedings of the 13th Biennial Southern Silvicultural Research Conference, General Technical Report-SRS 92/ Connor, Kristina F.; Asheville, NC: Southern Research Station, Forest Service, U.S. Department of Agriculture, 2006. pp. 17-20.*

<http://www.treesearch.fs.fed.us/pubs/23305>

Descriptors: commercial activities/ conservation measures/ nutrition/ feeding behavior/ reproduction/ reproductive behavior/ ecology/ terrestrial habitat/ land zones/ Aves: forestry/ forest regeneration treatment/ community structure/ habitat management/ foraging/ bark foragers/ breeding site/ cavity nesters/ habitat utilization/ oak hickory forest/ Alabama/ Cumberland Plateau/ birds/ chordates/ vertebrates

Abstract: We examined bark-foraging and cavity-nesting birds' use of upland hardwood habitat altered through a shelterwood regeneration experiment on the mid-Cumberland Plateau of northern Alabama. The five regeneration treatments were 0, 25, 50, 75, and 100 percent basal area retention. The 75 percent retention treatment was accomplished by stem-injecting herbicide into mostly midstory canopy trees; the other removal treatments were implemented through chain saw felling and grapple skidding. Density and species composition of bark-foraging and cavity-nesting birds were monitored during the breeding season of 2002 and 2003. Signs of bark-foraging and excavation activities were examined for permanently-marked trees in vegetation sampling plots in spring and fall of 2003 and spring, 2004. A total of 11 species were

detected; 9 of them established breeding territories on the study plots. Tufted Titmice were the most abundant species (1.35 ± 0.12 territories per plot per year), followed by White-breasted Nuthatch (0.67 ± 0.08 territories per plot per year) and Downy Woodpecker (0.58 ± 0.11 territories per plot per year). Species richness, abundance, and diversity indices of bark-foraging and cavity-nesting birds varied by the regeneration treatments: Clearcut had the lowest values. Interestingly, no difference was detected among the other four treatments. The amount of snags (measured as total d.b.h.) differed among the treatments: Plots that received the 75 percent retention (herbicide) treatment had the highest value. The signs of bark foraging and excavation activities (number of pecks and excavations) were positively correlated with the availability of dead trees.
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1223. Response of bird communities to selection harvesting in a northern tolerant hardwood forest.

Holmes, S. B. and Pitt, D. G.
Forest Ecology and Management 238(1-3): 280-292. (2007)
NAL Call #: SD1.F73; ISSN: 03781127.

Notes: doi: 10.1016/j.foreco.2006.10.022.

Descriptors: BACI/ bird community response/ forest birds/ northern tolerant hardwoods/ selection harvest

Abstract: We investigated the responses of forest birds to habitat changes following timber harvest by selection cutting in three northern tolerant hardwood forest stands using a before-after control-impact (BACI) type of experimental design. We observed only minor effects on the bird community associated with mature forests. Ovenbird (*Seiurus aurocapilla*) abundances declined by about 80-90% in two of the three harvested blocks. Black-throated blue warblers (*Dendroica caerulescens*) declined in abundance by about 70% on a single block 2 and 3 years post-harvest. Mechanical disturbance of the shrub layer [primarily Canada yew (*Taxus canadensis*)] was coincident to this decline. Several bird species that prefer early successional or shrubby habitats, such as veery (*Catharus fuscescens*), cedar waxwing (*Bombocilla cedrorum*), chestnut-sided warbler (*Dendroica pensylvanica*), magnolia warbler (*Dendroica magnolia*), American redstart (*Setophaga ruticilla*), mourning warbler (*Oporornis philadelphia*) and white-throated sparrow (*Zonotrichia albicollis*), benefited from selection cutting, with the timing of individual species' responses related to changes in habitat structure and composition. Effects in one block were still evident 7 years after harvest. Guidelines that support a residual stocking target of 20 m²/ha should promote the retention of mature forest bird communities, including ovenbird, while still providing habitat for early successional bird species. [Crown Copyright © 2006.]
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1224. Response of birds to thinning young Douglas-fir forests.

Hayes, John P.; Weikel, Jennifer M.; and Huso, Manuela M. P.

Ecological Applications 13(5): 1222-1232. (2003)
NAL Call #: QH540.E23 ; ISSN: 1051-0761

Descriptors: *Certhia americana/ Coccythraustes vespertinus/ Dendroica nigrescens/ Empidonax difficilis/ Empidonax hammondi/ Ixoreus naevius/ Myadestes townsendi/ Piranga ludoviciana/ Regulus satrapa/ Turdus migratorius/ Vireo huttoni/ Passeriformes/ Picoides villosus/*

Piciformes/ Aves/ forestry practices/ habitat alterations/ terrestrial ecology/ bird response/ forest management/ ecosystems/ information theory/ silviculture/ young Douglas-fir forest thinning/ Coast range, Tillamook Burn/ forests/ forest thinning/ habitat management/ Oregon/ status/ wildlife-human relationships/ commercial enterprises/ conservation/ wildlife management/ disturbances/ habitat use/ land zones/ population ecology/ abundance/ birds/ dispersion/ habitat change/ brown creeper/ evening grosbeak/ black-throated gray warbler/ Pacific-slope flycatcher/ Hammond's flycatcher/ varied thrush/ Townsend's solitaire/ western tanager/ golden-crowned kinglet/ American robin/ Hutton's vireo/ hairy woodpecker

Abstract: Silvicultural practices, such as thinning, are increasingly performed both for commodity production and to help achieve biodiversity goals and promote ecological restoration. However, relatively little research has examined effects of thinning conifer forests on vertebrates. We experimentally manipulated stands using a randomized block design to evaluate influences of two thinning intensities on populations of diurnal breeding birds in western Oregon. We conducted point counts of birds seven times each year in 1994 (prior to treatment) and from 1995 through 2000 (subsequent to treatment). We analyzed data using multiple linear regression and information-theoretic approaches to model selection. Of the 22 species for which we had sufficient data for analysis, detections of nine species decreased and eight species increased in thinned stands relative to controls, and there was no strong evidence that thinning influenced numbers of five species. Of the 17 species that responded to thinning, the magnitude of response of eight species varied with thinning intensity; for each of these species, response was greatest in the more heavily thinned stands. Although no species was extirpated from stands following thinning, detections of Hutton's Vireos (*Vireo huttoni*), Golden-crowned Kinglets (*Regulus satrapa*), Brown Creepers (*Certhia americana*), Blackthroated Gray Warblers (*Dendroica nigrescens*), and Varied Thrushes (*Ixoreus naevius*) decreased to less than half of the detections in controls in one or more treatment types, suggesting thinning significantly reduces their numbers. In contrast, American Robins (*Turdus migratorius*), Townsend's Solitaires (*Myadestes townsendii*), and Hammond's Flycatchers (*Empidonax hammondi*) were rare or absent in controls but regularly present in thinned stands, and detections of Western Tanagers (*Piranga ludoviciana*), Evening Grosbeaks (*Coccothraustes vespertinus*), and Hairy Woodpeckers (*Picoides villosus*) increased by threefold or more in thinned stands relative to controls. Only Pacific-slope Flycatchers (*Empidonax difficilis*), Warbling Vireos (*Vireo gilvus*), and Western Tanagers showed strong evidence of temporal trends in response. For these species, differences between numbers in controls and treated stands became more extreme through time. Our findings suggest that thinning densely stocked conifer stands in landscapes dominated by younger stands enhances habitat suitability for several species of birds, but that some unthinned patches and stands should be retained to provide refugia for species that are impacted by thinning.

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1225. Response of black bears to forest management in the southern Appalachian Mountains.

Mitchell, Michael S. and Powell, Roger A.

Journal of Wildlife Management 67(4): 692-705. (2003)

NAL Call #: 410 J827; ISSN: 0022-541X

Descriptors: *Ursus americanus*/ Ursidae/ Carnivora/ black bear/ *Ursus americanus*/ behavior/ conservation/ terrestrial ecology/ time-series analysis/ habitat suitability index/ forests/ ecosystems/ forest management/ habitat management/ habitat use/ home range-territory/ North Carolina/ Pisgah National Forest/ wildlife management/ land zones/ American black bear/ food/ forests/ habitat/ habitat change/ habitat evaluation/ home-range/ silviculture/ telemetry

Abstract: We evaluated responses of black bears (*Ursus americanus*) to changes in habitat in the Pisgah National Forest in North Carolina, USA. Changes in habitat were due to forest management, which affected bear habitat in complex ways. Harvested stands provided plentiful food resources that decreased with regeneration of the canopy. However, their value was offset by a lack of resources associated with mature overstory. Following canopy closure, early-successional food resources in harvested stands tended to decrease, although some soft mast remained more abundant than in unharvested stands. We used a tested Habitat Suitability Index (HSI) to evaluate effects of harvest management on bear habitat. Values of HSI for harvested stands tended to differ little among young stands and older stands regenerating in pine (*Pinus* spp.) or hardwood, and all had lower HSI values than unharvested stands. Although effects of roads are modeled negatively in the HSI, proximity of harvested stands to logging roads did not bias comparisons to harvested stands. We used time-series analysis to characterize year-to-year changes on HSI maps for our study area from 1981 through 1994, and designated the results as an index of habitat change. We used this index to evaluate use of changed areas by black bears, estimated from 127 home ranges. Adult females used changed areas inversely proportional to the index of change, whereas adult and juvenile males showed no preferences. With respect to year-to-year variation at the peripheries of their home ranges, adult males and adult females selected habitat patches where suitability had increased and rejected patches where suitability had declined. Home ranges of adult males contained proportionally fewer areas of habitat decline than those of females or juvenile males. Adult females used areas where habitat suitability decreased, proportional to the decrease, but did not prefer them to areas of stable or improved suitability. Adult males appeared to avoid areas of decreased suitability altogether. Forest management positively affected some aspects of bear habitat but had an overall negative effect on habitat suitability in the southern Appalachians. Forest management will not improve bear habitat overall in areas where resources are abundant. Where soft mast is limiting, however, trade-offs between overall habitat suitability and improved productivity of soft mast may be warranted.

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1226. The response of boreal forest songbird communities to fire and post-fire harvesting.

Morissette, J. L.; Cobb, T. P.; Brigham, R. M.; and James, P. C.

Canadian Journal of Forest Research 32(12): 2169-2183. (2002)

NAL Call #: SD13.C35; ISSN: 00455067

Descriptors: fires/ harvesting/ wood/ songbird communities/ forestry/ avifauna/ community structure/ ecological impact/ forest fire/ harvesting/ silviculture/ *Pinus banksiana*/ *Populus tremuloides*

Abstract: Post-fire timber harvesting (salvage logging) is becoming more prevalent as logging companies try to recover some of the economic losses caused by fire. Because salvaging is a relatively new practice and because of the common perception that burned areas are of little value to wildlife, few guidelines exist for salvaging operations. We surveyed birds in unburned and burned stands of jack pine (*Pinus banksiana* Lamb.), mixedwood, and trembling aspen (*Populus tremuloides* Michx.) to characterize the post-fire bird community in commercially important forest types. The effects of salvage logging were examined in mixedwood and jack pine. Using fixed-radius point counts, a total of 1430 individuals representing 51 species were detected during this study. Community analysis revealed that burned forests supported a distinct species assemblage of songbirds relative to unburned forests and that salvage logging significantly altered this community. An examination of guild composition showed that resident species, canopy and cavity nesters, and insectivores were the least likely to be detected in salvaged areas. Species less sensitive to salvage logging tended to be habitat generalists, omnivores, and species that nest on the ground or in shrubs. We suggest alternative management strategies that may help reduce the impact of salvage logging on the boreal forest songbird community. © 2008 Elsevier B.V. All rights reserved.

1227. Response of breeding bird communities to forest harvest around seasonal ponds in northern forests, USA.

Hanowski, J.; Danz, N.; and Lind, J.

Forest Ecology and Management 229(1-3): 63-72. (2006)

NAL Call #: SD1.F73; ISSN: 03781127.

Notes: doi: 10.1016/j.foreco.2006.03.011.

Descriptors: breeding bird communities/ forest harvest/ seasonal ponds

Abstract: We examined response of breeding bird communities to varying levels of timber harvest in and around 16-forested seasonal ponds in northern Minnesota, USA. This experimental study employed a before-after-control-impact design with three different harvest treatments. Treatments were assigned randomly (n = 4 ponds/treatment) and were applied within 17 m wide buffers outward from the ponds' edge: clear-cut harvest (reduction of basal area to <2 m²/ha), partial cut harvest (reduction of basal area to 7-10 m²/ha), and no harvest (no cut). Forest stands around treatment buffers (n = 12) were clear-cut harvested (ranging from 6.5 to 12.5 ha). Ponds with no harvest in the adjacent forests (controls) or buffers surrounding the ponds (n = 4) were maintained throughout the 5-year study. Prior to harvest, we found no significant difference (P > 0.05) in bird community composition around seasonal ponds versus nearby forest habitat, suggesting that seasonal ponds do not affect bird community structure

in a mature forest setting at this scale. Overall bird numbers and species richness increased (P < 0.05) in all pond buffers compared to controls over the 4 years after harvest. Increases in bird numbers on treated versus control pond buffers were found across all migration and nesting guilds, and among the forest edge guild. Bird community species composition also changed within the treated versus control pond buffers after harvest. Differences in bird communities among treatments were small the first year after harvest, but continued to diverge from controls over the 4 years after harvest. Bird communities of the clear-cut treatment were most dissimilar to controls. Both the partial and no cut buffer bird communities were more similar to the control than the clear-cut treatment. Treated pond buffers had more birds associated with early successional habitat. In contrast, many interior forest-associated bird species did not occur in any of the buffers after harvest. We found no difference in breeding bird community composition between pond buffers and other residual patches left on harvested sites, but there was a significant difference between harvest treatments when we combined pond buffer and residual patch birds on each site. Early successional habitat-associated bird species were more abundant in residual patches on sites that had a clear-cut pond buffer and forest-associated species were more abundant in residual patches on sites with no cut pond buffers. Habitat for mature forest-associated bird species can be maintained on harvest sites by leaving no cut or partial cut buffers around seasonal ponds or in similar sized residual patches in other areas of the harvest.

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1228. The response of ground beetles (Coleoptera: Carabidae) to selection cutting in a South Carolina bottomland hardwood forest.

Ulyshen, Michael D.; Hanula, James L.; Horn, Scott; Kilgo, John C.; and Moorman, Christopher E.

Biodiversity and Conservation 15(1): 261-274. (2006)

NAL Call #: QH75.A1B562; ISSN: 0960-3115

Descriptors: commercial activities/ ecology/ community structure/ terrestrial habitat/ land zones/ Carabidae: forestry/ selection cutting/ relative abundance/ faunal responses/ selection cutting/ bottomland hardwood forest/ species diversity/ species richness/ forest and woodland/ bottomland hardwood forest/ South Carolina/ Aiken/ Savannah River Site Nuclear Production Facility/ Insecta, Coleoptera, Adephaga, Caraboidea/ arthropods/ beetles/ insects/ invertebrates

Abstract: We compared the response of ground beetles (Coleoptera: Carabidae) to the creation of canopy gaps of different size (0.13, 0.26, and 0.50 ha) and age (1 and 7 years) in a bottomland hardwood forest (South Carolina, USA). Samples were collected four times in 2001 by malaise and pitfall traps placed at the center and edge of each gap, and 50 m into the surrounding forest. Species richness was higher at the center of young gaps than in old gaps or in the forest, but there was no statistical difference in species richness between old gaps and the forests surrounding them. Carabid abundance followed the same trend, but only with the exclusion of *Semiardistomis viridis* (Say), a very abundant species that differed in its response to gap age compared to most other species. The carabid assemblage at the gap edge was very similar to that of the forest, and there appeared to be no distinct edge community. Species known to occur in open or disturbed

habitats were more abundant at the center of young gaps than at any other location. Generalist species were relatively unaffected by the disturbance, but one species (*Dicaelus dilatatus* Say) was significantly less abundant at the centers of young gaps. Forest inhabiting species were less abundant at the centers of old gaps than in the forest, but not in the centers of young gaps. Comparison of community similarity at various trapping locations showed that communities at the centers of old and young gaps had the lowest similarity (46.5%). The community similarity between young gap centers and nearby forest (49.1%) and old gap centers and nearby forest (50.0%) was similarly low. These results show that while the abundance and richness of carabids in old gaps was similar to that of the surrounding forest, the species composition between the two sites differed greatly.

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1229. Response of northwestern chipmunks (*Tamias amoenus*) to variable habitat structure in young lodgepole pine forest.

Sullivan, T. P. and Klenner, W.

Canadian Journal of Zoology 78(2): 283-293. (2000)
NAL Call #: 470 C16D; ISSN: 00084301

Descriptors: habitat/ population dynamics/ abundance/ habitat structure/ population dynamics/ response analysis/ rodent/ thinning/ Canada/ *Pinus contorta*/ *Tamias amoenus*

Abstract: Abstract: This study was designed to test the hypothesis that large-scale habitat alteration by stand thinning over a range of densities would increase the abundance and related population dynamics of northwestern chipmunks (*Tamias amoenus*) in young lodgepole pine (*Pinus contorta*) forest. Replicate study areas were located near Penticton, Kamloops, and Prince George in south-central British Columbia, Canada. Each study area had three stands thinned to densities of \approx 500 (low), 1000 (medium), and 2000 (high) stems/ha, with an unthinned young pine stand and an old-growth pine stand for comparison. Chipmunk populations were sampled intensively in thinned stands from 1989 to 1991 and in the unthinned and old-growth stands from 1990 to 1991. Habitat structure was sampled in all stands in 1990. For herbs and shrubs, the crown volume index values were similar among stands; for trees, this index was lowest for the low-density stands, with the index for all three thinned stands being lower than that for the unthinned stands. Species diversity and the structural diversity of vegetation were similar among stands. The abundance of chipmunks was significantly higher in low-density than in high-density thinned stands at Penticton (1.3-1.9 times higher) and Prince George (2.4-3.8 times higher) but not at Kamloops. Chipmunks were less abundant in old-growth stands than in the other four treatment stands. Breeding performance and recruitment followed the same pattern as abundance. Chipmunk survival was generally similar among stands. There were heavier chipmunks in the low-density stands in some years at Penticton. Northwestern chipmunks appear to prefer 'open' habitats generated by heavy thinning of young lodgepole pine stands. This result was achieved in three different forest ecological zones and may enhance the overall forest ecosystem.

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1230. Response of prothonotary warblers to timber harvest and hydrology in a bottomland hardwood forest.

Cooper, Robert J. and Gannon, Jill J.

In: 88th Annual Meeting of the Ecological Society of America held jointly with the International Society for Ecological Modeling - North American Chapter, Savannah, Georgia, USA; August 03-08, 2003.; Vol. 88.; pp. 72; 2003.

Descriptors: forestry/ freshwater ecology: ecology, environmental sciences/ terrestrial ecology: ecology, environmental sciences/ single tree selection harvesting / applied and field techniques/ small patch cut harvesting/ active forest management/ bottomland hardwood forest/ fledging/ flooding/ hydrology/ natural disturbance/ nest depredation/ nest success/ productivity/ territory/ timber harvest/ water management projects

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1231. Response of white-footed mice (*Peromyscus leucopus*) to fire and fire surrogate fuel reduction treatments in a southern Appalachian hardwood forest.

Greenberg, C. H.; Otis, D. L.; and Waldrop, T. A.

Forest Ecology and Management 234: 355-362. (Oct. 2006)
NAL Call #: SD1.F73; ISSN: 0378-1127

Descriptors: *Peromyscus leucopus*/ hardwood/ deciduous forests/ forest fires/ wildfires/ prescribed burning/ fire hazard reduction/ small mammals/ forest habitats/ wildlife habitats/ forest-wildlife relations/ understory/ forest litter/ ground vegetation/ fire ecology/ North Carolina/ forest fuels/ understory removal

This citation is from AGRICOLA.

1232. Response of wildlife to prescribed fire in southwest Florida pine flatwoods.

Main, M. B. and Richardson, L. W.

Wildlife Society Bulletin 30(1): 213-221. (2002)
NAL Call #: SK357.A1W5; ISSN: 00917648

Descriptors: Florida habitat/ Infrared camera/ management/ *Meleagris gallopavo*/ *Odocoileus virginianus*/ pine flatwoods/ prescribed fire/ white-tailed deer/ wild turkey/ wildlife/ ecological impact/ gamebird/ habitat management/ mammal/ prescribed burning/ United States/ *Meleagris gallopavo*/ *Odocoileus virginianus*

Abstract: We conducted an experiment using infrared-triggered camera traps to document relative abundance of wildlife in pine flatwoods habitat at different stages of post-fire recovery at the Florida Panther National Wildlife Refuge in southwest Florida. Total wildlife, which for the purposes of this study was defined as records of wild turkey (*Meleagris gallopavo*) and all mammals captured on film, used pine flatwoods habitat in a fire management unit (FMU) with a post-fire recovery history of 24 months significantly more than adjacent pine flatwoods in an FMU with a post-fire recovery history of 48 months ($P=0.04$). Data suggested that the relative abundance of white-tailed deer (*Odocoileus virginianus*) was also higher in the 24-month post-fire FMU ($P=0.12$) compared to the 48-month FMU. To evaluate response of wildlife to prescribed fire, we burned the 48-month FMU and, after approximately 8 weeks, repeated the camera-trap surveys in the newly burned (<6-month) FMU and the adjacent FMU, now at approximately 30-months post-fire recovery. We

documented a significant increase in use of the recently burned (<6-month) FMU compared to previous levels of use (48-month FMU) by total wildlife ($P=0.04$) and white-tailed deer ($P=0.02$). Use of the <6-month FMU by wild turkey also appeared to increase ($P=0.13$). No difference was detected between the <6-month and the adjacent 30-month FMU in use by total wildlife ($P=0.52$), white-tailed deer ($P=0.43$), Florida panther ($P=0.23$), or wild turkey ($P=0.14$), although data suggested that wild turkey may have preferred the newly burned area. More importantly, our data suggested that wildlife did not avoid pine flatwoods habitat at up to 30-month post-fire recovery. Wildlife use of pine flatwoods habitat, therefore, was observed to increase in areas recently burned (<6 months post-fire), was similar between FMUs with post-fire recovery of <6 and up to 30 months, and was lowest in habitat that had not been burned for 48 months. Maintaining a prescribed-fire rotation of ≤ 48 months, therefore, appears to improve habitat quality of pine flatwoods for white-tailed deer, wild turkey, and other wildlife in southwest Florida.

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1233. Responses of bird communities to early successional habitat in a managed landscape.

Yahner, Richard H.

Wilson Bulletin 115(3): 292-298. (2003)

NAL Call #: 413.8 W692; ISSN: 0043-5643

Descriptors: Passerina cyanea/ Seiurus aurocapillus/ Setophaga ruticilla/ Spizella pusilla/ Vireo olivaceus/ Passeriformes/ Aves/ conservation/ forestry practices/ habitat alterations/ terrestrial ecology/ avian community responses/ breeding bird communities/ early successional habitat/ forest managements/ forested landscape/ managed landscape/ mature forest/ population trends/ species abundances/ species richness/ Centre County, Barrens Grouse Management Area/ communities/ forests/ ecosystems/ managed forest/ Pennsylvania/ status/ succession/ wildlife-human relationships/ commercial enterprises/ disturbances/ habitat use/ land zones/ population ecology birds/ biocenosis/ brood-egg/ habitat management/ silviculture/ fauna/ indigo bunting/ ovenbird/ American redstart/ field sparrow/ red-eyed vireo/ Populus spp./ Quercus spp.

Abstract: I examined short and long term responses of breeding bird communities to the systematic creation of early successional habitat resulting from forest management at a 1,120-ha study site in the Ridge and Valley Province of Pennsylvania, from 1998 through 2002. Species richness and abundances of all species combined and of early successional species increased from pre-cut (1998-1999) to post-cut eras (2001-2002) in a treated sector (aspens, Populus spp., and mixed oak, Quercus spp., areas combined), an uncut control sector, and the total study site (treated and control sectors combined) after the fourth cutting cycle. Abundances of a woodland species (Red-eyed Vireo, Vireo olivaceus) and four early successional species (e.g., Field Sparrow, Spizella pusilla) also increased. Over the past 15 years, which spans the third and the fourth cutting cycles at the study site, three woodland species increased significantly in both treated and control sectors (Red-eyed Vireo) or in the treated sector only (Ovenbird, Seiurus aurocapillus, and American Redstart, Setophaga ruticilla). The population of an early successional species (Indigo Bunting, Passerina cyanea) increased significantly in both treated and control sectors.

Population trends of three woodland and three early successional species at the study site paralleled statewide or provincial increases in these species over the past two decades. My study has shown that the management of early successional habitats in extensively forested areas will be of benefit for the long term conservation of both early successional and mature forest bird species within a forested landscape.

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1234. Responses of small mammal populations to riparian buffers in western Washington.

West, Stephen D.

Northwestern Naturalist 81(2): 92. (2000)

NAL Call #: QL671.M8; ISSN: 1051-1733

Descriptors: habits-behavior/ biometrics/ census-survey methods/ ecosystems/ forestry practices/ habitat alterations/ habitat use/ mammals/ riparian habitat/ species diversity/ techniques/ transect surveys/ wildlife/ habitat relationships/ Washington, western area

Abstract: Habitat occupancy patterns and relative abundance of small mammals within riparian zones and uplands were documented two years before and after harvest on six control sites, on six sites harvested under Forest Practices guidelines, and on six modified harvests. Snap and pitfall traps captured 9,163 individuals of 18 species. On riparian transects, species richness and evenness did not differ significantly among treatments. Species composition of the riparian transects was very similar between harvest treatments. No species showed a statistically significant change in capture rate with respect to treatment on riparian transects. Knowing if species will persist that had declining trends over the two-year post-harvest period requires additional sampling.

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1235. Responses of songbirds to diameter-limit cutting in the central Appalachians of West Virginia, USA.

Weakland, C. A.; Wood, P. B.; and Ford, W. M.

Forest Ecology and Management 155(1-3): 115-129. (2002)

NAL Call #: SD1.F73; ISSN: 03781127.

Notes: doi: 10.1016/S0378-1127(01)00552-7.

Descriptors: diameter-limit/ high-grading/ nesting success/ partial harvesting/ songbirds/ biodiversity/ hardwoods/ harvesting/ silviculturally-accepted systems/ forestry/ abundance/ forestry/ harvesting/ reproduction/ songbirds/ United States/ Aves/ Junco hyemalis/ Passeri/ Wilsonia canadensis

Abstract: Diameter-limit harvesting is a commonly-used forest harvesting technique among landowners in West Virginia as opposed to silviculturally-accepted systems such as clearcutting, single-tree selection, and two-age harvesting. Songbird species respond both negatively and positively to these systems, and ornithologists suggest these techniques can be used when managing for songbirds at the stand and landscape levels. However, little is known about the effects of diameter-limit harvesting on songbird abundances and their reproductive success. We evaluated the effects of this technique on songbird populations at the Westvaco Wildlife and Ecosystem Research Forest (WVERF) in the Allegheny Mountains of West Virginia. The area is an industrial forest composed predominantly of Appalachian hardwoods 60-80 years old. We examined songbird abundances throughout the forest and nesting success on four 40 ha plots in 1996. In 1997,

two plots were harvested using the diameter-limit technique where most trees ≥ 45.7 cm were removed. Abundance and nesting success were monitored again in 1997 and 1998. Results indicate that the abundances of most songbird species present prior to harvest changed little after the timber removal. Two species, the Canada warbler (*Wilsonia canadensis*) and dark-eyed junco (*Junco hyemalis*), were more abundant in harvested areas than unharvested forest. One habitat group, interior/edge species, and total abundance of songbirds also had higher abundance in harvested areas. Overall nest survival in harvested areas was higher both 1- (37.7%) and 2-years (46.4%) after harvesting than before harvesting (14.9%). Only large-diameter trees were removed on the WWERF, and intermediate and subcanopy trees remained standing, retaining considerable structural heterogeneity. Stands that were harvested differed from unharvested stands by having more snags, higher density of trees ≥ 8 -14.9 cm, and a higher percent cover of down wood. Canopy cover over 24 m, density of saplings, and the amount of leaf litter decreased after harvesting, while canopy cover ≥ 0.5 -3 m and the percent of bareground increased. Diameter-limit harvesting at the low intensity in our study might not adversely affect forest-dwelling songbirds in the central Appalachians in the short-term and forest bird communities could be retained.

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1236. Responses of southeastern amphibians and reptiles to forest management: A review.

Russell, Kevin R.; Wigley, T. Bently; Baughman, William M.; Hanlin, Hugh G.; and Ford, W. Mark

In: Southern Forest Science: Past, Present, and Future, General Technical Report-SRS 75/ Rauscher, H. M. and Johnsen, K; Asheville, NC: Southern Research Station, Forest Service, U.S. Department of Agriculture, 2004. pp. 319-334.

Notes: Literature review.

Descriptors: commercial activities/ conservation measures/ ecology/ land zones/ Amphibia/ Reptilia: forestry/ faunal responses/ forest management/ habitat management/ ecology/ United States, southeastern region/ amphibians/ chordates/ reptiles/ vertebrates

Abstract: Forest managers in the Southeast increasingly need information about amphibian and reptile responses to silvicultural practices in order to guide sustainable forestry programs. A review of existing literature indicates that effects of silvicultural practices on herpetofauna often are region- and species-specific, with individual taxa responding positively, negatively, or not at all in the short term. Responses of herpetofauna to forestry likely are influenced by adaptations of taxa to historical disturbance regimes. Few studies have evaluated long-term population or landscape-level implications of silvicultural practices for herpetofauna. Furthermore, many existing studies lack pretreatment data, replication, or appropriate reference conditions. We suggest that future research focus on manipulative and retrospective studies designed to identify forestry practices that successfully blend economic objectives with herpetofaunal conservation.

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1237. Resting and denning sites of American martens in northeastern Oregon.

Bull, E. L. and Heater, T. W.

Northwest Science 74(3): 179-185. (2000)

NAL Call #: 470 N81; ISSN: 0029344X

Descriptors: den/ forest management/ habitat use/ mustelid/ site selection/ United States/ Arceuthobium/ Chrysomyxa arctostaphyli/ Martes americana/ Melampsorella caryophyllacearum

Abstract: Resting and denning sites of the American marten (*Martes americana*) are important habitat components because they provide protection from predators, inclement weather, and thermal stress. Resting sites ($n = 1184$) used by 35 radiocollared martens were in trees with natural platforms (43%), in trees with cavities (23%), subnivean (under snow) (23%), in hollow logs or slash piles (7%), and underground (3%). Thirty natal and post-natal dens were in trees with cavities (40%), in hollow logs (37%), underground (17%), and in slash piles (6%). Resting and denning sites in cavities and hollow logs were typically large-diameter structures with extensive heartwood decay that had created hollow chambers. The majority of platforms used as resting sites were formed by broom rust (*Chrysomyxa arctostaphyli* and *Melampsorella caryophyllacearum*) and dwarf mistletoe (*Arceuthobium* spp.). Incorporating habitat needs of martens in forest management practices by retaining coarse woody debris and trees with brooms is one component necessary for maintaining viable populations of the species.

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1238. Restoration efforts for plant and bird communities in tallgrass prairies using prescribed burning and mowing.

Van Dyke, F.; Van Kley, S. E.; Page, C. E.; and

Van Beek, J. G.

Restoration Ecology 12(4): 575-585. (2004)

NAL Call #: QH541.15.R45R515; ISSN: 10612971.

Notes: doi: 10.1111/j.1061-2971.2004.00352.x.

Descriptors: DeSoto National Wildlife Refuge/ edge species/ grassland birds/ grassland plants/ mowing/ prescribed burning/ tallgrass prairie/ habitat management/ mowing/ prairie/ prescribed burning/ restoration ecology/ DeSoto National Wildlife Refuge/ Iowa/ Aves

Abstract: Recent losses and fragmentation of tallgrass prairie habitat to agriculture and urban development have led to corresponding declines in diversity and abundance of plants and birds associated with such habitat. Mowing and burning are alternative management strategies for restoring and rejuvenating prairies in fragmented landscapes, but their specific, comparative effects are the subjects of ongoing evaluation. We compared the responses of plant and bird communities on four sets of mowed, burned, and untreated sites of small (3-10ha), fragmented tallgrass prairies at the DeSoto National Wildlife Refuge (DNWR), Iowa, U.S.A., during May-July in 1998 and 1999. Species richness and diversity of plants, resident grassland birds, and communities of birds associated with grassland edges (edge species) were independent of treatment. Although not affecting species richness and diversity in plant communities, mowed sites ranked lower in total plant coverage and total forb coverage than burned sites or untreated sites. In contrast, untreated sites had more coverage by shrubs, suggesting that mowing and burning

did retard shrub encroachment. Overall, abundance and diversity of plants and birds were generally insensitive to management strategies. Small, fragmented sites of rare habitat may not respond in the short term to management treatments and may not be capable of supporting highly diverse communities, no matter how intensively manipulated. It is more probable that diversity of native prairie communities can be enhanced and restored only through long-term efforts, acquisition of large land units capable of supporting stable populations, and deliberate reintroduction of species of high conservation value. © 2004 Society for Ecological Restoration International. © 2008 Elsevier B.V. All rights reserved.

1239. Restoration of hard mast species for wildlife in Missouri using precocious flowering oak in the Missouri River floodplain, USA.

Grossman, B. C.; Gold, M. A.; and Dey, D. C. *Agroforestry Systems* 59(1): 3-10. (2003)
 NAL Call #: SD387.M8A3; ISSN: 0167-4366.
<http://mdc.mo.gov/documents/forest/mast.pdf>
Descriptors: Cervidae/ Artiodactyla/ forestry practices/ habitat alterations/ terrestrial ecology/ direct seeding/ agroforestry/ hard mast species restoration/ herbivory/ natural regeneration/ precocious flowering oak use/ survival/ vegetation growth
Abstract: Increased planting of hard mast oak species in the Lower Missouri River floodplain is critical as natural regeneration of oak along the Upper Mississippi and Lower Missouri Rivers has been limited following major flood events in 1993 and 1995. Traditional planting methods have limited success due to frequent flood events, competition from faster growing vegetation and white-tailed deer herbivory. Results of early growth response of swamp white oak (*Quercus bicolor* Willd.) seedlings in relation to initial acorn mass and size, and early rapid shoot growth for seedlings produced by containerized root production method (RPMTM), are presented. Containerized RPMTM seedlings grown in the greenhouse under optimal conditions demonstrate that seed size had no discernable impact on first-year root or shoot size. Seedling survival for the first two years and acorn production for the first three years after outplanting are presented, comparing use of containerized RPMTM swamp white oak seedlings to nursery stock. Flood tolerant precocious RPMTM oak seedlings in the floodplain provide a source of food for acorn-consuming wildlife ten to fifteen years sooner than oaks originating, from natural regeneration, direct seeding or traditional bare root planting. Compared to bare root nursery stock that produced no acorns, some RPMTM swamp white oak seedlings averaged 4.3, 5.2, and 6.3 acorns/seedling in the first three years after fall outplanting. © NISC

1240. Restoring bottomland hardwood ecosystems in the Lower Mississippi Alluvial Valley.

Stanturf, John A.; Gardiner, Emile S.; Hamel, Paul B.; Devall, Margaret S.; Leininger, Theodor D.; and Warren, Melvin E. *Journal of Forestry* 98(8): 10-16. (2000)
 NAL Call #: 99.8 F768 ; ISSN: 0022-1201
Descriptors: bottomlands/ ecosystem management/ ecosystems/ forests, deciduous/ funding/ habitat management/ management/ restoration/ riparian habitat/ wildlife/ Mississippi River and Basin

Abstract: Management of the bottomland hardwood ecosystems of the lower Mississippi River Alluvial Valley is described. This valley has experienced the most widespread loss of bottomland hardwood forests and is one of the most endangered ecosystems in the United States. Information is provided on the history of the hardwoods in the valley and on the details of the current restoration projects for wildlife refuges, wetland mitigation, and wetland reserves. The most intensive restoration technique is to interplant a nurse crop of fast-growing species, such as the eastern cottonwood, with a slower-growing hardwood tree. © NISC

1241. Restructuring the forest: Goshawks and the restoration of southwestern ponderosa pine.

Long, James N. and Smith, Frederick W. *Journal of Forestry* 98(8): 25-30. (2000)
 NAL Call #: 99.8 F768 ; ISSN: 0022-1201
Descriptors: Accipitridae/ Ciconiiformes/ Accipiter gentilis/ behavior/ birds/ ecosystem management/ ecosystems/ forestry practices/ forests, coniferous/ habitat management/ habitat use/ habits-behavior/ home range-territory/ management/ ponderosa pine/ restoration/ techniques/ wildlife/ wildlife-habitat relationships/ northern goshawk/ United States, Southwest
Abstract: The authors discuss the management of northern goshawk habitat in the southwestern United States. Guidelines have been adopted that will cause substantial changes in the structure of vegetation of ponderosa pine forests. In this article, ways are reviewed in which foresters and wildlife biologists are attempting to implement the goshawk guidelines and the resulting silvicultural challenges are highlighted. © NISC

1242. A review of the long-term effects of post-harvest silviculture on vertebrate wildlife, and predictive models, with an emphasis on boreal forests in Ontario, Canada.

Thompson, I. D.; Baker, J. A.; and Ter-Mikaelian, M. *Forest Ecology and Management* 177(1-3): 441-469. (2003)
 NAL Call #: SD1.F73; ISSN: 03781127
Descriptors: amphibians/ biodiversity/ birds/ boreal forest/ Intensive forest management/ mammals/ Ontario/ biodiversity/ fertilizers/ fibers/ harvesting/ vertebrates species/ forestry/ boreal forest/ silviculture/ vertebrate/ yield/ biodiversity/ fibers/ forests/ harvesting/ silviculture/ Canada/ *Picoides arcticus*
Abstract: Greater fibre yields may be possible in commercial forests through an increased application of post-harvest silvicultural techniques. In Canadian boreal forests, while basic silvicultural regeneration techniques such as planting, seeding, scarifying, and tending, have been employed since the 1940's, more intensive techniques (intensive forest management (IFM)) such as increased area planted, pre-commercial and commercial thinning, extra tending events, fertilizing, and short rotations may soon be used. There may be effects of basic and more intensive silviculture on biodiversity in the long-term, compared to natural regeneration following logging or especially stand development following natural disturbances. We reviewed approximately 50 papers that reported studies of the long-term effects of post-harvest silviculture on vertebrate wildlife. In particular, large impacts to biodiversity universally occur when native forest types

are replaced by rapidly-growing exotic tree species. However, in boreal forests, native tree species are usually planted, and so any effects on associated wildlife communities may be considerably less than in non-native species plantations. Limited long-term information is available, but published studies of effects of basic silviculture and IFM suggested that loss of structures in forest stands was an important common impact that resulted in vertebrate species responses. Fewer structural features in managed forests compared to in natural forests likely results in reduced numbers of animal species dependent on those structures, such as cavity-using species and species for which large decaying woody debris is important. Simplifying stand structures and species composition may result in systems with low connectivity, making them vulnerable to insect and mammalian herbivory. Concentration of IFM in stands on highly productive sites could exacerbate effects (positive or negative), owing to the positive relationship between forest productivity and animal and plant diversity. Species such as black-backed woodpeckers (*Picoides arcticus*) may be reduced over large areas by stand conversion to mixedwoods, stand structural changes and especially age-class truncation. On the other hand, IFM may contribute increased habitats to species favoring young to mature coniferous-dominated forests, that normally decline across a landscape following clearcutting in boreal mixed and upland conifer stands. An aspatial model, based on published and local information and expert opinion, suggested that IFM and post-harvest silviculture in Ontario's boreal forests would produce positive and negative species-specific effects on the vertebrates that we modeled. However, IFM appeared to result in little increased effect over basic post-harvest silviculture. We also expect that stand-level effects of IFM on species would accumulate through time over landscapes, as more stands come under intensive management and the level of effects will be cumulative. [Crown Copyright © 2002]
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1243. A review of wildlife changes in southern bottomland hardwoods due to forest management practices.

Wigley, T. Bently and Roberts, Thomas H.
Wetlands 14(1): 41-48. (1994)
NAL Call #: QH75.A1W47; ISSN: 0277-5212
Descriptors: United States, southern region/ wildlife abundance/ wildlife diversity
Abstract: One function of bottomland hardwood forests is provision of wildlife diversity and abundance. In this paper, we discuss the temporal and spatial changes in wildlife diversity and abundance often associated with forest management practices in bottomland hardwoods. Forest management activities alter forest composition, structure, and spatial heterogeneity, thereby changing the composition, abundance, and diversity of wildlife communities. Special habitat features such as snags, den trees, and dead and down woody material also may be impacted by forestry practices. More research is needed to fully understand landscape-level impacts of forest management.
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1244. Richness, distribution and conservation status of cavity nesting birds in Mexico.

Monterrubio-Rico, T. C. and Escalante-Pliego, P.
Biological Conservation 128(1): 67-78. (2006)
NAL Call #: S900.B5; ISSN: 00063207.
Notes: doi: 10.1016/j.biocon.2005.09.017.
Descriptors: cavity nesting birds/ Mexican avifaunas/ protected areas/ birds/ conservation status/ management practices/ nest site/ species richness/ Mexico/ North America/ Aves/ Psittacidae/ Strigidae
Abstract: A considerable number of bird species depend on tree cavities availability for nesting in temperate and tropical forests in Mexico. Tree cavity availability is reduced in heavily managed forests, making cavity nesting species particularly vulnerable to the high rates of forest loss and degradation that occur every day in the remaining wilderness areas of the country. We analyzed information about nesting behavior, distribution, and conservation status of resident landbird avifauna from 35 important and protected bird areas of Mexico. The main intention was to determine the proportion of resident bird species that nest in tree cavities and are more sensitive to intensive forest management practices. Our results revealed that 17% (112 species) of the resident landbird avifauna need tree cavities for nesting. Cavity nesters represented a higher proportion of endangered and threatened species than non-cavity nesters. The families Strigidae and Psittacidae represented the highest number of tree cavity nesting species in status. In the 35 avifaunas examined, the mean percentage of cavity nesting species ranged from 17% to 21%. The cloud forest reserve of "El Triunfo" with 43 species, is the area with the highest concentration of cavity nesting species in Mexico.
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1245. Riparian zone forest management and the protection of biodiversity: A problem analysis.

Sarr, D. A.; Odion, D. C.; Hibbs, D. E.; Weikel, J.; Gresswell, R. E.; Bury, R. B.; Czarnomski, N. M.; Pabst, R. J.; Shatford, J.; and Moldenke, A. R.
NCASI Technical Bulletin(908)(2005); ISSN: 08860882
Descriptors: aquatic invertebrates/ biodiversity/ birds/ buffer/ disturbance regime/ endangered species/ fish/ forest zones/ fungi/ keystone species/ mammals/ plants/ riparian/ stream amphibians/ vegetation/ biodiversity/ crops/ plants (botany)/ seed/ disturbance regime/ endangered species/ forest zones/ forestry/ birds/ farm crops/ fishes/ forestry/ logs/ seeds/ Amphibia/ Aves/ bacteria (microorganisms)/ fungi/ Invertebrata/ Mammalia
Abstract: This report evaluates the general effects of forestry practices on biodiversity along streams in the Pacific Northwest and northern California. There are four parts to the report. In Part I, we present concepts of biodiversity and the processes underlying it. Biodiversity is expressed as a general concept for species, habitat, and genetic diversity of all groups of organisms. We describe the interacting processes that govern riparian biodiversity by integrating those operating over large spatial extents, such as climate, with interrelated ones that have more localized influences, such as disturbance and habitat heterogeneity. The effects of forestry on biodiversity are then analyzed in the context of these controls, and how

they are influenced by disturbances. We predict that habitat heterogeneity and retention of pre-disturbance biological legacies (trees, snags, logs, seed and spore banks that can be important to growth of populations of organisms after disturbance) are two of four key determinants of biodiversity because they may act as mechanisms that promote species coexistence. Habitat heterogeneity is especially scale-dependent. Physiological stress and related resource availability are the other two primary controllers of biodiversity because they may limit the number of species that coexist. These limiting factors are strongly influenced by geography. All four factors are combined into a simple graphical model for predicting how disturbance regimes in general, and forestry practices in particular, will affect biodiversity. Disturbance regimes that are intermediate in influence are predicted to best maintain biodiversity. Geographic variation, as described in Appendices A and B, must be considered when implementing the conceptual model, and we illustrate this by contrasting how a variety of forestry practices are predicted to affect biodiversity in relative extremes in the Pacific Northwest: wet forests west of the Cascades vs. dry forests on the east slope of the range. The primary controllers of species diversity will have different effects on organisms depending on their life histories. Therefore, in Part II, we provide separate chapters by selected authors summarizing information about the effects of forestry practices on biodiversity along streams in the study area for specific taxonomic groups. These summaries contain the most current information on the ecology of the taxonomic groups, and how they and their habitats may be affected by forestry practices. Each section also suggests forestry practices that may sustain the selected taxonomic group. Finally, research needed to improve understanding of these taxa-specific topics is described. Synthesizing this information in Part III, we stress that there may be tradeoffs in managing for different elements of biodiversity, which leads to complications in managing for overall biodiversity. This highlights the need for clear articulation of management goals. For improving overall biodiversity maintenance, the principles outlined in Part I lead to potentially cost-effective stand-level management actions. In terms of enhancing habitat heterogeneity, planting multiple crop species, leaving some native trees unharvested to remain through a second rotation, lengthening rotations and earlier thinning schedules may all be effective, depending on the circumstances. Woody debris and snags are critical habitat features for many species that can be maintained or created to improve legacy retention. Site preparation following harvesting that creates biological legacies that occur with natural disturbances and that conserves coarse woody debris can help maintain many non-crop species. Controlling exotic species that act as artificial keystones/pest plants can reduce physiological stress and maintain more natural resource availability for native species. We also describe strategies for maintaining biodiversity at the landscape scale. Specifically, we discuss some advantages and limitations of disturbance regime-based management, riparian buffers, and conservation reserves as means to protect biodiversity. The report concludes in Part IV with a draft research agenda to complement taxon-specific research recommended in Part II. This research agenda is based on reviews of existing literature and ongoing research, which exhibits geographic and taxonomic biases. The goal of the research proposed is to improve understanding of how to protect biodiversity in

managed forests. There is a need for much basic ecological information about both the ecology of lesser known riparian taxa, as well as applied research determining their sensitivity to forestry related disturbance.
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1246. **The road to recovery.**

Kulynycz, Erin

Wildlife Rehabilitation Today 13(2): 19-21. (2004);

ISSN: 1044-2618

Descriptors: Sciurus niger cinereus/ mammals/ study methods/ endangered-threatened species/ wildlife-habitat relationships/ habitat alterations/ stocking-transplanting/ restoration/ forestry practices/ marking/ tagging/ monitoring/ telemetry/ home range-territory/ status/ wildlife management/ habitat management/ fires-burns/ timber harvest/ Delmarva fox squirrel/ Virginia: Chincoteague National Wildlife Refuge

Abstract: Research methods such as tagging, monitoring, and studying habitat criteria are essential to the recovery of the Delmarva fox squirrel, one of the largest tree squirrels in the Western Hemisphere. The author reports on the recovery program for this species. Thirty squirrels were released at Chincoteague National Wildlife Refuge, Virginia, from 1969 to 1971. This translocation was successful. Research conducted in 2001 focused on the effects on the squirrels of timber removal resulting from an infestation of southern pine beetles. The researcher also studied the home range, population size, and monitoring techniques used to study the squirrel. Ongoing research focuses on improving habitat at Chincoteague by studying the effects of prescribed burns on the squirrel's habitat use. Biologists used fire in May and June to reduce the thick vine and shrub layer of the forest. The refuge staff also conducted vegetation surveys to determine changes in composition due to the fires. Mast trees important to the squirrels are red maples, loblolly pines, and oaks. The removal of understory vegetation, such as greenbrier, should aid in the movement and predator vigilance of the Delmarva fox squirrel. This is the first study of its kind to assess the effects of prescribed burns on fox squirrels. The researchers hope the fire will provide a new tool for managers and landowners to improve the status of Delmarva fox squirrels and make habitat more suitable throughout the area.

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1247. **Roads as edges: Effects on birds in forested landscapes.**

Ortega, Yvette K. and Capen, David E.

Forest Science 48(2): 381-390. (2002)

NAL Call #: 99.8 F7632; ISSN: 0015-749X

Descriptors: terrestrial ecology/ fixed-radius point counting/ degree of forestation/ forested landscapes/ interior transects/ landscape factors/ narrow forest canopy breaks/ nest concealment/ nest predation rates/ road edge habitat/ territory density/ unpaved roads/ forests/ ecosystems/ forest roads/ forestry practices/ habitat alterations/ Green Mountain National Forest/ habitat management/ mortality/ roads/ Vermont/ wildlife-human relationships/ commercial enterprises/ conservation/ wildlife management/ disturbances/ habitat use/ land zones/ artificial structures/ population ecology

Abstract: Numerous studies have documented that forest edges affect habitat use and reproductive success of forest

birds, but few studies have considered edges created by narrow breaks in the forest canopy. We compared predation rates on artificial nests placed within forest habitat along edge transects, 10 m from unpaved roads, and along interior transects, 300 m from forest-road boundaries. Local factors, such as nest concealment, and landscape factors, such as the degree of forestation in surrounding areas, were accounted for when testing for edge effects on nest predation. We conducted fixed-radius point counts to compare relative abundance of 34 bird species on edge and interior transects. Also, seven study plots were established adjacent to unpaved roads to map the distribution of bird territories within edge areas, 0-150 m from unpaved roads, and interior areas, 150-300 m from roads. Rates of nest predation on artificial nests did not differ between edge and interior transects, but the distribution of forest birds was influenced by unpaved roads. Four of 18 forest-interior species had lower relative abundance or territory density adjacent to roads, while four of six species categorized as edge nesters had higher relative abundance on edge transects. Our results suggest that narrow openings within forested landscapes may affect habitat use but not nest predation levels, emphasizing the need to frame definitions of "edge effects" within the context of multiple ecological processes.

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1248. Roberts Creek Study Forest: Habitat use of a dispersed retention area by breeding winter wrens.

Waterhouse, F. Louise and Harestad, Alton S.

Vancouver Forest Region Forest Research Technical Report TR-020: Unpaginated. (2002).

<http://www.for.gov.bc.ca/RCO/research/wildlifereports/tr020.pdf>

Descriptors: commercial activities/ conservation measures/ reproduction/ reproductive behavior/ behavior/ ecology/ terrestrial habitat/ land zones/ North America/ Canada/ Troglodytes troglodytes pacificus: forestry/ Dispersed retention system/ habitat management/ breeding site/ territoriality/ habitat utilization/ effects of dispersed retention harvest practices on territories and breeding sites/ forest and woodland/ Mature forest/ British Columbia/ Roberts Creek Study Forest/ Aves, Passeriformes, Troglodytidae/ birds/ chordates/ vertebrates

Abstract: The Winter Wren (*Troglodytes troglodytes pacificus*) is a common bird in British Columbia and is typically associated with pockets of complex forest structure. From 1995 to 1997, on the south coast of British Columbia, we studied Winter Wrens' use of habitat in a 13.1-ha pilot study block of mature (>120 years) forest. In the central area of the block, 7.1-ha had been harvested in 1993 to produce a uniform dispersed retention of single dominant Douglas- fir and western redcedar trees. We chose to study the Winter Wren because it is distributed throughout forests of the Pacific Northwest, and its habitat use and life history traits are sensitive to forestry practices. We focused on territorial and nesting behaviour of male wrens. Our results indicate that during the immediate post-harvest years, habitat quality of the dispersed retention area may be sub-optimal for breeding males because of changes to forest structure and amounts of habitat attributes. As well, habitat quality for Winter Wrens depends on site tenacity, annual weather, and proximity of structurally complex, closed canopy forest. Furthermore, we suggest streams and seeps may provide higher quality

sites for nesting and foraging in either dispersed retention or mature forest despite their overall differences in stand structure. Based on these findings, we think that the overall effect of the dispersed retention system on wildlife will depend on the size of the block and its juxtaposition to other forest types. Understanding how forest practices affect a species, such as the Winter Wren, helps managers design forest practices that can provide habitat to wrens and other forest dwelling organisms which rely on similar structures and ecological processes.

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1249. Rodent communities of native woodland, replanted, and secondary succession sites in the lower Rio Grande Valley, Texas.

Sternberg, Mitchell A. and Judd, Frank W.

Texas Journal of Science 58(2): 99-118. (2006)

NAL Call #: 470 T31; ISSN: 0040-4403

Descriptors: conservation measures/ ecology/ terrestrial habitat/ land zones/ Rodentia: habitat management/ biomass/ native woodland/ replanted and secondary succession sites/ community structure/ forest and woodland/ Texas/ Lower Rio Grande Valley/ Mammalia/ chordates/ mammals/ rodents/ vertebrates

Abstract: Wildlife habitat is rapidly disappearing in the Lower Rio Grande Valley of Texas and is in critical need of protection. United States Fish and Wildlife Service plans call for protection of 53,420 ha in the area, with the Rio Grande serving as the major corridor linking tracts of native and restored vegetation. Species richness, diversity, density, biomass and similarity of rodent communities were compared among a native woodland, a replanted field, and an unaided secondary succession site to obtain information on the efficacy of vegetation efforts in promoting rodent community diversity. Species diversity varied from $H' = 0.0$ to 0.65 depending on habitat, grid and season. Species richness ranged from 5 to 9 among the three habitats and a total of 10 species was captured. Density for all species combined ranged from 269 to 388 rodents/ha. *Sigmodon hispidus*, *Peromyscus leucopus*, and *Liomys irroratus* were the most abundant rodents in the native woodland and replanted habitats where they together comprised 88% and 90%, respectively, of the individuals captured. *Mus musculus* replaced *P. leucopus* in abundance in the unaided succession habitat. Biomass was greatest where *S. hispidus* was most abundant. Community similarity was greater between the two successional habitats than either was to the native woodland. The native woodland had fewer species but greater evenness than either successional habitat. The replanting technique used by the United States Fish and Wildlife Service in a formerly cultivated field produced greater diversity of rodents in less time than unaided secondary succession of a fallow field. Variation in application of planting techniques can produce significant differences in vegetation and rodent communities on small replanted areas.

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1250. The role of dead wood in maintaining arthropod diversity on the forest floor.

Hanula, James L.; Horn, Scott.; and Wade, Dale D.

In: *Insect Biodiversity and Dead Wood: Proceedings of a Symposium for the 22nd International Congress of Entomology*, General Technical Report-SRS 93/ Grove, Simon J. and Hanula, James L.; Asheville, NC: Southern

Research Station, Forest Service, U.S. Department of Agriculture, 2006. pp. 57-66.

Notes: Symposium held August 15-21, 2004 at Brisbane, Australia.

http://www.srs.fs.usda.gov/pubs/gtr/gtr_srs093/gtr_srs093.pdf

Descriptors: commercial activities/ conservation measures/ nutrition/ diet/ feeding behavior/ associations/ parasites diseases and disorders/ hosts/ ecology/ community structure/ predators/ terrestrial habitat/ land zones/ Arthropoda: forestry/ dead wood role in maintaining faunal diversity on forest floor/ endangered avian predator relations/ habitat management/ food plants/ associations/ plant hosts/ biological breakdown/ species diversity/ avian predators/ *Picoides borealis*/ endangered predator relationships/ habitat utilization/ forest and woodland/ Florida/ North/ Osceola National Forest/ Aves, Piciformes, Picidae/ arthropods/ birds/ chordates/ invertebrates/ vertebrates

Abstract: Dead wood is a major component of forests and contributes to overall diversity, primarily by supporting insects that feed directly on or in it. Further, a variety of organisms benefit by feeding on those insects. What is not well known is how or whether dead wood influences the composition of the arthropod community that is not solely dependent on it as a food resource, or whether woody debris influences prey available to generalist predators. One group likely to be affected by dead wood is ground-dwelling arthropods. We studied the effect of adding large dead wood to unburned and frequently burned pine stands to determine if dead wood was used more when the litter and understory plant community are removed. We also studied the effect of annual removal of dead wood from large (10-ha) plots over a 5-year period on ground-dwelling arthropods. In related studies, we examined the relationships among an endangered woodpecker that forages for prey on live trees, its prey, and dead wood in the forest. The results of these and other studies show that dead wood can influence the abundance and diversity of the ground-dwelling arthropod community and of prey available to generalist predators not foraging directly on dead trees.

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1251. The role of herbicides for enhancing forest productivity and conserving land for biodiversity in North America.

Wagner, R. G.; Newton, M.; Cole, E. C.; Miller, J. H.; and Shiver, B. D.

Wildlife Society Bulletin 32(4): 1028-1041. (2004)

NAL Call #: SK357.A1W5; ISSN: 00917648.

Notes: doi: 10.2193/0091-7648(2004)032 [1028:TROHFE]2.0.CO;2.

Descriptors: forest plantations/ forest vegetation management/ growth and yield/ high-yield conservation/ Intensive silviculture/ biodiversity/ conservation/ forest management/ herbicide/ wildlife management/ wood quality/ yield

Abstract: Herbicide technology has evolved with forest management in North America over the past 60 years and has become an integral part of modern forestry practice. Forest managers have prescribed herbicides to increase reforestation success and long-term timber yields. Wildlife managers and others interested in conserving biodiversity, however, have often viewed herbicide use as conflicting with their objectives. Do herbicides increase forest

productivity, and are they compatible with the objectives of wildlife management and biodiversity conservation? Results from the longest-term studies (10-30 years) in North America suggest that the range of wood volume yield gains from effectively managing forest vegetation (primarily using herbicides) is 30-450% in Pacific Northwest forests, 10-150% in the southeastern forests, and 50-450% in northern forests. Most of the 23 studies examined indicated 30-300% increases in wood volume yield for major commercial tree species and that gains were relatively consistent for a wide range of site conditions. Meeting future demands for wildlife habitat and biodiversity conservation will require that society's growing demand for wood be satisfied on a shrinking forestland base. Increased fiber yields from intensively managed plantations, which include the use of herbicides, will be a crucial part of the solution. If herbicides are properly used, current research indicates that the negative effects on wildlife usually are short-term and that herbicides can be used to meet wildlife habitat objectives. © 2008 Elsevier B.V. All rights reserved.

1252. Ruffed grouse (*Bonasa umbellus*) brood microhabitat selection in the southern Appalachians.

Haulton, G. S.; Stauffer, D. F.; Kirkpatrick, R. L.; and Norman, G. W.

American Midland Naturalist 150(1): 95-103. (2003)

NAL Call #: 410 M58; ISSN: 00030031

Descriptors: gamebird/ ground cover/ habitat management/ habitat selection/ microhabitat/ United States/ *Bonasa umbellus*

Abstract: Brood cover is a critical component of ruffed grouse habitat during a period when chick mortality, may be high. We compared microhabitat characteristics at ruffed grouse (*Bonasa umbellus*) brood locations with random locations to determine characteristics selected by females with broods in the Appalachian region of Virginia and West Virginia. Females with broods used forested sites with a well-developed overstory canopy (>70%). These sites had a higher abundance of arthropods in the first 3 wk after hatch ($P = 0.02$), taller ground cover ($P < 0.1$) and higher percent ground cover ($P < 0.1$) in the first 6 wk after hatch than random sites. Total woody stem densities were not different ($P > 0.1$) between brood and random sites as has been found in several studies from more northern sites. Most management prescriptions for ruffed grouse brood habitat are based on increasing hardwood stem densities; our results suggest alternative habitat management techniques that promote ground cover, such as prescribed burning and forest stand thinning, may be more appropriate in the southern Appalachian region.

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1253. Ruffed grouse brood habitat use in mixed softwood-hardwood nordic-temperate forests, Quebec, Canada.

Giroux, W.; Blanchette, P.; Bourgeois, J. C.; and Cabana, G.

Journal of Wildlife Management 71(1): 87. (Jan. 2007)

NAL Call #: 410 J827

Descriptors: ruffed grouse/ wildlife habitat/ nesting/ brood rearing/ Quebec/ Canada

Abstract: Adequate cover is a critical component of ruffed grouse (*Bonasa umbellus*) habitat during the brood-rearing period when chick mortality is high. We assessed habitat use by ruffed grouse during the brood-rearing period by

comparing characteristics of tree, shrub, and ground layers at ruffed grouse brood and random locations. We captured and radiomarked 29 females with broods in 2 forest settings of the Reserve faunique de Portneuf, Quebec, Canada. We described grouse habitat using ground surveys and forest maps, and we identified the used habitat characteristics using analysis of variance and logistic regression. Females with broods used mixed and regenerated clearcut stands that were 1.5-7 m tall and 11-20 years old. Compared with random locations, grouse locations had higher lateral obstruction (76% vs. 68%), higher small-stem density (29,085 stems/ha vs. 19,340 stems/ha), and were closer to roads and trails. Percentage of coverage by ground vegetation was not higher at grouse locations as often reported in previous studies. Results from this study will help orient ruffed grouse habitat management on Quebec public land and elsewhere in nordic-temperate mixed hardwood-softwood forests to maintain suitable brood habitat after logging operations. Forest management should promote growth of young mixed stands with high horizontal and vertical cover provided by high small-stem density, which offers protection against aerial and terrestrial predation. Edges such as roadsides are also important in brood habitat as they provide food and cover.

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1254. Ruffed grouse population ecology in the Appalachian Region.

Devers, Patrick K.; Stauffer, Dean F.; Norman, Gary W.; Steffen, Dave E.; Whitaker, Darroch M.; Sole, Jeffrey D.; Allen, Tom J.; Bittner, Steve L.; Buehler, David A.; Edwards, John W.; Figert, Daniel E.; Friedhoff, Scott T.; Giuliano, William W.; Harper, Craig A.; Igo, William K.; Kirkpatrick, Roy L.; Seamster, Michael H.; Spiker, Harry A.; Swanson, David A.; and Tefft, Brian C.

Wildlife Monographs 168: 1-36. (2007)

NAL Call #: 410 W64; ISSN: 0084-0173

Descriptors: Galliformes/ Phasianidae/ Bonasa umbellus/ Appalachian Region/ forests/ ecosystems/ habitat management/ population ecology/ productivity/ conservation/ wildlife management/ habitat use/ land zones/ reproduction/ *Carya* spp./ *Quercus* spp.

Abstract: The Appalachian Cooperative Grouse Research Project (ACGRP) was a multistate cooperative effort initiated in 1996 to investigate the apparent decline of ruffed grouse (*Bonasa umbellus*) and improve management throughout the central and southern Appalachian region (i.e., parts of Ohio, Pennsylvania, Rhode Island, Kentucky, West Virginia, Virginia, and North Carolina, USA). Researchers have offered several hypotheses to explain the low abundance of ruffed grouse in the region, including low availability of early-successional forests due to changes in land use, additive harvest mortality, low productivity and recruitment, and nutritional stress. As part of the ACGRP, we investigated ruffed grouse population ecology. Our objectives were to estimate reproductive rates, estimate survival and cause-specific mortality rates, examine if ruffed grouse harvest in the Appalachian region is compensatory, and estimate ruffed grouse finite population growth. We trapped >3,000 ruffed grouse in autumn (Sep-Nov) and spring (Feb-Mar) from 1996 to September 2002 on 12 study areas. We determined the age and gender of each bird and fitted them with necklace-style radiotransmitters and released them at the trap site. We tracked ruffed grouse ≥ 2 times per week using handheld radiotelemetry

equipment and gathered data on reproduction, recruitment, survival, and mortality. Ruffed grouse population dynamics in the Appalachian region differed from the central portion of the species' range (i.e., northern United States and Canada). Ruffed grouse in the Appalachian region had lower productivity and recruitment, but higher survival than reported for populations in the Great Lakes region and southern Canada. Population dynamics differed between oak (*Quercus* spp.)-hickory (*Carya* spp.) and mixed-mesophytic forest associations within the southern and central Appalachian region. Productivity and recruitment were lower in oak-hickory forests, but adult survival was higher than in mixed-mesophytic forests. Furthermore, ruffed grouse productivity and recruitment were more strongly related to hard mast (i.e., acorn) production in oak-hickory forests than in mixed-mesophytic forests. The leading cause of ruffed grouse mortality was avian predation (44% of known mortalities). Harvest mortality accounted for 12% of all known mortalities and appeared to be compensatory. Population models indicated ruffed grouse populations in the Appalachian region are declining ($\lambda = 0.7-0.95$), but differences in model estimates highlighted the need for improved understanding of annual productivity and recruitment. We posit ruffed grouse in the Appalachian region exhibit a clinal population structure characterized by changes in life-history strategies. Changes in life history strategies are in response to gradual changes in forest structure, quality of food resources, snowfall and accumulation patterns, and predator communities. Management efforts should focus on creating a mosaic of forest stand ages across the landscape to intersperse habitat resources including nesting and brood cover, adult escape cover, roosting sites, and, most importantly, food resources. Land managers can intersperse habitat resources through a combination of clearcutting, shelterwood harvests, group selection, and timber stand improvement (including various thinnings and prescribed fire). Managers should maintain current ruffed grouse harvest rates while providing high quality hunting opportunities. We define high quality hunting as low hunting pressure, low vehicle traffic, and high flush rates. Managers can provide high quality hunting opportunities through use of road closures in conjunction with habitat management.

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1255. Safe harbor for the red-cockaded woodpecker: Private forest landowners share their views.

Zhang, D. and Mehmood, S. R.

Journal of Forestry 100(5): 24-29. (2002)

NAL Call #: 99.8 F768 ; ISSN: 00221201

Descriptors: endangered species/ nonindustrial private forestland/ policy/ wildlife/ behavioral research/ combustion/ forestry/ landowners/ biodiversity/ environmental legislation/ management practices/ public attitude/ species conservation/ *Picoides borealis*

Abstract: We surveyed North Carolina and South Carolina private forest landowners to learn their attitudes about the Safe Harbor Program initiated by the US Fish and Wildlife Service and the Environmental Defense Fund. Landowners who own large amounts of forestland near active clusters of red-cockaded woodpeckers (*Picoides borealis*), whose forest have a high proportion of mature pine, and who practice prescribed burning or chemical or mechanical methods to control understory hardwoods are most likely to sign an agreement to participate. We found that the views

of program participants and nonparticipants were similar concerning the Endangered Species Act and the alternatives to the Safe Harbor Program.
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1256. Sciurid habitat relationships in forests managed under selection and shelterwood silviculture in Ontario.

Holloway, Gillian L. and Malcolm, Jay R.
Journal of Wildlife Management 70(6): 1735-1745. (2006)
NAL Call #: 410 J827; ISSN: 0022-541X

Descriptors: commercial activities/ conservation measures/ ecology/ population dynamics/ terrestrial habitat/ land zones/ North America/ Canada/ *Glaucomys sabrinus*/ *Glaucomys volans*/ *Tamias striatus*/ *Tamiasciurus hudsonicus*: forestry/ shelterwood and selection silviculture/ population density impact/ habitat management/ silviculture methods in forest habitat/ population density/ forest management impact/ forest and woodland/ silviculture impact on population density/ Ontario/ Algonquin Provincial Park/ silviculture impact on forest population density/ Mammalia, Rodentia, Sciuridae/ chordates/ mammals/ rodents/ vertebrates

Abstract: Although partial forest harvesting is practiced over large areas, managers know little about its impacts on sciurid rodents, particularly on northern (*Glaucomys sabrinus*) and southern flying squirrels (*G. volans*) in the northeastern United States and Canada. We examined habitat relationships of sciurid rodents (northern flying squirrels, southern flying squirrels, red squirrels (*Tamiasciurus hudsonicus*), and eastern chipmunks (*Tamias striatus*)) at 2 spatial scales in managed and unmanaged coniferous and hardwood forests of Algonquin Provincial Park, Ontario, Canada. We live-trapped rodents in 26 northern hardwood stands and in 16 white pine (*Pinus strobus*) stands from 2002 to 2004. Northern flying squirrel and red squirrel densities were significantly lower in recently harvested (3-10 yr since harvest) shelterwood stands than in unmanaged stands. In contrast, southern flying squirrel densities were higher in selection-harvested stands than in old-forest areas. The densities of northern flying squirrels and red squirrels had a strong relationship with the density of large spruce (*Picea* sp.) and hardwood trees and snags in conifer sites. Southern flying squirrel numbers had a positive association with the density of mast trees at the landscape level but not at the stand level in hardwood forests. Eastern chipmunk density had a positive correlation with the volume of old downed woody debris and the stems per hectare of declining trees. We recommend forest managers retain more large spruce and hardwood trees to mitigate the impacts of shelterwood harvesting on northern flying squirrels and red squirrels, and that they maintain high mast availability at the landscape level to ensure the persistence of southern flying squirrels.

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1257. Seasonal activity of adult, ground-occurring beetles (Coleoptera) in forests of northeastern Wisconsin and the Upper Peninsula of Michigan.

Werner, S. M. and Raffa, K. F.
American Midland Naturalist 149(1): 121-133. (2003)
NAL Call #: 410 M58; ISSN: 00030031

Descriptors: abundance/ beetle/ community composition/ forest management/ seasonality/ species diversity/ species richness/ United States/ *Calathus ingratus*/ *Calosoma*

frigidum/ *Carabus nemoralis*/ *Carabus sylvosus*/ Coleoptera/ *Geotrupes baylii*/ *Nicrophorus defodiens*/ *Nicrophorus sayi*/ *Nicrophorus tomentosus*/ *Oiceoptoma noveboracensis*/ *Platynus decentis*/ *Pterostichus adstrictus*/ *Pterostichus melanarius*/ *Pterostichus mutus*/ *Pterostichus pensylvanicus*/ *Pterostichus tristis*/ *Sphaeroderus lecontei*/ *Synuchus impunctatus*/ Wisconsin/ Michigan
Abstract: Seasonal activity of 24 species of ground-occurring, forest Coleoptera in northern Wisconsin and the Upper Peninsula of Michigan was assessed using pitfall traps during the spring and summer of 1996 and 1997. Overall, species richness, abundance and diversity remained relatively constant throughout the season, although species composition varied considerably. Trap catch of seven species was greatest from early May to late June: *Calosoma frigidum* Kirby, *Carabus nemoralis* Muller, *Platynus decentis* (Say), *Pterostichus adstrictus* Eschscholtz, *P. mutus* (Say), *P. pensylvanicus* LeConte and *Sphaeroderus lecontei* Dejean. Two species, *Carabus sylvosus* Say and *Nicrophorus sayi* Laporte, showed both early and late peaks in trap catch. Trap catch of eight species was greatest from early July to late August: *Calathus ingratus* Dejean, *Synuchus impunctatus* (Say), *Pterostichus melanarius* (Illiger), *Pterostichus tristis* (Dejean), *Geotrupes baylii* Jekel, *Nicrophorus defodiens* Mannerheim, *N. tomentosus* Weber and *Oiceoptoma noveboracensis* Forster. Implications for studies that assess impacts of forest management practices on beetle biodiversity are discussed.

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1258. Seasonal and annual home ranges of female eastern wild turkeys in a managed pine landscape in Mississippi.

Miller, Darren A. and Conner, L. Mike
Proceedings of the Annual Conference Southeastern Association of Fish and Wildlife Agencies 59: 89-99. (2005)
NAL Call #: SK1.S6; ISSN: 0276-7929

Descriptors: conservation measures/ behavior/ ecology/ terrestrial habitat/ land zones/ *Meleagris gallopavo silvestris*: habitat management/ home range/ seasonal and annual home ranges/ females/ managed pine landscape/ distribution within habitat/ forest and woodland/ Mississippi/ Kemper County/ Interior Flatwoods Resource Area/ Aves, Galliformes, Phasianidae/ birds/ chordates/ vertebrates
Abstract: Eastern wild turkeys (*Meleagris gallopavo silvestris*) are an important recreational resource throughout their range. Previous research has shown that intensively managed pine forests can sustain huntable populations of eastern wild turkeys. However, little research has examined patterns of spatial use of turkeys within these systems. An expected increase in acreage of intensively managed pine forests over the next half century requires a basic understanding of wild turkey ecology in these systems. Therefore, we used a long-term (1986-1993) data set to estimate annual and seasonal home range size of female eastern wild turkeys from a landscape dominated by intensively managed pine forests in east-central Mississippi. Mean seasonal home range size was 406 ha \pm 20 ha (mean \pm SE; N = 268). Home ranges were larger during fall/winter (524 \pm 43.5 ha) than preincubation (326 \pm 23.2 ha) and summer (392 \pm 32.5 ha). Average annual home range size was 796 ha \pm 46.0 ha and was smaller in 1993 (P < 0.05) than other years. We documented wide variability in seasonal and annual home ranges likely in

response to localized resource availability and individual female behavior. For some females, home range size was affected by seasonal movements between intensively managed pine stands in spring and summer and a large bottomland hardwood and agriculture complex during fall-winter. Managers need to understand movements within home ranges to better understand spatial use by wild turkeys. We suggest managers consider spatial distribution of vegetation types, particularly mature hardwoods, important to turkeys when making management decisions.
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1259. Seasonal avifauna responses to fuel reduction treatments in the upper piedmont of South Carolina: Results from Phase 1 of the National Fire and Fire Surrogate Study.

Zebehazy, Laura A.; Lanham, J. Drew; and Waldrop, Thomas A.

In: Proceedings of the 12th Biennial Southern Silvicultural Research Conference, General Technical Report-SRS 71/ Connor, Kristina F.; Asheville, NC: Southern Research Station, Forest Service, U.S. Department of Agriculture, 2004. pp. 82-86.

<http://www.treesearch.fs.fed.us/pubs/6304>

Descriptors: commercial activities/ ecology/ terrestrial habitat/ abiotic factors/ physical factors/ land zones/ Aves: forestry/ prescribed burning and thinning/ community structure effects/ forest habitats/ community structure/ prescribed burning and thinning effects/ forest and woodland/ pine and mixed forest habitats/ fire/ prescribed burning/ South Carolina/ upper piedmont/ Aves/ birds/ chordates/ vertebrates

Abstract: We examined avian species and assemblage responses to prescribed burns and thinning in a southeastern Piedmont pine and mixed pine-hardwood forest as part of the National Fire and Fire Surrogate Study (NFFS) examining the effects of fuel reduction on forest health. Point counts conducted during the non-breeding and breeding seasons of 2000-2002 showed that winter bird species abundance and evenness (J') did not change significantly between pre- and post-treatment winter surveys. However, bird species richness increased significantly between years. No differences were found between treatments for species abundance, richness, or evenness during the breeding season. However, foliage-gleaning and canopy-nesting breeding species were detected significantly more often in thinned than burned or control sites. Nest searches and monitoring found 79 nests (thin, n = 30; burn, n = 27; control, n = 22) with a 49-percent failure rate over the 2-year period. Most of these failures (41 percent) occurred in thinned stands.

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1260. Seasonal bird use of canopy gaps in a bottomland forest.

Bowen, Liessa T.; Moorman, Christopher E.; and Kilgo, John C.

Wilson Journal of Ornithology 119(1): 77-88. (2007)

NAL Call #: QL671.W55 ; ISSN: 1559-4491

Descriptors: conservation/ ecology/ terrestrial habitat/ land zones/ Aves: conservation measures/ Implications of seasonal use of canopy gaps/ habitat utilization/ seasonal use of canopy gaps in bottomland forest/ conservation implications/ forest and woodland/ bottomland forest/ seasonal use of canopy gaps/ South Carolina/ Savannah

River Site/ Aves/ birds/ chordates/ vertebrates

Abstract: Bird use of small canopy gaps within mature forests has not been well studied, particularly across multiple seasons. We investigated seasonal differences in bird use of gap and forest habitat within a bottomland hardwood forest in the Upper Coastal Plain of South Carolina. Gaps were 0.13- to 0.5-ha, 7- to 8-year-old group-selection timber harvest openings. Our study occurred during four bird-use periods (spring migration, breeding, postbreeding, and fall migration) in 2001 and 2002. We used plot counts and mist netting to estimate bird abundance in canopy gaps and surrounding mature forest habitats. Using both survey methods, we observed more birds, including forest-interior species, forest-edge species, field-edge species, and several individual species in canopy gap and gap-edge habitats than in surrounding mature forest during all periods. Interactions between period and habitat type often were significant in models, suggesting a seasonal shift in habitat use. Bird activity generally shifted between the interior of canopy gaps and the immediate gap edge, but many species increased their use of forested habitat during the breeding period. This suggests that many species of birds selectively choose gap and gap-edge habitat over surrounding mature forest during the non-breeding period. Creation of small canopy gaps within a mature forest may increase local bird species richness. The reasons for increased bird activity in gaps remain unclear.
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1261. Seasonal habitat selection by raccoons (*Procyon lotor*) in intensively managed pine forests of central Mississippi.

Chamberlain, Michael J.; Conner, L. Mike; and Leopold, Bruce D.

American Midland Naturalist 147(1): 102-108. (2002)

NAL Call #: 410 M58; ISSN: 0003-0031

Descriptors: *Procyon lotor*/ Procyonidae/ Carnivora/ mammals/ behavior/ habitat use/ seasonal activities/ habitat management/ forestry practices/ ecosystems/ pine/ coniferous forests/ deciduous forests/ age-sex relationships/ breeding season/ care and rearing of young/ home range-territory/ habitat alterations/ terrestrial ecology/ radio-telemetry/ breeding ecology/ forest management/ habitat selection/ forests/ Jasper County/ Mississippi/ pine forests/ seasonal habitat selection/ wildlife-human relationships/ commercial enterprises/ disturbances/ land zones/ reproduction/ common raccoon/ desert habitat/ silviculture/ abundance/ dispersion/ telemetry

Abstract: Raccoons (*Procyon lotor*) are ecological generalists, existing in diverse landscapes. Although general habitat use patterns of raccoons have been extensively described, little research has examined raccoon habitat selection within landscapes managed intensively for wood fiber production. Furthermore, no published studies using radio-telemetry have detailed raccoon habitat selection at multiple spatial scales. The authors monitored 31 raccoons on a 2000 ha area characterized by short-rotation (<35 years) pine forests in central Mississippi during 1996-1997 and examined seasonal habitat selection at three spatial scales. Habitat selection at the home range scale differed ($p = 0.004$) between genders. Gender and season interacted to affect habitat selection at the core area scale of selection. Both male and female core areas contained greater proportions of mature hardwood habitats during breeding and young-rearing. Habitat use within

home ranges, as determined by point locations, did not differ ($P > 0.440$) with gender or season. However, raccoons used habitats disproportionately ($P = 0.016$) relative to habitat composition of the home range. The authors' findings illustrate the importance of examining individual habitat selection at multiple scales, as raccoon habitat selection in this study varied by scale. Furthermore, their results indicate the importance of hardwood dominated habitats for raccoons existing in pine-dominated landscapes.

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1262. Seasonal habitat use and movements of mountain goats, *Oreamnos americanus*, in east-central British Columbia.

Poole, Kim G. and Heard, Douglas C.

Canadian Field Naturalist 117(4): 565-576. (2003)

NAL Call #: 410.9 Ot8; ISSN: 0008-3550

Descriptors: conservation measures/ techniques/ ecology/ habitat utilization/ terrestrial habitat/ land zones/ North America/ Canada/ *Oreamnos americanus*: habitat management/ forested buffers/ forestry disturbance avoidance/ tracking techniques/ GPS accuracy/ forest canopy closure effect/ distribution within habitat/ seasonal habitat use/ forestry disturbance/ habitat preference/ mineral licks/ forest and woodland/ British Columbia/ Robson Valley surrounds/ Mammalia, Artiodactyla, Bovidae/ chordates/ mammals/ ungulates/ vertebrates

Abstract: To identify the potential for adverse effects of forest development on Mountain Goats (*Oreamnos americanus*), we documented the patterns of forest use by goats and the factors influencing goat habitat use. We used a combination of 15 very high frequency (VHF) and six global positioning system (GPS) radiocollars to document the distribution and movements of 21 (15 female, 6 male) goats from 1997 to 1999 in the mountains surrounding the Robson Valley in east-central British Columbia. Because canopy closure reduces the likelihood that a GPS receiver will obtain a location fix, we estimated that GPS collars underrepresented forest use by about 23%. Three goats used separate winter and summer ranges separated by 8-13 km, while most simply exhibited seasonal shifts in elevation. In winter, goats were more often at lower elevations, in commercial forest stands, on southerly aspects, and moved less each hour and over the course of the winter. Goat use declined in areas >500 m from escape terrain and goats were found lower in elevation from evening to dawn compared to daylight hours. Collared goats used high elevation licks, which were either within their home range, or in two cases, 6 and 14 km from their typical home range. We documented use of known mid-elevation mineral licks by three collared goats, but no use of known low elevation (valley bottom and lower slopes) mineral licks. Robson Valley goats appeared to be at relatively low risk from disturbances related to logging, because although forest use was documented during winter, it occurred primarily on high elevation, steep slopes where trees are currently of low commercial value, and goats made little use of low elevation mineral licks. We recommend that in this area a forested buffer of 500 m around cliffs be left to reduce the possibility of adverse effects on goats especially, on southerly aspects above 1300 m.

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1263. Selection of nest and roost trees by pileated woodpeckers in coastal forests of Washington.

Aubry, K. B. and Raley, C. M.

Journal of Wildlife Management 66(2): 392-406. (2002)

NAL Call #: 410 J827; ISSN: 0022541X

Descriptors: *Abies amabilis*/ decadent tree/ *Dryocopus pileatus*/ forest management/ heart-rot fungi/ nest/ Pacific Northwest/ Pacific silver fir/ pileated woodpecker/ roost/ snag/ *Thuja plicata*/ *Tsuga heterophylla*/ Western hemlock/ Western redcedar/ birds/ forest management/ habitat management/ nesting/ roost site/ species conservation/ United States/ *Abies amabilis*/ *Dryocopus pileatus*/ *Thuja plicata*/ *Tsuga heterophylla*

Abstract: Providing adequate habitat for the pileated woodpecker (*Dryocopus pileatus*) is a key component of federal forest management plans in the Pacific Northwest, yet information is extremely limited on characteristics of trees selected by this species for nesting or roosting in coastal forests. We investigated selection by pileated woodpeckers of both individual tree and site characteristics for nesting and roosting in coastal forests, and evaluated the efficacy of current management prescriptions for these woodpeckers on federal lands. From 1990 to 1995, we used call surveys, ground searches, and radiotelemetry to locate 25 nest and 144 roost trees used by 31 adult pileated woodpeckers (16 females, 15 males) in western hemlock (*Tsuga heterophylla*) forests located about 20 km east of the Pacific coast in Washington, USA. Nesting pairs typically excavated nest cavities in different trees each year, and individual birds used an average of 7 different roost trees during the nonbreeding season. Pileated woodpeckers used decadent live trees as often as snags for both nesting and roosting. They selected Pacific silver fir (*Abies amabilis*) for nesting and western redcedar (*Thuja plicata*) for roosting, and selected against western hemlock for both activities. For nesting, pileated woodpeckers used only trees 65-154 cm in diameter at breast height (dbh) but were not selective within this range; for roosting, they selected trees 155-309 cm dbh and selected against trees <125 cm dbh. For both nesting and roosting, pileated woodpeckers selected trees ≥ 27.5 m tall and selected against trees <17.5 m tall. Decay characteristics of trees used by pileated woodpeckers for nesting differed su'ongly from those used for roosting. Site characteristics also influenced selection of nest and roost trees by pileated woodpeckers; 0.4-ha plots around nest and roost trees contained a higher diversity of tree species and higher densities of decadent trees ≥ 20 cm dbh and snags ≥ 50 cm dbh than availability plots. The Northwest Forest Plan specifies the retention of 1 large, hard snag per 17 ha of harvested forest to provide nest trees for pileated woodpeckers. Our results indicate that providing adequate habitat for pileated woodpeckers in coastal forests of the Pacific Northwest may require a more comprehensive management strategy that also includes provisions for roost trees and that emphasizes retention of both snags and decadent trees, especially those infected with heart-rot decay fungi.

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1264. Short-term breeding bird response to two harvest practices in a bottomland hardwood forest.

Harrison, Charles A. and Kilgo, John C.

Wilson Bulletin 116(4): 314-323. (2004)

NAL Call #: 413.8 W692; ISSN: 0043-5643

Descriptors: commercial activities/ conservation measures/ ecology/ community structure/ population dynamics/ terrestrial habitat/ land zones/ clearcutting and patch retention harvesting/ short term breeding population responses/ habitat management/ forest management/ species diversity/ breeding species richness/ harvest practices/ population density/ breeding population/ clearcutting/ patch retention harvesting/ forest and woodland/ short term breeding population responses/ South Carolina/ Lower Coastal Plain/ Coosawhatchie River/ bottomland hardwood forest/ Aves/ birds/ chordates/ vertebrates

Abstract: Clearcutting is the preferred timber harvest method in bottomland hardwood forests because it is most likely to result in regeneration of preferred species.

However, clearcutting generally has negative impacts on forest birds. Patch-retention harvesting may provide similar silvicultural benefits, but its effects on birds are unknown. We surveyed breeding birds in uncut control, clearcut, and patch-retention treatment areas (11-13 ha) for one season prior to harvest and two seasons postharvest in a bottomland hardwood forest in the Lower Coastal Plain of southeastern South Carolina. Bird observations recorded along line transects were analyzed using the software EstimateS to estimate species richness and program Distance to estimate densities. We found greater species richness and bird densities in the patch-retention treatment than in the clearcut in both postharvest seasons. We detected no forest-interior birds in the clearcut after the harvest, but by the second postharvest season in the patch-retention treatment, the density of forest-interior birds had returned to approximately half of its preharvest level. Thus, based on density response, patch-retention harvesting appears to be less detrimental to forest birds than clearcutting. However, additional work is needed to determine whether retained patches influence avian survival and productivity.

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1265. Short-term effects of fire and other fuel reduction treatments on breeding birds in a southern Appalachian upland hardwood forest.

Greenberg, C. H.; Tomcho, A. L.; Lanham, J. D.; Waldrop, T. A.; Tomcho, J.; Phillips, R. J.; and Simon, D.

Journal of Wildlife Management 71(6): 1906-1916.

(Aug. 2007)

NAL Call #: 410 J827

Descriptors: fire ecology/ forest fires/ forest habitats/ forest wildlife relations/ wildlife habitats/ fire hazard reduction/ prescribed burning/ wildland fire management/ montane forests/ wild birds/ understory/ shrubs/ forest trees/ tree mortality/ canopy gaps/ population density/ species diversity/ *Sialia sialis*/ duration/ forest litter/ forest insects/ hardwood forests/ Appalachian region/ North Carolina/ *Passerina cyanea*/ *Contopus virens*/ *Mniotilta varia*/ *Wilsonia citrina*/ *Helminthos vermivorus*/ natural resources, environment, general ecology, and wildlife conservation/ animal ecology and behavior/ forestry related/ forest fire management

This citation is from AGRICOLA.

1266. Short-term effects of fuel reduction on pileated woodpeckers in northeastern Oregon: A pilot study.

Bull, Evelyn L.; Clark, Abe A.; and Shepherd, Jay F.

Portland, OR: Pacific Northwest Research Station, Forest Service, U.S. Department of Agriculture; Research Paper-PNW 564, 2005. 17 p.

Notes: 0882-5165 (ISSN).

Descriptors: commercial activities/ nutrition/ feeding behavior/ ecology/ terrestrial habitat/ land zones/ *Dryocopus pileatus*: forestry/ foraging/ fuel reduction impact in forest habitat/ habitat utilization/ forest and woodland/ Oregon/ La Grande/ Aves, Piciformes, Picidae/ birds/ chordates/ vertebrates

Abstract: To determine the short-term effects (1 to 3 years posttreatment) of fuel reduction on pileated woodpeckers (*Dryocopus pileatus*) in northeastern Oregon, we compared measures of abundance of logs, snags, stumps, and of woodpecker foraging in mixed-conifer stands that had undergone the following treatments: prescribed burning after mechanical fuel reduction, mechanical fuel reduction without prescribed burning, or no treatment. Pileated woodpecker foraging was significantly more abundant in the stands that were not treated or had mechanical fuel reduction only. Ants, the primary prey of pileated woodpeckers, were also significantly more abundant in these stands.

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1267. Short-term effects of harvest technique and mechanical site preparation on arthropod communities in jack pine plantations.

Belloq, M. Isabel; Smith, Sandy M.; and Doka, Margaret E.

Journal of Insect Conservation 5(3): 187-196. (2001)

NAL Call #: QL362.J68; ISSN: 1366-638X

Descriptors: commercial activities/ conservation measures/ ecology/ population dynamics/ land and freshwater zones/ Canada/ Arthropoda: forestry/ silvicultural practices/ habitat management/ jack pine plantations/ community structure/ population density/ Ontario, northern/ Chapeau/ arthropods/ invertebrates

Abstract: Arthropods play a key role in the functioning of forest ecosystems and contribute to biological diversity. However, the influence of current silvicultural practices on arthropod communities is little known in jack pine (*Pinus banksiana*) forests, a forest type comprising a major portion of the Canadian boreal forest. In this study, the effects of silvicultural treatments on arthropod communities were compared to identify those treatments that minimize ecological impacts on arthropods. The influence of harvesting techniques and mechanical site preparations on insect family richness and abundance of arthropods (total, by orders and by trophic groups) was examined in young (three-year-old) jack pine plantations of northern Ontario. Each of the following treatments were conducted in three plots: (1) tree length harvest and trenching; (2) full tree harvest and trenching; (3) full tree harvest and blading; and (4) full tree harvest and no site preparation. Arthropods were collected using sweepnets and pitfall traps over two years. Blading significantly reduced insect family richness, the total abundance of arthropods, abundance of Orthoptera, Heteroptera, Hymenoptera, Diptera, insect larvae, and plant feeders when compared to the other treatments. The use of either full tree or tree length harvesting had similar short-term effects on family richness and the abundance of arthropods. Arthropod diversity

declined with increasing post-harvest site disturbance. These results suggest that arthropod communities in the understory and on the ground are reduced most on sites mechanically prepared by blading, but are similar under conditions immediately following either full tree or tree length harvesting. The implications for regenerating jack pine in the boreal forest are discussed.

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1268. Short-term effects of wildfires on spotted owl survival, site fidelity, mate fidelity, and reproductive success.

Bond, Monica L.; Gutierrez, R. J.; Franklin, Alan B.; LaHaye, Williams S.; May, Christopher A.; and Seamans, Mark E.

Wildlife Society Bulletin 30(4): 1022-1028. (2002)

NAL Call #: SK357.A1W5; ISSN: 0091-7648

Descriptors: Strix occidentalis/ Strigiformes/ Strigidae/ behavior/ terrestrial ecology/ controlled burning/ forested landscapes/ habitat restoration/ mate fidelity/ reproductive success/ short-term effects/ site fidelity/ survival/ wildfires/ fires and burns/ forests/ ecosystems/ pair formation/ breeding/ productivity/ United States, Southwest/ territorial defense/ home range-territory/ environmental factors/ habitat use/ land zones/ population ecology/ reproduction/ spotted owl/ habitat change/ habitat management/ philopatry/ mortality/ territory/ mating

Abstract: The effects of wildfire on wildlife are important considerations for resource managers because of recent interest in the role of fire in shaping forested landscapes in the western United States. This is particularly true of wildfire effects on spotted owls (*Strix occidentalis*) because of the uncertainty of impacts of controlled burning within spotted owl habitat. Therefore, we documented minimum survival, site fidelity, mate fidelity, and reproductive success for 21 spotted owls after large (>540 ha) wildfires occurred within 11 owl territories in California, Arizona, and New Mexico. In each territory, fire burned through the nest and primary roost sites. Eighteen owls (86%) were known to be alive at least 1 year after the fires, which was similar to reported annual adult survival probabilities for the species. Of 7 pairs of which both members were later resighted, all were located together on the same territories during the breeding season following fires, and 4 pairs produced a total of 7 fledglings. No pair separations were observed after fire. On 8 territories where fire severities were mapped, 50% experienced predominantly low- to moderate-severity fires while 50% experienced high-severity fires that burned large (>30%) areas of the territories. We hypothesize that wildfires may have little short-term impact on survival, site fidelity, mate fidelity, and reproductive success of spotted owls. Further, prescribed burning could be an effective tool in restoring habitat to natural conditions with minimal short-term impact on resident spotted owls. While we do not advocate wholesale prescribed burning in spotted owl territories at this time, we believe our observations justify large-scale experiments on effects of prescribed burning on spotted owls to corroborate our observations and to establish cause-and-effect relationships.

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1269. Short-term response of shrews to prescribed fire and mechanical fuel reduction in a southern Appalachian upland hardwood forest.

Greenberg, Cathryn H.; Miller, Stanlee; and Waldrop, Thomas A.

Forest Ecology and Management 243(2-3): 231-236. (2007)

NAL Call #: SD1.F73; ISSN: 0378-1127

Descriptors: commercial activities/ conservation measures/ ecology/ community structure/ terrestrial habitat/ land zones/ Blarina brevicauda/ Sorex fumeus/ Sorex hoyi/ Sorex longirostris: forestry/ burning and mechanical understory reduction/ relative abundance/ habitat management/ relative abundance/ forest and woodland/ hardwood forest/ North Carolina/ Polk County/ Green River Game Land/ Mammalia, Insectivora, Soricidae/ chordates/ Insectivores/ mammals/ vertebrates

Abstract: As part of the multidisciplinary National Fire and Fire Surrogate study, we used drift fences with pitfall traps from May to September 2003 and 2004 to determine how three fuel reduction techniques affected shrews in the Southern Appalachian Mountains of North Carolina.

Ground-dwelling macroarthropods also were collected from a subset of pitfall traps to assess relative prey availability among the treatments. Four experimental units, each > 14 ha were contained within each of three replicate blocks. Treatments were (1) prescribed burning; (2) mechanical felling of shrubs and small trees; (3) mechanical felling + burning; (4) forested controls. Mechanical understory felling treatments were conducted in winter 2001-2002, and prescribed burning was conducted in March 2003. High-intensity fires and high tree mortality increased canopy openness in mechanical felling + burn treatment compared to the others. Burning reduced leaf litter depth in both the burned treatments (burn only and mechanical felling + burn), whereas mechanical understory felling alone increased leaf litter depth in that treatment. Dry biomass of ground-dwelling macroarthropods was similar among the treatments and control. We collected a total of 269 shrews of four species during 2003 and 2004, including northern short-tailed shrews (*Blarina brevicauda*), smokey shrews (*Sorex fumeus*), pygmy shrews (*S. hoyi*), and southeastern shrews (*S. longirostris*). Relative abundance of all shrews combined and pygmy shrews was lowest in the mechanical felling + burn treatment, but differed significantly only from the mechanical understory felling treatment where the contrast in leaf litter depth was high. Our results indicate that low-intensity fuel reduction treatments, with minimal change to canopy cover or leaf litter depth, have little impact on shrews. However, high-intensity disturbance, such as prescribed burning that kills trees and dramatically reduces shade and leaf litter depth, can reduce the abundance of some shrew species and all shrews combined, at least in the short term. © 2007 Published by Elsevier B.V.

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1270. Short-term responses of the small mammal communities to forest management within Missouri Ozark forest ecosystem project sites.

Fantz, Debby K. and Renken, Rochelle B.

In: Proceedings of the Second Missouri Ozark Forest Ecosystem Project Symposium: Post-treatment Results of the Landscape Experiment, General Technical Report-NC 227/ Shifely, S. R. and Kabrick, J. M.; St. Paul, MN: North

Central Forest Experiment Station, Forest Service, U.S. Department of Agriculture, 2002. pp. 161-170.

Notes: 0363-616X (ISSN).

Descriptors: conservation measures/ ecology/ terrestrial habitat/ land zones/ Mammalia: habitat management/ forest management/ small taxa/ community structure/ forest and woodland/ Missouri/ Ozarks/ Mammalia/ chordates/ mammals/ vertebrates

Abstract: We conducted a capture-recapture study on the northeast-facing slopes of the MOFEP sites in south central Missouri to determine the initial effects of even- and uneven-aged forest management on species composition, species richness, and relative abundance of the small mammal communities. We compared changes between pre-treatment (1994-1995) and post-treatment (1998-2000) measures. Species richness ranged from two to six species per site across years; eight different species were caught across all nine sites and years. Overall small mammal relative abundance estimates ranged from 0.23 to 7.75 individuals captured per 100 trap nights per site across years. Qualitative and quantitative evaluations indicate that forest management had no short-term effect on species composition or species richness, but did have an effect upon total small mammal relative abundance 2, 3, and 4 years after harvest. Even-aged management, and uneven-aged management to a lesser extent, appeared to have dampened a natural decline in small mammal relative abundance that was observed on control sites. Relative abundance estimates on treated sites were slightly higher than those on control sites.

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1271. **Silvicultural guidelines for creating and managing wildlife habitat in west-side production forests.**

Harrington, Timothy B. and Tappeiner, John C.
In: *Managing for wildlife habitat in westside production forests*, General Technical Report-PNW 695; Portland, OR: Pacific Northwest Research Station, Forest Service, U.S. Department of Agriculture, 2007. pp. 49-59.
http://www.fs.fed.us/pnw/pubs/pnw_gtr695.pdf

Descriptors: wildlife management: conservation/ germination/ spatial arrangement/ competition control/ wildlife habitat management/ sprouting/ planting/ west side production forest/ rhizome expansion

Abstract: Conventional silvicultural treatments (planting, competition control, and thinning) are being considered as techniques for creating and managing wildlife habitat in Westside production forests of the Pacific Northwest. These methods can be used to diversify forest structure (i.e., species, size, age, and spatial arrangement of trees and other vegetation) and facilitate development of old-forest characteristics. Pre-treatment planning is essential for identifying management intensities appropriate for a given area, retaining existing structural elements, or providing conditions for development of new structural elements. Hardwoods and shrubs from the pre-harvest stand can be managed for habitat within a new conifer plantation if they are given sufficient growing space. Conifer seedlings can be established successfully under low overstory densities, but their growth can be strongly reduced by competition from overstory trees and understory vegetation. Combining thinning and moderate soil disturbance during harvest will create favorable conditions for germination, sprouting, and rhizome expansion of understory species. Thinning will result in a heterogeneous forest structure if it is applied

with uneven spacing and retains minor species, standing dead trees, and pockets of tree regeneration. Site-specific characteristics, such as rootrot pockets, soil and topographic variability, and potential for wind damage, should be considered when designing a thinning treatment. The inherent productivity of a forest site will determine the rate at which a diverse stand structure will develop; however, some characteristics of old forests (large cavities in snags, high abundance of coarse woody debris, and nesting platforms on large limbs) will take decades to develop.

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1272. **Silvicultural practices and management of habitat for bats.**

Guldin, James M.; Emmingham, William H.; Carter, Andrew; and Saugey, David A.
In: *Bats in Forests: Conservation and Management*/ Lacki, M. J.; Hayes, J. P.; and Kurta, A.
Baltimore, MD: Johns Hopkins University Press, 2007.
Notes: Literature review; 0801884993 (ISBN).

Descriptors: commercial activities/ conservation measures/ terrestrial habitat/ land zones/ Chiroptera: forestry/ silvicultural practice/ habitat management/ forest habitat management/ forest and woodland/ forest habitat management related to silvicultural practice/ North America/ Mammalia/ Bats/ chordates/ mammals/ vertebrates

Abstract: In the twenty-first century, we expect that the practice of silviculture will broaden to increasingly encompass ecosystem-based goals such as restoration and enhancement of habitat for desired plant and animal species and communities. The array of reproduction cutting methods, re-generation treatments, and intermediate treatments that constitute a silvicultural system can be configured to meet the habitat requirements of bats. The choices among overall reproduction cutting methods, and between even-aged and uneven-aged methods, have implications for bats, especially with regard to roosting and the management of foraging habitat. Special attention needs to be focused on creating and retaining structural and legacy features such as relict trees and snags. Once the type, amount, and distribution of such features are known, they can be incorporated into a variety of silvicultural systems. To satisfy management objectives for species whose habitat requirements transcend individual stands, the forester should plan silvicultural practices in concert across stands and, increasingly, across ownerships. There are some important hurdles to implementing bat-friendly silviculture. Foremost for bat biologists will be the definition and quantification of those attributes that are of value to bats. Once those needs are understood, biologists and silviculturists can work together to develop prescriptions that meet the needs of bats in forests. The challenge for biologists is to learn as much as possible about roosting, foraging, and other habitat requirements for the bat species of interest. The challenge for silviculturists working with biologists concerned about bats is to incorporate ways to satisfy habitat requirements of bats while meeting other forest management objectives.

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1273. **Silvicultural treatments for enhancing and recruiting spotted owl habitat in British Columbia.**

D'Anjou, Brian; Parish, Roberta; and Waterhouse, Louise
Vancouver Forest Region Forest Research Technical Report TR-033: 1-36. (2006).

Notes: Literature review.

<http://www.for.gov.bc.ca/rco/research/silvreports/tr033.pdf>

Descriptors: commercial activities/ conservation measures/ nutrition/ diet/ ecology/ habitat utilization/ terrestrial habitat/ land zones/ North America/ Canada/ *Strix occidentalis caurina*: forestry/ silviculture/ habitat management/ silvicultural management techniques/ prey/ habitat preference/ forest and woodland/ old growth forest/ British Columbia/ old growth forest availability/ silvicultural techniques/ habitat enhancement/ Aves, Strigiformes, Strigidae/ birds/ chordates/ vertebrates

Abstract: British Columbia forms the northern periphery of the Northern Spotted Owl's habitat (*Strix occidentalis caurina*); this owl is an endangered species that depends on old-growth forest for its survival and reproduction. Stand-level definitions, which are based on Washington State research, describe two classes of Spotted Owl habitat: superior quality habitat (Type A) which is appropriate for nesting, foraging, roosting, and dispersing; and moderate quality habitat (Type B) which is unsuitable for nesting but appropriate for other owl activities. Spotted Owl Management Plans have identified the need to create new suitable habitats and enhance existing ones within permanent Special Reserve Management Zones. This report reviews how forest structure in British Columbia provides habitat for the Spotted Owl and its primary prey. It also reviews the harvesting systems that are proposed for creating stands containing Spotted Owl habitat, and it summarizes field reviews of partial harvesting and heavy volume removal approaches that would integrate timber harvesting opportunities while meeting objectives for owl habitat. Preliminary TASS modelling was used to project outcomes of harvesting and silvicultural practices on indicators of owl habitat quality, and results are provided. This report identifies opportunities to improve development of harvest systems and silvicultural treatments for developing Spotted Owl habitat.

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1274. **Similarities and differences between harvesting- and wildfire-induced disturbances in fire-mediated Canadian landscapes.**

Lecomte, N.; Simard, M.; Asselin, H.; Nappi, A.; Noel, J.; and Bergeron, Y.

NCASI Technical Bulletin(924): 1-64. (2006);
ISSN: 08860882.

Notes: Literature review.

Descriptors: biodiversity/ clearcut/ coarse woody debris/ compound disturbance/ disturbance regime/ forest productivity/ harvesting landscape/ landscape composition/ landscape configuration/ Salvage logging/ scientific soil nutrients/ soil organic matter

Abstract: For decades, many have hypothesised that the effects of harvesting and wildfire differed significantly and that this would have significant effects on ecosystem processes and biodiversity. However, it is only recently that an appreciable amount of scientific data has emerged on this topic. In this report, we present our review of the similarities and differences between the ecological effects of fire- and harvesting-induced disturbances that have been

noted in the scientific literature. Comparisons of the effects of these disturbances on numerous forest attributes (coarse woody debris, soil nutrients, productivity, plant diversity, wildlife response) are presented at two distinct spatial scales: stand and landscape. At the stand scale, our review noted significant differences between harvesting and wildfire early after disturbance. Structurally, young post-fire stands are characterized by more snags, less downed woody debris, and significantly thinner forest floors than logged sites. Additionally, while both disturbances generate a pulse of extractable nutrients, the intensity of the pulse is greater after wildfire than clearcut harvesting and an increase in soil pH is observed after fire as opposed to little change or a slight decrease after harvesting. Early after disturbance, biodiversity elements significantly differ between burned and logged sites. Dissimilar understory vascular and non-vascular communities generally colonize burned and logged sites, although differences are usually a question of abundance rather than species absence/presence. As compared to fire, faunal assemblages, be it mammals, invertebrates or birds, all seem to respond differently to harvesting. Among these faunal groups, species specifically associated with snags were the most likely to show a contrasting response to harvesting- and wildfire-induced disturbances. Tree species respond differently to fire- and harvesting-induced disturbances, with harvesting favouring the establishment of deciduous species (notably trembling aspen, *Populus tremuloides*) and of coniferous tree species not adapted to fire such as balsam fir (*Abies balsamea*). Furthermore, there are commonly more residual deciduous trees in clearcuts than in fires. Because of this and the differential response of tree species to these two types of disturbances, divergent successional patterns with respect to overstory tree species compositions can be observed in burned and harvested stands. While we noted some variability among studies, stand and tree productivity are generally similar in burned and logged sites. When the effects of harvesting- and wildfire-induced disturbances are compared at longer temporal scales, our review noted that most forest attributes that were reported as dissimilar early after disturbance converged a few decades post-disturbance. Nonetheless, thicker forest floors observed after logging as compared to fire appear to persist numerous decades after disturbance. Additionally, while faunal communities do become less different as time passes, late in succession, some species present in burned stands are either significantly less abundant or absent in similarly aged logged stands. Finally, several studies warn that while the effects of wildfire- and harvesting-induced disturbances do not significantly differ after a few decades, there is some concern about the ability of harvesting-induced disturbances to recreate the full range of natural variability observed during post-fire stand succession. Unfortunately, little research has compared the effects of alternative silvicultural interventions (partial retention, partial cutting, etc.) or site preparation techniques (controlled burning, scarification, etc.) to the effects of wildfires. However, the few studies comparing the effects of post-logging control burns and different levels of retention indicate that these practices may attenuate some of the differences observed early after disturbance. Our review indicates that as compared to wildfire alone, salvage logging can have significant effects on ecological processes, biological legacies and the abundance of species commonly encountered only after fire. Removal of

fire-killed trees can affect tree regeneration, understory composition, the abundance and distribution of dead wood, wildlife habitat, and soil properties. Nonetheless, many of these effects are site-specific; hence, additional investments in research are needed to support management decisions and policy development. At the landscape scale, the main difference between fire and harvesting regimes is the distribution of stand age classes. The proportion of stands older than the rotation period (usually 100 yrs) tends toward zero under a fully regulated harvesting regime, while it is around 35% under a fire regime of similar rotation period. This fundamental difference results in a significant loss of advanced seral stage forests in managed landscapes, thereby affecting organisms that are primarily associated with such stands. Interestingly, since harvesting-induced disturbances are unable to recreate the conditions commonly found in young burned stands, landscapes under the influence of harvesting will also be characterized by a reduction of stands capable of replacing the ecological role of young burned stands within landscapes. Unfortunately, only a few studies have empirically compared the effects of wildfire and harvesting at the landscape scale under similar rotation periods. Nonetheless, research demonstrates that fires usually produce more heterogeneous landscapes than clearcuts, with more remnant islands. Fires are also more complex in shape, and have edges that are more gradual than clearcuts. In conclusion, our review reveals two main challenges faced by forest managers in order to generate similar ecological effects as produced by fire. First, managers need to improve management practices in order to minimize the differences observed between young post-harvest stands and young post-fire stands, particularly with respect to coarse woody debris and soil conditions. Second, managers need to maintain some areas with the tree species composition and structural attributes characteristic of over-mature fire-origin stands. Such stands can occupy a significant portion of fire-mediated landscapes. This may necessitate lengthening the rotation period of a certain proportion of stands within managed landscapes or may require the application of alternative harvesting methods that can recreate the structure and tree composition characteristic of advanced serai stage stands. This review concludes by identifying future research needs that might help meet these challenges. © 2006 by the National Council for Air and Stream Improvement, Inc. © 2008 Elsevier B.V. All rights reserved.

1275. **Simulated adaptive management for timber and wildlife under uncertainty.**

Hughell, David A. and Roise, Joseph P.
In: Seventh Symposium on Systems Analysis in Forest Resources, General Technical Report-NC 205/
Vasievich, J. M.; Fried, J. S.; and Leefers, L. A., eds.; St. Paul, MN: North Central Forest Experiment Station, Forest Service, U.S. Department of Agriculture, 2000. pp. 130-134.
Notes: 0363-616X (ISSN); Conference held 1997 May 28-31 in Traverse City, MI; General Technical Report NC-205; North Central Forest Experiment Station.
<http://www.ncrs.fs.fed.us/pubs/gtr/other/gtr-nc205/pdffiles/p56.pdf>
Descriptors: commercial activities/ conservation measures/ land and freshwater zones/ *Picoides borealis*/ habitat management/ United States/ forestry management/ behavior simulation models/ coupling/ *Picidae*/ *Piciformes*/

Aves/ birds/ chordates/ vertebrates

Abstract: A spatially explicit stochastic behavior simulation model for the endangered red-cockaded woodpeckers (*Picoides borealis*) is coupled with a forest management optimization algorithm to simulate adaptive (feedback) management within an uncertain environment. To update the adaptive forest harvest schedule in a timely manner during each management planning period, a genetic algorithm heuristic is employed. This model is used to evaluate management policies for the production of timber and red-cockaded woodpeckers.

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1276. **Simulated effects of forest management alternatives on landscape structure and habitat suitability in the midwestern United States.**

Shifley, S. R.; Thompson, F. R.; Dijak, W. D.; Larson, M. A.; and Millsbaugh, J. J.
Forest Ecology and Management 229(1-3): 361-377. (2006)
NAL Call #: SD1.F73; ISSN: 03781127.
Notes: doi: 10.1016/j.foreco.2006.04.030.
Descriptors: coarse woody debris/ disturbance/ fire/ habitat suitability index/ LANDIS/ oak-hickory/ Ozark Highlands/ simulation/ timber harvest/ wildlife/ wind
Abstract: Understanding the cumulative effects and resource trade-offs associated with forest management requires the ability to predict, analyze, and communicate information about how forest landscapes (1000s to >100,000 ha in extent) respond to silviculture and other disturbances. We applied a spatially explicit landscape simulation model, LANDIS, and compared the outcomes of seven forest management alternatives including intensive and extensive even-aged and uneven-aged management, singly and in combination, as well as no harvest. We also simulated concomitant effects of wildfire and windthrow. We compared outcomes in terms of spatial patterns of forest vegetation by age/size class, edge density, core area, volume of coarse woody debris, timber harvest, standing crop, and tree species composition over a 200-year simulation horizon. We also used habitat suitability models to assess habitat quality for four species with diverse habitat requirements: ovenbird (*Seiurus aurocapilla*), prairie warbler (*Dendroica discolor*), hooded warbler (*Wilsonia citrina*), and gray squirrel (*Sciurus carolinensis*). Management alternatives with similar levels of disturbance had similar landscape composition but different landscape patterns. The no-harvest scenario resulted in a tree size class distribution that was similar to scenarios that harvested 5% of the landscape per decade; this suggests that gap phase replacement of senescent trees in combination with wind and fire disturbance may produce a disturbance regime similar to that associated with a 200-year timber rotation. Greater harvest levels (10% per decade) resulted in more uniform structure of small or large patches, for uneven- or even-aged management, respectively, than lesser levels of harvest (5% or no harvest); apparently reducing the effects of natural disturbances. Consequently, the even-aged management at the 10% level had the greatest core area and least amount of edge. Habitat suitability was greater, on average, for species dependent on characteristics of mature forests (ovenbird, gray squirrel) than those dependent on disturbance (prairie warbler, hooded warbler) and habitat suitability for disturbance dependent species was more sensitive to the management alternatives. The approach

was data-rich and provided opportunities to contrast the large-scale, long-term consequences for management practices from many different perspectives. [Crown Copyright © 2006.]
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1277. Sixth-year results following partial cutting for timber and wildlife habitat in a mixed oak-sweetgum-pine stand on a minor creek terrace in southeast Louisiana.

Lockhart, B. R. and Linnartz, N. E.
Proceedings of the Eleventh Biennial Southern Silvicultural Research Conference: 209-213. (2002).
Notes: USDA Forest Service General Technical Report Southern Research Station no. SRS-48.
http://www.srs.fs.usda.gov/pubs/gtr/gtr_srs048/article/gtr_srs048-lockhart01.pdf

Descriptors: basal area/ botanical composition/ bottomland forests/ diameter/ forest management/ forests/ growth/ habitats/ increment/ mixed forests/ pines/ silviculture/ species richness/ stand structure/ thinning/ wetlands/ wildlife conservation/ wildlife management/ Liquidambar styraciflua/ Pinus/ Quercus
Abstract: Hardwood management has primarily focused on highly productive river bottom and upland sites. Less is known about hardwood growth and development on terrace sites. Such sites are usually converted to other uses, especially pine [Pinus] plantations. The objectives of this study, implemented in a mixed oak [Quercus]-sweetgum [Liquidambar styraciflua]-pine stand in a minor creek terrace in southeast Louisiana, USA, were to describe changes in stand composition and structure following partial cutting for 3 different management objectives: (1) maximize timber production; (2) maximize wildlife habitat; and (3) improve timber production and wildlife habitat. Stand composition in 1985 prior to treatment was heavy to oak (72% based on importance values) compared to sweetgum (10%) and pine (16%). Greater diameter growth occurred in the treated plots compared to control 6 years after cutting. Diameter growth differences were also found between crown classes and species groups. Few differences were found in basal area growth between the treatments and the controls while stocking in the treated plots increased relative to the controls. Results indicate that hardwoods will respond to partial cutting on terrace sites, making hardwood or mixed pine-hardwood management options viable.

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1278. Small mammal and herpetile community responses to prescribed burning and selective herbicide (imazapyr) treatments in thinned, mid-rotation loblolly pine plantations in Mississippi.

Carroll, Austin David. Mississippi State University, 2004.
Notes: Advisor: Leopold, Bruce D.; Miller, Darren A.; Thesis/ Dissertation

Descriptors: agriculture/ forestry/ wildlife/ United States, prescribed fire/ loblolly pine/ Mississippi/ small mammals/ herpetile community/ abundance
Abstract: Forest managers of pine plantations in the southeastern United States have used prescribed fire and herbicides extensively for non-pine vegetation control. This study used 6 replicate stands, containing 4, 10-ha treatment plots randomly assigned one of 4 treatments (herbicide, prescribed burning, herbicide followed by

prescribed burning, and control) that were previously established within thinned, mid-rotation loblolly pine stands in Mississippi. Small mammal and herpetile abundance, diversity, and richness 2 to 3 years post-treatment was examined. Vegetation structure, microhabitat characteristics at traps, and environmental conditions were correlated with treatments and mean capture rates using ordination analyses. Results indicated small mammal and herpetile community metrics (richness and diversity) generally were not affected by changes in vegetation, yet individual species responses were related to the aforementioned ordination variables. A mosaic of habitat types including rotationally burned and no-treatment areas would provide habitat for small mammal and herpetile species with differing life history requirements.
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1279. Small mammal and herpetile response to mid-rotation pine management in Mississippi.

Hood, Sybil A.; Miller, Darren A.; Leopold, Bruce D.; and Burger, L. Wes

Proceedings of the Annual Conference Southeastern Association of Fish and Wildlife Agencies 56: 171-186. (2002)

NAL Call #: SK1.S6; ISSN: 0276-7929

Descriptors: commercial activities/ terrestrial habitat/ abiotic factors/ chemical factors/ physical factors/ land zones/ Reptilia: forestry/ midrotation pine management/ community structure/ forest and woodland/ pine plantation/ fertilizers and pesticides/ herbicide application/ fire/ burning/ Mississippi/ Kemper County/ Amphibia/ amphibians/ chordates/ mammals/ reptiles/ vertebrates

Abstract: Prescribed burning and/or herbicide applications are performed in managed pine (Pinus spp.) forests to control non-pine vegetation. Little research has examined small mammal or herpetile community response to these treatments in mid-rotation pine stands. Therefore, our objective was to determine prescribed burning and herbicide treatments effects on small mammal and herpetile communities within mid-rotation pine plantations in Mississippi. We established 4 treatments (herbicide only, herbicide/burn, burn only, control) with 6 replicates within thinned, mid-rotation (18-22 years old) loblolly pine (P. taeda) stands. We applied 697-872 m¹/ha of Arsenal herbicide during September 1999 and conducted prescribed burning during January 2000. We captured small mammals and herpetiles to examine abundance, richness, and diversity as related to habitat conditions before and 2 years after treatment. We captured 15 species of small mammals and 21 species of herpetiles. Use of a skidder for herbicide application may have reduced small mammal richness and diversity during the first winter after treatment. Overall species diversity and richness did not differ between the pre-treatment growing season and the first year post-treatment growing season. However, small mammals, particularly peromyscids, generally responded favorably to burning and burning with herbicide treatments the first and second growing seasons after treatment. Treatments in mid-rotation pine plantations that maintain early successional vegetation and open canopy structure should be beneficial to small mammal and herpetile communities, although more years of post-treatment response are needed to make definitive management recommendations.

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1280. Small mammal communities of streamside management zones in intensively managed pine forests of Arkansas.

Miller, D. A.; Thill, R. E.; Melchior, M. A.; Wigley, T. B.; and Tappe, P. A.

Forest Ecology and Management 203(1-3): 381-393. (2004)
NAL Call #: SD1.F73; ISSN: 03781127.

Notes: doi: 10.1016/j.foreco.2004.08.007.

Descriptors: Akaike's information criterion/ Arkansas/ intensive forestry/ pine plantations/ riparian zones/ small mammals/ ecology/ hardwoods/ water quality/ habitat diversity/ streamside management zones (SMZ)/ wildlife communities/ community structure/ relative abundance/ species diversity/ wildlife management/ Ouachita Mountains/ *Blarina brevicauda*/ *Blarina carolinensis*/ *Carolinensis*/ *Cricetinae*/ *Mammalia*/ *Ochrotomys nuttalli*/ *Peromyscus*/ *Riparia*/ *Soricidae*

Abstract: Streamside management zones (SMZs), composed primarily of hardwoods in the southeastern United States, provide habitat diversity within intensively managed pine (*Pinus* spp.) plantations. However, effects of SMZ width and adjacent plantation structure on riparian wildlife communities are poorly understood. Therefore, during 1990-1995, we examined small mammal communities within 5 SMZ width classes (1-20 to >100 m) embedded within three types of pine plantations (young, open canopy; closed canopy; and thinned) and three natural riparian stands in the Ouachita Mountains of Arkansas, USA. We captured small mammals for 10 consecutive days each February using four to six traplines each consisting of nine trap stations with three snap traps at each station. We estimated relative abundance [catch-per-unit-effort (CPUE)], species richness, species diversity, and species evenness for all captures and captures just along the stream course. Within the SMZ/plantation settings and three natural stands, we captured 1701 small mammals of 11 species in 114,285 trapnights. Golden mice (*Ochrotomys nuttalli*), southern short-tailed shrews (*Blarina carolinensis*), and *Peromyscus* spp. comprised 88% of all captures. Our study suggests that narrow (≤ 20 m wide) SMZs in managed pine forests tend to have higher small mammal abundance and species richness than wider SMZs. Additionally, species richness and CPUE was greater in SMZs within young, open canopy and thinned plantations versus closed canopy plantations. Plantation structure appears to influence small mammal community structure within SMZs more than SMZ width. Shortening the amount of time plantations spend in closed canopy conditions would likely improve habitat conditions for small mammals existing in SMZs within intensively managed pine landscapes. Streamside management zones in the South designed to meet voluntary water quality standards are likely sufficient for small mammal conservation.

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1281. Small mammal population and habitat responses to forest thinning and prescribed fire.

Converse, S. J.; Block, W. M.; and White, G. C.

Forest Ecology and Management 228(1-3): 263-273. (2006)
NAL Call #: SD1.F73; ISSN: 03781127.

Notes: doi: 10.1016/j.foreco.2006.03.006.

Descriptors: forest restoration/ *Neotoma mexicana*/ *Peromyscus maniculatus*/ *Pinus ponderosa*/ population density/ *Spermophilus lateralis*/ *Tamias cinereicollis*

Abstract: We examined changes in small mammal habitat and densities of four small mammal species, including deer mice (*Peromyscus maniculatus*), gray-collared chipmunks (*Tamias cinereicollis*), golden-mantled ground squirrels (*Spermophilus lateralis*), and Mexican woodrats (*Neotoma mexicana*), 2-3 years after thinning and prescribed fire treatments in ponderosa pine (*Pinus ponderosa*) forests of northern Arizona, US. These treatments were designed to simultaneously reduce high-severity fire risk while returning forests to conditions more representative of pre-European settlement structure and function. Treatments resulted in changes in important components of small mammal habitat, including increased herbaceous vegetation, decreased shrub density, and decreased woody debris. Deer mouse densities were negatively related to tree densities. Gray-collared chipmunks were negatively affected by treatment, negatively related to tree density, and positively related to woody debris. Golden-mantled ground squirrels did not appear to vary strongly with either treatment or treatment-related habitat changes, but appeared to be somewhat positively related to shrub cover. Mexican woodrats were positively related to shrub cover, and were positively, but weakly, related to woody debris. Overall, forest thinning can be expected to increase densities of small mammals in these forests, and retention of slash in fuel reduction/restoration treatments may further increase small mammal densities in the post-treatment community. However, reduction of shrubs and woody debris with overly frequent prescribed fire entries may reduce small mammal densities.

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1282. Small-mammal responses to pine regeneration treatments in the Ouachita Mountains of Arkansas and Oklahoma, USA.

Perry, Roger W. and Thill, Ronald E.

Forest Ecology and Management 219(1): 81-94. (2005)
NAL Call #: SD1.F73; ISSN: 0378-1127

Descriptors: commercial activities/ conservation measures/ ecology/ community structure/ population dynamics/ terrestrial habitat/ land zones/ *Mammalia*: forestry/ small taxa abundance/ montane forests/ pine regeneration treatments/ habitat management/ relative abundance/ population density/ forest and woodland/ montane forests/ small taxa abundance related to pine regeneration treatments/ mountain habitat/ Arkansas/ Ouachita Mountains/ Oklahoma/ *Mammalia*/ *chordates*/ mammals/ vertebrates

Abstract: We compared the initial effects of four forest regeneration treatments (single-tree selection, group selection, shelterwood, and clearcut), and unharvested controls (mature, second-growth forest) on relative abundance of small mammals and small-mammal habitat throughout the Ouachita Mountains of western Arkansas and eastern Oklahoma. We compared small-mammal capture rates in 20 forest stands (4 replicates of 5 treatments) for 2 years prior to harvest treatments, and 1.5, 3.5, and 5.5 years after treatment. We also examined relationships among small mammals, treatments, and habitat conditions. Before harvest, all stands where characterized by high basal areas (BA), little understorey vegetation, and low small-mammal capture rates. Compared with pre-harvest numbers, the number of individuals captured increased nearly five-fold in treated stands 1.5 years after harvest. After harvest, capture rates

for all taxa combined were significantly greater in harvested stands (regardless of treatment) than in unharvested controls. Fulvous harvest mice (*Reithrodontomys fulvescens*) capture rates were greatest in clearcuts. Fulvous harvest mice, cotton rats (*Sigmodon hispidus*), and pine voles (*Microtus pinetorum*) were associated with abundant herbaceous vegetation in the understory and low BA. Eastern woodrats (*Neotoma floridana*), golden mice (*Ochrotomys nuttalli*), and *Peromyscus* spp. were associated with moderate to dense woody vegetation in the understory and intermediate BA levels. No taxon of terrestrial small mammal was captured exclusively in unharvested stands; most taxa we captured appear to be either disturbance-adapted or tolerant to disturbances from timber harvest. Published by Elsevier B.V.
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1283. Small mammal responses to silvicultural and precipitation-related disturbance in northeastern Missouri riparian forests.

Elliott, A. G. and Root, B. G.

Wildlife Society Bulletin 34(2): 485-501. (2006)

NAL Call #: SK357.A1W5; ISSN: 0091-7648

Descriptors: flooding/ forest litter/ forest management/ forests/ precipitation/ riparian forests/ silviculture/ small mammals/ species richness/ *Blarina brevicauda*/ *Microtus*/ *Peromyscus*/ *Sorex*

Abstract: Information about factors influencing forest floor small mammals of midwestern riparian forests in agriculture-dominated areas is necessary for improved forest management. We determined occurrence and capture rates of forest floor small mammal taxa at 4 riparian forests in northeastern Missouri, USA, during 1995-2002. We modelled the effects of year, study site, and precipitation (flooding) on relative abundance of commonly captured taxa. We also evaluated changes in the species assemblage and capture rates resulting from silvicultural treatments (clearcut, basal area retention, and unharvested) at a 215-ha forest tract. We captured 12 taxa of forest floor small mammals, of which 10 were captured at all sites. The species assemblages were dominated by habitat generalists, such as *Peromyscus* spp. and *Sorex* spp. Among-year variation in capture rates was large for all common taxa. Precipitation amounts during spring and summer were negatively correlated with relative abundances of several forest floor small mammal taxa. We measured few changes in taxonomic composition or abundances of forest floor small mammals in response to silvicultural treatments. There was some indication that *Peromyscus* spp. and short-tailed shrew (*Blarina brevicauda*) abundance decreased in areas where treatments increased fragmentation, but among-year differences accounted for more variation than treatment effects. We suggest that small mammal assemblages in fragmented midwestern riparian forests are dominated by habitat generalists and their abundances are primarily affected by variability in environmental conditions (especially flooding during the breeding season). Silvicultural treatments may have minimal effects on taxonomic composition or abundance, as long as forests are allowed to regenerate, mature forest blocks are maintained, and other important factors (e.g., hydrology) are not altered.

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1284. Small mammal responses to thinning and wildfire in ponderosa pine-dominated forests of the southwestern United States.

Converse, S. J.; White, G. C.; and Block, W. M.

Journal of Wildlife Management 70(6): 1711-1722. (2006)

NAL Call #: 410 J827; ISSN: 0022541X.

Notes: doi: 10.2193/0022-541X(2006)70

[1711:SMRTTA]2.0.CO;2.

Descriptors: biomass/ effective trapping area/ fire surrogate/ mark-recapture/ model selection/ *Peromyscus*/ population density/ small mammals/ *Tamias*/ thinning/ weighted regression/ wildfire

Abstract: As part of a national experiment, the Fire and Fire Surrogate Project, we evaluated the effects of forest thinning on small mammal population densities and total small mammal biomass in ponderosa pine (*Pinus ponderosa*) - dominated forests at 2 study areas in northern Arizona and northern New Mexico, USA. We also evaluated the effects of wildfire on small mammal population densities and biomass after a wildfire burned a portion of one study area. Our statistical methods consisted of estimation of population densities in combined analyses across space and time, followed by a weighted regression analysis of treatment effects on densities. We hypothesized that habitat change postdisturbance would be the critical determinant of population responses to thinning and wildfire within 1 year of disturbances. Our results largely supported this hypothesis, as we documented predicted positive responses to thinning for deer mice (*Peromyscus maniculatus*), gray-collared chipmunks (*Tamias cinereicollis*), and least chipmunks (*T. minimus*). We also observed predicted positive responses to wildfire for deer mice, although our results did not support predicted negative responses to wildfire for least chipmunks. Total small mammal biomass generally increased following both thinning and wildfire. Our results suggest that fuel reduction treatments will have the largest positive impact on small mammal populations in areas where tree densities are especially high.

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1285. Small mammals and forest fuel reduction: National-scale responses to fire and fire surrogates.

Converse, S. J.; White, G. C.; Farris, K. L.; and Zack, S.

Ecological Applications 16(5): 1717-1729. (Oct. 2006)

NAL Call #: QH540.E23

Descriptors: forest fires/ fire hazard reduction/ prescribed burning/ forest thinning/ animal ecology/ small mammals/ forest habitats/ wildlife habitats/ population density/ population ecology/ *Tamias*/ *Spermophilus*/ *Peromyscus*/ wildlife management/ Alabama/ Florida/ United States, western region/ forest fuel reduction/ National Fire And Fire Surrogate Project/ natural resources/ ecology/ wildlife conservation/ forest fire management

This citation is from AGRICOLA.

1286. Small mammals as bioindicators of sustainable boreal forest management.

Pearce, Jennie and Venier, Lisa

Forest Ecology and Management 208(1-3): 153-175. (2005)

NAL Call #: SD1.F73; ISSN: 0378-1127

Descriptors: commercial activities/ conservation measures/ ecology/ habitat utilization/ terrestrial habitat/ land zones/ North America/ Canada/ Mammalia: forestry/ sustainable boreal forest management/ small taxa evaluation as

bioindicators/ habitat management/ population dynamics/
Bioindicators of sustainable boreal forest management/
small taxa evaluation/ habitat preference/ environmental
indicators/ forest and woodland/ boreal forest/ Bioindicators
of sustainable forest management/ Ontario/ White River
area/ Mammalia/ chordates/ mammals/ vertebrates

Abstract: Small mammals such as mice and voles have potential as indicators of sustainable forest management. They have an important functional role in forests, they are economically important as prey for furbearer populations, and they respond to disturbance in a characteristic manner. In Ontario, Canada, several small mammal species have been suggested as bioindicators. However, strong year-to-year variation in population levels independent of forest disturbance means that very long time frames would be required to detect trends. Models of habitat supply have been suggested as a method of monitoring small mammals. We explore the feasibility of monitoring structural measurements and habitat supply for small mammal species using an area near White River, Ontario, Canada, as a case study. Small mammals were surveyed in the region for 3 years, and associations with mapped and stand level habitat attributes examined. Thirteen species were recorded, but only five species were recorded in sufficient numbers for habitat associations to be examined. The deer mouse and red-backed vole were recorded from all mature forest habitats, although both were more prevalent in mixedwood stands. Red-backed vole abundance was linearly related to stand age and the volume of downed logs. Deer mice were most abundant in recently clearcut stands, with abundance declining sharply in 5-15-year-old stands. They were also abundant in mature forest, where they were significantly associated with downed wood volume. Vegetation complexity was also significant for both species. Habitat supply maps for both species could be readily developed, and structural attributes modified by forest practices were important. However, strong year-to-year variation in the abundance of both species in mature forest prevented carrying capacities from being reliably assigned to habitat supply maps. Thus, while relative changes in the availability of high, medium and low quality habitat are identifiable, expected changes in minimum population size cannot be inferred. The effect of cumulative disturbances on the quality of available habitat is also unknown. Without this information, change in habitat supply cannot be used to assess the sustainability of forest management actions. We suggest that dynamic landscape meta-population (DLMP) models may provide one solution, and require further exploration as a sustainability assessment tool. © 2004 Elsevier B.V. All rights reserved.
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1287. Small mammals in agricultural landscapes of Prince Edward Island (Canada): Effects of habitat characteristics at three different spatial scales.

Silva, Marina; Hartling, Leslie; and Opps, Sheldon B.
Biological Conservation 126(4): 556-568. (2005)
NAL Call #: S900.B5; ISSN: 0006-3207
Descriptors: biogeography: population studies/ terrestrial ecology: ecology, environmental sciences/ biodiversity/ wildlife management: conservation/ species richness/ habitat fragmentation/ microhabitat/ agricultural landscape/ macrohabitat/ habitat characteristic effect/ landscape spatial scale

Abstract: We examined the influence of habitat characteristics at the microhabitat, macrohabitat, and landscape spatial scales on small mammals occurring in 12 forest patches within four agricultural landscapes of Prince Edward Island (Canada). Landscape features were important determinants of small mammal variables at all levels, but especially at the community level, whereas microhabitat characteristics tended to influence small mammals at the population level. Macrohabitat characteristics had only minor effects on small mammals occurring in our study sites. Species richness was most strongly influenced by patch area, reaching a threshold at forest patches of roughly 8-10 ha. The proportions of both forest and hedgerow cover within 400 m from the study site were also significant determinants of small mammals species diversity, possibly reflecting their ability to perceive suitable habitats, forage in areas outside the forest patches, and/or disperse in agricultural landscapes. At least one small mammal species (*Napaeozapus insignis*) benefitted from the presence of agricultural fields at distances up to 1000 m. *Tamias striatus* benefitted from the presence of hedgerow cover within 400 m from forest patches, possibly allowing them to move between forest patches. Clearly, the maintenance of forest patches of 8-10 ha and of forest cover within 400 m from them is fundamental for the conservation of small mammals inhabiting agricultural landscapes on the Island. Conservation strategies should also consider the establishment of more effective regulations to prevent and/or reduce hedgerow removal on Prince Edward Island. © 2005 Elsevier Ltd. All rights reserved.

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1288. Snag density and use by cavity-nesting birds in managed stands of the Black Hills National Forest.

Spiering, D. J. and Knight, R. L.
Forest Ecology and Management 214(1-3): 40-52. (2005)
NAL Call #: SD1.F73; ISSN: 03781127.
Notes: doi: 10.1016/j.foreco.2005.03.054.
Descriptors: Black Hills/ cavity-nesting birds/ managed forests/ *Pinus ponderosa*/ ponderosa pine/ snags/ biodiversity/ data acquisition/ surveys/ snag density/ snag variables/ forestry/ habitat use/ United States/ Aves/ *Parus atricapillus*/ *Picoides villosus*/ *Poecile atricapillus*/ *Sitta canadensis*
Abstract: We examined whether cavity-nesting bird abundance was related to the density of snags in managed ponderosa pine stands (*Pinus ponderosa* Laws.) on the Black Hills National Forest. We also examined whether snag variables were related to bird use of snags as nest sites and for foraging. Study plots (n = 144 plots) were established throughout the forest in managed ponderosa pine stands and data on the density, size, and condition of 2886 snags were collected. We searched snags for cavities and signs of foraging, and surveyed plots for cavity-nesting birds (n = 272 counts). Nine species of cavity-nesting birds were detected, with red-breasted nuthatch (*Sitta canadensis*), black-capped chickadee (*Poecile atricapillus*), and hairy woodpecker (*Picoides villosus*) occurring most frequently. The mean number of cavity-nesting birds at a plot was independent of snag density or other plot variables. Larger DBH and greater snag height were positively associated with the presence of a cavity, and advanced stages of decay and the presence of a broken

top were negatively associated with the presence of a cavity. Snags in larger DBH size classes had more evidence of foraging than expected based on abundance. Combining the data on the presence of a cavity and evidence of foraging, snags with large DBH were used most by cavity-nesting birds. Our study found no relationship between the number of cavity-nesting birds and snag density across the range of snag densities, snag sizes, and snag conditions measured. However, the densities of large snags may have been too low to influence the abundance of cavity-nesting birds, limiting our ability to detect such an effect.

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1289. **Snags, cavity-nesting birds, and silvicultural treatments in western Oregon.**

Walter, S. T. and Maguire, C. C.

Journal of Wildlife Management 69(4): 1578-1591. (2005)

NAL Call #: 410 J827; ISSN: 0022541X

Descriptors: cavity-nesting birds/ Douglas-fir/ Green-tree retention/ Oregon Coast range/ Pseudotsuga menziesii/ snags

Abstract: We examined cavity-nesting bird use of natural snags (n = 221) and 10- to 12-year-old snags (n = 836) created by topping mature conifers in 3 silvicultural treatments (group-selection cuts, 2-story regeneration harvests, clearcuts with retained trees) and 2 snag arrangements (clustered, scattered) in 30 Douglas-fir (*Pseudotsuga menziesii*) stands in the Oregon Coast Range. Eight bird species nested in created snags. Open-canopy stands (2-story and clearcut treatments) had higher levels of avian nesting, species richness, and species diversity compared to closed-canopy, group-selection stands. We did not find a difference in nesting levels between clustered and scattered snags. In created snags, most active nests were in the top 25% of the bole, cavity entrances typically faced northeast, and the presence of dead branches did not alter use of snags for nesting. Topped conifers that remained alive (n = 102) were rarely used for nesting or foraging. Since the last survey 6 years prior to our survey, the number of cavities per created snag per silvicultural treatment increased 3.3- to 6-fold, and we observed 4 additional avian species nesting; 3 were secondary cavity nesters. Total cavities per snag averaged 5.1, 4.3, and 2.5 for created snags, natural snags >12 years old, and natural snags <12 years old, respectively. Only 1 created snag fell in the decade since topping. Natural new snag recruitment resulting from residual green tree mortality was highest in 2-story stands (0.76 snag/ha) and lowest in clearcuts (0.20 snag/ha). Snags created by topping large conifers provided nesting and foraging structures for cavity-nesting birds under a range of silvicultural conditions, and use was influenced more by residual green tree density than snag arrangement. In addition, created snags increased in value for birds through their first decade (88% had cavities). Because snags created by topping last long and are readily used by birds, they should be considered a management option to improve avian habitat in managed forests.

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1290. **Solution of forest health problems with prescribed fire: Are forest productivity and wildlife at risk?**

Tiedemann, Arthur R.; Klemmedson, James O.; and Bull, Evelyn L.

Forest Ecology and Management 127(1/3): 1-18. (2000)

NAL Call #: SD1.F73; ISSN: 0378-1127

Descriptors: ecosystems/ fires-burns/ forestry practices/ forests/ habitat alterations/ habitat management/ management/ snags/ succession/ wildlife/ wildlife-habitat relationships/ forest/ fire/ dead wood/ *Larix* spp./ *Pinus ponderosa*/ *Pinus* spp./ ponderosa pine/ Oregon/ Washington

Abstract: Advanced forest succession and associated accumulations of forest biomass in the Blue Mountains of Oregon and Washington and Intermountain area have led to increased vulnerability of these forests to insects, diseases, and wildfire. One proposed solution is large-scale conversion of these forests to seral conditions that emulate those assumed to exist before European settlement: open-spaced stands (ca. 50 trees per ha), consisting primarily of ponderosa pine (*Pinus ponderosa* Laws.) and western larch (*Larix occidentalis* Nutt.). We question how well presettlement forest conditions are understood and the feasibility and desirability of conversion to a seral state that represents those conditions. Current and future expectations of forest outputs and values are far different from those at presettlement times. Emphasis on prescribed fire for achieving and maintaining this conversion raises questions about how well we understand fire effects on forest resources and values. We consider here potential effects of prescribed fire on two key aspects of forest management-productivity and wildlife. Use of large-scale prescribed fire presents complex problems with potential long-term effects on forest resources. Before implementing prescribed fire widely, we need to understand the range of its effects on all resources and values. Rather than attempting to convert forests to poorly described and understood presettlement seral conditions, it would seem prudent to examine present forest conditions and assess their potential to provide desired resource outputs and values. Once this is achieved, the full complement of forest management tools and strategies, including prescribed fire, should be used to accomplish the desired objectives. We suggest a more conservative approach until prescribed fire effects are better understood.

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1291. **Songbird abundance and avian nest survival rates in forests fragmented by different silvicultural treatments.**

Duguay, J. P.; Wood, P. B.; and Nichols, J. V.

Conservation Biology 15(5): 1405-1415. (2001)

NAL Call #: QH75.A1C5; ISSN: 08888892.

Notes: doi: 10.1046/j.1523-1739.2001.99023.x.

Descriptors: breeding population/ conservation management/ ecological impact/ forest management/ habitat fragmentation/ silviculture/ songbird/ United States

Abstract: Concerns over declining songbird populations have led to investigations of the effects of various silvicultural practices on breeding songbirds. Few studies published, however, have examined both songbird populations and avian nest success among harvesting treatments, particularly in forested landscapes. We conducted a study in the Monongahela National Forest of

West Virginia during the summers of 1993 to 1996 to compare breeding-bird abundance and daily nest survival rates among different silvicultural treatments: a two-age treatment (a type of deferred removal in which 37-49 mature trees/ha remain after a harvest until the next rotation), clearcutting treatments 15 years after harvest, unharvested forest surrounding the harvested stands, and unharvested stands not adjacent to cuts. Abundance and daily nest-survival rates did not differ among treatments ($p > 0.05$) for four of the five species for which the most nests were found: Wood Thrush (*Hylocichla mustelina*), Rose-breasted Grosbeak (*Pheucticus ludovicianus*), Acadian Flycatcher (*Empidonax vireescens*), Veery (*Catharus fuscescens*), Red-eyed Vireo (*Vireo olivaceus*). Parasitism rates were low (6%), and most parasitized nests were associated with the two-age harvest treatment. A source-sink model for the Wood Thrush revealed that all treatments were likely population sources for this species. Thus, it appears that 15 years after harvest, cuts placed within otherwise extensively forested areas do not result in the type of edge effects (population sinks) observed in areas fragmented by agriculture in the midwestern United States. Further, because neither nest success nor avian abundance was lower in the two-age than clearcut harvests, we conclude that two-age management is a viable conservation alternative to clearcutting in large forested landscapes where Brown-headed Cowbird (*Molothrus ater*) parasitism is not a concern.
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1292. Songbird abundance in clear-cut and burned stands: A comparison of natural disturbance and forest management.

Simon, N. P. P.; Schwab, F. E.; and Otto, R. D.

Canadian Journal of Forest Research 32(8):

1343-1350. (2002)

NAL Call #: SD13.C35; ISSN: 00455067.

Notes: doi: 10.1139/x02-057.

Descriptors: biodiversity/ vegetation/ natural disturbances/ forestry/ avifauna/ ecological impact/ forest management/ succession/ timber harvesting/ wildfire/ Canada/ Aves/ Canidae/ *Catharus guttatus*/ Coniferophyta/ *Dendroica coronata*/ *Dendroica petechia*/ *Passerella*/ *Passeri*/ *Passeridae*/ *Picea*/ *Picea mariana*/ *Turdidae*

Abstract: To evaluate the efficacy of forest management to emulate natural disturbance, we compared bird abundances among burned and clear-cut, former black spruce (*Picea mariana* (Mill.) BSP) sites, after 5, 14, and 27 years of succession. Total bird density was lower in clear-cut sites resulting from fewer hermit thrushes, yellow warblers, Swainson's thrushes, and fox sparrows. Hermit thrushes were positively correlated with snag density while yellow warblers and Swainson's thrushes were positively associated with deciduous tree cover and negatively correlated with conifer cover. Only yellow-rumped warblers had higher densities on clear-cut sites, likely due to greater conifer cover. Bird densities and species richness peaked in the 14-year-old burns and exceeded that of mature forests reported for Labrador. This demonstrates the importance of natural early successional forests for birds. Although logged areas support several species found in natural young burns, logging does not precisely mimic fire. This suggests that forest managers should allow some forests to burn naturally.

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1293. Songbird community variation among five levels of overstory retention in northern Alabama.

Lesak, Adrian A.; Wang, Yong.; and Schweitzer, Callie Jo In: Proceedings of the 12th Biennial Southern Silvicultural Research Conference, General Technical Report-SRS 71/ Connor, Kristina F.; Asheville, NC: Southern Research Station, Forest Service, U.S. Department of Agriculture, 2004. pp. 11-17.

<http://www.treesearch.fs.fed.us/pubs/6304>

Descriptors: commercial activities/ conservation measures/ ecology/ terrestrial habitat/ land zones/ Oscines: forestry/ overstory retention/ habitat management/ community structure/ overstory retention effects/ distribution within habitat/ habitat utilization/ forest and woodland/ oak hickory forest/ Alabama/ Jackson County/ Cumberland Plateau/ Aves, Passeriformes/ birds/ chordates/ vertebrates

Abstract: We compared songbird communities among varying degrees of overstory tree retention in the oak-hickory forest of the southern Mid-Cumberland Plateau region. Three 20-ha complete block replicates of 5 experimental treatments (15 treatment units, 4 ha per unit) were used. The five treatments were operational shelterwood stands with target overstory retention levels of approximately 0, 25, 50, 75, and 100 percent. The residual basal area and resultant canopy cover of these overstory retentions were compared among treatments and both showed three distinct conditions, closed canopy, open forest, and clearcut. Territory spot-mapping was used to quantify bird species richness and density during the first post-treatment year, between mid-April and July 2002. Sixty bird species were detected with 34 of those defending territories on the sites. Clearcuts (0 percent retention) had significantly lower values than the other four treatment types for overall bird territory density, species richness, and Shannon diversity index. Territorial density of breeding songbirds was highest in the 50 percent retention treatments, while species richness and Shannon diversity peaked in the units with 25 percent basal area retention.
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1294. Songbird, forest owl and small mammal diversity in mature and harvested aspen and mature mixed-woodforests in the Dawson Creek Forest District: Summary of research and related survey projects, 1992-1999.

Darling, Laura M.; Booth, Barry; Merckens, Markus; and Gebauer, Martin

Wildlife Working Report WR-104: i-xii, 1-66. (2002);

ISSN: 0831-4330

Descriptors: conservation measures/ ecology/ community structure/ terrestrial habitat/ land zones/ North America/ Canada/ Aves: habitat management/ forest management/ long term research projects/ species diversity/ mature vs harvested aspen forests/ mature mixed wood forests/ biodiversity comparisons/ British Columbia/ Dawson Creek Forest District/ Passeriformes/ birds/ chordates/ mammals/ vertebrates

Abstract: From 1992 to 1999, we assessed species diversity, relative abundance and community dominance of forest songbirds and small mammals in mature (control) and recently harvested, aspen forests near Chetwynd, B.C. Resident owls were surveyed during March-April 1997. We also assessed vegetation cover, security cover, woody debris and wildlife trees in the harvested and control stands. This report focuses on results of the songbird and small mammal study components and highlights the results

of the other surveys. The reader is referred to details presented in unpublished annual progress reports. Small mammal species richness and abundance varied between years and between mature and harvested stands. Multi-year population cycles and stochastic weather events likely accounted for much of the between-year variation. Several mammal species encountered within mature stands during this study were never captured in clearcut areas. Only Deer Mouse and Meadow Vole were significantly affected by clearcutting, though the effect of clearcutting was not consistent over the duration of the study. Retention patches of sufficient size within clearcuts may provide interior-forest species with suitable habitat or corridors. Our forest songbird results are based on "presence" of apparently breeding (i.e., singing or calling) individuals of a species, not whether they are successfully reproducing. Analyses of point-count data indicate that there were significant differences in species abundance between years for 15 of 24 bird species recorded in seven mature stands monitored from 1993 to 1997. However, fluctuations in abundance in mature stands appeared to be part of the normal variation in songbird abundance rather than population trends. Variations in diversity, abundance and dominance patterns were recorded among mature stands and among harvested stands of various age classes. The magnitude of these variations has potentially significant implications for interpretation of short-term "control-versus-treatment" studies. The number of bird species recorded in mature stands and clearcut stands did not differ within a given year, but numbers varied between years. In all mature stands and clearcuts, there were a few dominant bird species that provided about 80% of the observations, while many species were uncommonly recorded; however, the dominance order (rank) of the species in harvested stands differed from mature stands, reflecting songbird habitat preferences. Abundance of bird species after clearcutting followed established patterns: (1) no significant change in abundance of some species; (2) a lower abundance of species usually associated with older forests; (3) detections of mature-forest species in the clearcuts, primarily in leave-tree patches; (4) early successional bird species in clearcuts, and (5) significant annual changes in abundance of various species in clearcuts. Management recommendations stemming from this study include: (1) large, unfragmented mature stands must be distributed across the landscape and over time; (2) retention patches in clearcuts must be large (> 5 ha), connected to intact forest, representative of the intact forest, and include critical elements such as large-diameter live aspen with visible signs of heart rot to maintain nesting habitat for cavity-nesting wildlife; (3) long, large-diameter woody debris and small woody debris must be retained in slash piles and scattered throughout the harvested block where feasible; (4) longer harvest rotations should be scattered across the landscape. Additionally, managers must recognize that significant annual fluctuations in species abundance are normal and may result in misleading interpretation of short-term studies, and that the presence of an apparently breeding songbird does not imply successful breeding. Further study is required on the size and configuration of leave patches, particularly in reference to the role of

patches in small mammal and songbird population dynamics and reproductive success. Stands 20 to 60 years old need to be studied to determine at what stand age forest-associated species re-colonize regenerating stands. © Thomson Reuters Scientific

1295. Songbird response to group selection harvests and clearcuts in a New Hampshire northern hardwood forest.

Costello, C. A.; Yamasaki, M.; Pekins, P. J.; Leak, W. B.; and Neefus, C. D.

Forest Ecology and Management 127(1-3): 41-54. (2000)
NAL Call #: SD1.F73; ISSN: 03781127.

Notes: doi: 10.1016/S0378-1127(99)00131-0.

Descriptors: clearcut/ early successional/ forest birds/ group selection/ northern hardwood forest/ avifauna/ clearcutting/ community composition/ forest ecosystem/ habitat use/ song/ species richness/ United States

Abstract: Clearcutting creates habitat for many species of early successional songbirds; however, little information is available on bird use of small forest openings created by group selection harvests. Group selection harvests are increasing on the White Mountain National Forest due to negative public response to clearcutting. The objective of this study was to determine if avian species richness and composition differ between clearcut and group selection openings, and between mature stands and the uncut portions of group selection stands. Point count surveys were conducted during the 1992 and 1993 breeding seasons within six study blocks in the White Mountain National Forest, NH. Each block consisted of a clearcut stand, a group selection stand and a mature stand. Species richness per stand was significantly higher in clearcut openings ($p = 0.010$) than in group selection openings. Forested areas surrounding group selection openings were similar to mature stands in species richness ($p = 0.848$) and composition. Our data suggest that, relative to avian use, the group selection system does not provide habitat similar to that created by clearcutting in extensive northern hardwood stands. The group selection system appears to retain much of the mature forest bird community while providing for a limited number of early successional bird species. Gradual replacement of clearcutting with group selection harvests could result in reduced avian diversity across large forested tracts.

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1296. Songbird use of regenerating forest, glade, and edge habitat types.

Fink, A. D.; Thompson, F. R.; and Tudor, A. A.

Journal of Wildlife Management 70(1): 180-188. (2006)
NAL Call #: 410 J827; ISSN: 0022-541X

Descriptors: animal behavior/ habitat selection/ habitats/ models/ natural regeneration/ pastures/ population density/ reproduction/ stand characteristics/ stand structure/ wild birds/ wildlife conservation/ birds/ Passeriformes

Abstract: Population numbers of many bird species associated with early-successional or disturbance-dependent habitat types are declining. We used an information-theoretic approach to evaluate hypotheses concerning factors affecting breeding bird densities in different early-successional habitat types. We studied

shrubland bird communities in 3- to 5-year-old regenerating forest (n=3), glade (n=3), and forest-pasture edge (n=3) habitat types in the predominantly forested Missouri Ozarks in 1997-1999. We monitored 8 bird species using spot mapping and total mapping techniques, searched for and monitored nests, and measured vegetation structure within nested circular plots. In evaluating breeding densities in these habitat types, we compared support for a global model with year, habitat type, and a habitat type x year interaction to several reduced models and a null model with only an intercept, and we used model-averaged coefficients to evaluate effect size. We found support for the effects of habitat type on breeding densities of prairie warbler (*Dendroica discolor*) and yellow-breasted chat (*Icteria virens*); the effects of habitat type and year on densities of blue-winged warbler (*Vermivora pinus*), eastern towhee (*Pipilo erythrophthalmus*), and field sparrow (*Spizella pusilla*); the effect of year on densities of indigo bunting (*Passerina cyanea*) and northern cardinal (*Cardinalis cardinalis*); and no effects on densities of white-eyed vireo (*Vireo griseus*). The effect size of habitat type on breeding densities varied among species and indicated important species-specific differences in habitat use. Most shrubland bird species used both glades and regenerating forests more than forest-pasture edge sites, and breeding densities of some species were higher in regenerating forests than in glades. For some species, patterns in reproductive success (reported as interval nest success) mirrored observed patterns in breeding densities. However, substantial variation existed among species with respect to patterns in habitat use and nest success. Conservation planning for the persistence of birds requiring early-successional habitat types should consider the ephemeral nature of these areas and the potential contribution from young, regenerating forest.

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1297. Soricid abundance in partial overstory removal harvests and riparian areas in an industrial forest landscape of the central Appalachians.

Ford, W. Mark and Rodrigue, J. L.

Forest Ecology and Management 152(1-3): 159-168. (2001)
NAL Call #: SD1.F73; ISSN: 03781127.

Notes: doi: 10.1016/S0378-1127(00)00597-1.

Descriptors: Appalachians/ BMP/ diameter-limit/ riparian areas/ shrews/ SMZ/ Soricids/ two-aged regeneration/ cutting/ life cycle/ rocks/ statistical methods/ timber/ shrews/ forestry/ abundance/ forest management/ harvesting/ insectivore/ riparian forest/ United States/ Blarina brevicauda/ Mammalia/ Riparia/ Sorex cinereus/ Sorex dispar/ Sorex fumeus/ Sorex hoyi/ Soricidae

Abstract: Within eastern North America, soricid (shrew) diversity reaches its peak in the central and southern Appalachians. Though shrews are an important component of Appalachian mammalian fauna, most species are small, cryptic, and little studied. The understanding of basic life history and habitat preferences is considered problematic. To assess the response of soricids to partial overstory timber harvest, and to investigate the importance of riparian areas to soricids, we conducted pitfall trapping surveys during the summers of 1996-1998 in the Westvaco Ecosystem Research Forest. Pitfall transect lines were established in uncut control forest stands in upland sites, along uncut forest stands in riparian areas, and in upland stands subjected to heavy diameter-limit cutting or two-

aged regeneration methods. Diameter-limit and two-aged regeneration harvests occurred in 1996 following our initial pitfall survey effort. Riparian areas were surveyed within the area that would constitute a Streamside Management Zone under West Virginia's Best Management Practices guidelines. During 10,560 trapnights, we collected masked shrews (*Sorex cinereus*), rock shrews (*S. dispar*), smokey shrews (*S. fumeus*), pygmy shrews (*S. hoyi*), and northern short-tailed shrews (*Blarina brevicauda*). Of species collected in sufficient numbers to analyze statistically across treatments, the relative abundance of masked shrews, smokey shrews, and northern short-tailed shrews did not differ among harvest sites and control sites for any year, either pre-harvest or post-harvest. Uncut, control sites had higher relative abundances than did riparian sites of masked shrews in 1996 and of smokey shrews in 1997. Collections of all species were poorly correlated with most micro-habitat variables we collected. Rock shrews were restricted to uncut upland sites at higher elevations with large amounts of emergent rock.
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1298. Southern California Mountains and Foothills Assessment: Habitat and species conservation issues.

Stephenson, J. R. and Calcarone, G. M.
Albany, CA: U.S. Forest Service; GTR-PSW-172,
2000. 402 p.

Notes: produced by the Pacific Southwest
Research Station.

<http://www.treesearch.fs.fed.us/pubs/6778>

Descriptors: Southern California/ ecosystem/ biodiversity/ land management

Abstract: The Southern California Mountains and Foothills Assessment: Habitat and Species Conservation Issues provides detailed information about current conditions and trends for ecological systems and species in the region. This information can be used by land managers to develop broad land management goals and priorities and provides the context for decisions specific to smaller geographic areas. The assessment area covers 6.1 million acres, of which 56 percent are national forest system lands. Over eighteen million people live in the coastal basin bordering the assessment area. As compared to historic conditions, mountain and foothill ecosystems in this region have undergone dramatic changes. Forested landscapes are more susceptible to stand-replacing fires. Invasive non-native species have become widely established, causing a decline in habitat capability for many native plants and animals. An extensive network of dams and diversions has altered aquatic systems. Some areas of high ecological integrity remain and can serve as building blocks for restoration. Biological diversity is not uniformly distributed across the landscape; rare species in particular tend to be concentrated in certain habitats. Key areas of high ecological integrity and rare species assemblages are identified in this report. This assessment provides a rich information base, including over eighty mapped themes with associated models and databases, from which future decisions can benefit.

This citation is from Treesearch.

1299. Southern Forest Resource Assessment highlights: Terrestrial ecosystems and wildlife conservation.

Trani, Margaret Katherine

Journal of Forestry 100(7): 35-40. (2002)

NAL Call #: 99.8 F768; ISSN: 0022-1201.

<http://saf.publisher.ingentaconnect.com/content/saf/jof/2002/00000100/00000007/art00008>

Descriptors: conservation measures/ land zones/ Vertebrata: disturbance by man/ habitat alteration/ habitat management/ land owners role/ endangered status/ species of concern/ conservation/ habitat alteration/ United States, southern region/ chordates/ vertebrates

Abstract: Southern population and economic growth are putting pressure on wildlife species and the communities that support them. Loss of habitat is the primary reason why 132 southern terrestrial vertebrate species are of conservation concern, but other factors include environmental contaminants, exploitation, development, stream modification, and wetland degradation. A high proportion of rare forest communities are imperiled to some degree; 14 have estimated losses of 98 percent since European settlement. In the midst of continued regional growth, biological diversity will become a critical conservation issue. Each southern landowner has an important role in the conservation of species and their habitats.

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1300. Spatial and temporal patterns of beetles associated with coarse woody debris in managed bottomland hardwood forests.

Ulyshen, M. D.; Hanula, J. L.; Horn, S.; Kilgo, J. C.; and Moorman, C. E.

Forest Ecology and Management 199(2-3): 259-272. (2004)

NAL Call #: SD1.F73; ISSN: 03781127.

Notes: doi: 10.1016/j.foreco.2004.05.046.

Descriptors: bark beetles/ Buprestidae/ Cerambycidae/ Cleridae/ coarse woody debris/ Saproxylic/ woodborers/ biodiversity/ hardwoods/ insect control/ artificial canopy/ temporal patterns/ forestry/ beetle/ canopy gap/ coarse woody debris/ community structure/ forest management/ saproxylic organism/ spatiotemporal analysis/ South Carolina/ Bostrichidae/ Brentidae/ Coleoptera/ Curculionidae/ Scolytinae

Abstract: Malaise traps were used to sample beetles in artificial canopy gaps of different size (0.13 ha, 0.26 ha, and 0.50 ha) and age in a South Carolina bottomland hardwood forest. Traps were placed at the center, edge, and in the surrounding forest of each gap. Young gaps (~1 year) had large amounts of coarse woody debris compared to the surrounding forest, while older gaps (~6 years) had virtually none. The total abundance and diversity of wood-dwelling beetles (Buprestidae, Cerambycidae, Brentidae, Bostrichidae, and Curculionidae (Scolytinae and Platypodinae)) was higher in the center of young gaps than in the center of old gaps. The abundance was higher in the center of young gaps than in the surrounding forest, while the forest surrounding old gaps and the edge of old gaps had a higher abundance and diversity of wood-dwelling beetles than did the center of old gaps. There was no difference in wood-dwelling beetle abundance between gaps of different size, but diversity was lower in 0.13 ha old gaps than in 0.26 ha or 0.50 ha old gaps. We suspect that gap size has more of an effect on woodborer abundance

than indicated here because malaise traps sample a limited area. The predaceous beetle family Cleridae showed a very similar trend to that of the woodborers. Coarse woody debris is an important resource for many organisms, and our results lend further support to forest management practices that preserve coarse woody debris created during timber removal.

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1301. Spatial and temporal patterns of use by moose of pre-commercially thinned, naturally-regenerating stands of balsam fir in central Newfoundland.

McLaren, Brian E.; Porter, Truman S.; and Oosenbrug, Sebastian M.

Forest Ecology and Management 133(3): 179-196. (2000)

NAL Call #: SD1.F73; ISSN: 0378-1127

Descriptors: conservation/ ecology/ terrestrial habitat/ land zones/ Canada/ Alces alces: conservation measures/ habitat management/ wildlife management/ habitat utilization/ forest and woodland/ precommercially thinned balsam fir stands/ Newfoundland, central region/ chordates/ mammals/ ungulates/ vertebrates

Abstract: A study of use and damage of pre-commercially thinned (PCT) forest stands containing balsam fir (*Abies balsamea* [L.] Mill.) by moose (*Alces alces* L.) in central Newfoundland was undertaken to determine how potentially conflicting resource management goals such as wood yield optimization and provision of stable moose populations could be achieved. Objectives were to measure spatial and temporal variability in damage to balsam fir due to moose habitat preferences for certain stand types and stem densities, and, secondly, to explore possibilities for manipulating PCT operations, within this context, to minimize damage. A stable moose population was achieved over 5 years of study, through the issue of licences for a management sub-area designed to coincide with on-going PCT. Good road access ensured high success for hunters in this sub-area, and this management option eventually allowed for declines in moose density and in browsing of crop trees in PCT stands. Aerial census techniques were the preferred means of determining areas of high use or high potential use; pellet group counts were only weakly correlated to measures of browsing in vegetation sample plots. Identification of localized areas of use, or of moose habitat preferences that were likely primary to the selection of PCT stands, may allow PCT operations to be planned to avoid winter moose 'yards.' Consideration by management should be given to locating PCT in stands like those containing black spruce, which are less frequently occupied by moose. Management of hardwood also appears to be important for reducing potential moose damage to balsam fir stands when moose densities are high.

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1302. Spatial and temporal variation in fruit use by wildlife in a forested landscape.

McCarty, J. P.; Levey, D. J.; Greenberg, C. H.; and Sargent, S.

Forest Ecology and Management 164(1-3): 277-291. (2002)

NAL Call #: SD1.F73; ISSN: 03781127.

Notes: doi: 10.1016/S0378-1127(01)00612-0.

Descriptors: Frugivory/ fruit consumption/ fruit phenology/ fruit production/ managed forests/ migratory birds/ Savannah River Site/ Climatology/ forestry/ Fruits/

managers/ plants (botany)/ wildlife/ ecology/ forest management/ frugivory/ plant-herbivore interaction/ spatial variation/ temporal variation/ United States/ Aves/ Hexapoda/ Insecta/ *Morella cerifera*/ *Myrica*/ Myricaceae/ Vertebrata

Abstract: We monitored production and removal rates of fruit from 22 common plant species over 2 years in five habitats of a managed landscape in South Carolina (USA). Our long-term goal is to determine the importance of fruit as a resource for vertebrates and to provide recommendations for management of key species and habitats. This study lays the foundation for that goal by documenting fruit production and availability, variation in use by wildlife, and how these factors vary by plant species, habitat, and season. Six species produced >1 kg dry mass of pulp per hectare per year. Vertebrates consumed ≥ 50% of fruits in 17 of the 22 plant species. Fruit loss to insects and microbes was generally small and varied significantly among seasons, being lowest in fall and winter. The length of time ripe fruit survived on plants varied among species from 3 to 165 days. Survival time of fruits did not vary significantly among habitats but was significantly shorter in the summer than in fall or winter. Approximately, half the species produced fruit in the fall and winter and these fruits were primarily consumed by over-wintering wildlife. This pattern is inconsistent with the general belief that fruit production in the eastern United States is timed to correspond with periods of high bird abundance during fall migration. Production and consumption of winter fruits deserves further attention from forest managers, as relatively little other food is available in winter, energy demands of overwintering birds are high, and current management practices often reduce fruit availability of key species (e.g., *Myrica cerifera*). We suggest that fruit is more important than generally realized in maintaining vertebrate diversity in temperate forests and that the focus of managers on hard mast production should be broadened to include fruiting plants.

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1303. Spatial modeling of harvest constraints on wood supply versus wildlife habitat objectives.

Rempel, Robert S. and Kaufmann, Cynthia K. *Environmental Management* 32(5): 646-59. (2003)
 NAL Call #: HC79.E5E5; ISSN: 0364-152X
Descriptors: Cervidae/ Artiodactyla/ Mustelidae/ Carnivora/ *Alces alces*/ *Martes americana*/ *Rangifer tarandus*/ Mammalia/ *Rangifer tarandus* [American term]/ Parulidae/ Passeriformes/ *Seiurus aurocapillus*/ Aves/ spatial harvest planning model/ Nakina Forest Management Unit/ Caribou/ moose wintering habitat supply/ annual harvest area/ caribou habitat supply/ habitat suitability modeling/ emergent habitat pattern/ marten habitat supply/ conservation of natural resources/ timber harvesting constraints/ timber harvest objectives/ harvest block size/ harvest block proximity/ boreal mixedwood forest/ green-up delay/ animals, wild/ models, theoretical/ wildlife-human relationships/ habitat management/ habitat alterations/ habitat evaluation/ habitat change/ habitat mosaic/ mesoscale stratification/ habitat supply/ hierarchical modeling/ population dynamics/ wildlife management/ regression analysis/ boreal forests/ timber harvesting/ ecological requirements/ commercial enterprises/ forestry practices/ models and simulations/ land zones/ study methods/ Canada/ carnivora/ management/ animals/

mammals/ disturbances/ conservation/ seasons/ Ontario/ birds/ conflicts/ techniques/ ecosystems/ silviculture/ deer/ wildlife/ environment/ trees/ forestry/ moose

Abstract: We studied the effects of spatial and temporal timber harvesting constraints on competing objectives of sustaining wildlife habitat supply and meeting timber harvest objectives in a boreal mixedwood forest. A hierarchical modeling approach was taken, where strategic and tactical level models were used to project blocking and scheduling of harvest blocks. Harvest block size and proximity, together with short- and long-term temporal constraints, were adjusted in a factorial manner to allow creation of response-surface models. A new measure of the habitat mosaic was defined to describe the emergent pattern of habitat across the landscape. These models, together with multiple linear regression, were used to provide insight on convergence or divergence between spatial objectives. For example, green-up delay (defined as time required before a harvest block adjacent to a previously logged block can be scheduled for harvest) had an adverse effect on the amount of annual harvest area that could be allocated and blocked spatially, and habitat supply responded in an opposite direction to that of wood supply, where caribou, moose wintering, and marten habitat supply increased when harvest blocks were further apart, maximum block size smaller, and both a green-up delay and mesoscale stratification were applied. Although there was no "solution space" free of conflicts, the analysis suggests that application of the mesoscale stratification, together with a diversity of harvest block sizes and a between-harvest block proximity of 250 m, will perform relatively well with respect to wood supply objectives, and at the same time create a less fragmented landscape that better reflects natural forest patterns.

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1304. A spatially explicit decision support model for restoration of forest bird habitat.

Twedt, Daniel J.; Uihlein, William B.; Elliott, A. Blaine; and Uihlein W. B.

Conservation Biology 20(1): 100-10. (2006)

NAL Call #: QH75.A1C5 ; ISSN: 0888-8892

Descriptors: Aves/ birds/ conservation of natural resources/ decision support techniques/ trees/ forestry methods/ decision making/ ecosystem/ Mississippi/ population dynamics/ models/ habitat/ forest/ Partners in Flight

Abstract: The historical area of bottomland hardwood forest in the Mississippi Alluvial Valley has been reduced by >75%. Agricultural production was the primary motivator for deforestation; hence, clearing deliberately targeted higher and drier sites. Remaining forests are highly fragmented and hydrologically altered, with larger forest fragments subject to greater inundation, which has negatively affected many forest bird populations. We developed a spatially explicit decision support model, based on a Partners in Flight plan for forest bird conservation, that prioritizes forest restoration to reduce forest fragmentation and increase the area of forest core (interior forest >1 km from "hostile" edge). Our primary objective was to increase the number of forest patches that harbor >2000 ha of forest core, but we also sought to increase the number and area of forest cores >5000 ha. Concurrently, we targeted restoration within local (320 km²) landscapes to achieve > or =60% forest cover. Finally, we emphasized restoration of higher-elevation bottomland hardwood forests in areas where restoration

would not increase forest fragmentation. Reforestation of 10% of restorable land in the Mississippi Alluvial Valley (approximately 880,000 ha) targeted at priorities established by this decision support model resulted in approximately 824,000 ha of new forest core. This is more than 32 times the amount of core forest added through reforestation of randomly located fields (approximately 25,000 ha). The total area of forest core (1.6 million ha) that resulted from targeted restoration exceeded habitat objectives identified in the Partners in Flight Bird Conservation Plan and approached the area of forest core present in the 1950s.

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1305. Spatially explicit influences on northern goshawk nesting habitat in the interior Pacific Northwest.

McGrath, Michael T.; DeStefano, Stephen; Riggs, Robert A.; Irwin, Larry L.; and Roloff, Gary J. *Wildlife Monographs* (154): 1-63. (2003)

NAL Call #: 410 W64; ISSN: 0084-0173

Descriptors: Accipiter gentilis atricapillus/ Falconiformes/ Accipitridae/ Ciconiiformes/ Accipiter gentilis/ northern goshawk/ terrestrial ecology/ bootstrap technique/ forest structure/ habitat quality/ habitat selection/ habitat suitability/ nesting habitat/ spatial distribution/ species abundance/ stand development/ breeding grounds/ forests/ ecosystems/ forestry practices/ habitat alterations/ habitat use/ nest site/ nesting habitat selection/ Oregon/ Washington/ environmental factors/ wildlife-human relationships/ commercial enterprises/ disturbances/ land zones/ reproduction/ breeding/ dispersion/ disturbance/ ecological requirements/ fertility-recruitment/ habitat change/ habitat management/ silviculture/ simulation/ topography

Abstract: We compared northern goshawk (*Accipiter gentilis atricapillus*) nesting habitat within 1 ha of nest sites and at landscape scales of 10, 30, 60, 83, 120, 150, and 170 ha in 4 study areas east of the Cascade Mountains in Oregon and Washington. Our objective was to describe goshawk nesting habitat at biologically relevant scales and to develop models capable of assessing the effects of forest management alternatives on habitat suitability. We evaluated habitat at 82 active goshawk nests and 95 random sites. Productivity (young fledged per nest) was evaluated at 81 nests. We collected data on forest structure within 1 ha of nests and random points. At scales ranging from 10 to 170 ha, we recorded the abundance and spatial distribution of several forest stages of stand development (i.e., stand initiation, stem exclusion, understory reinitiation, old growth) on aerial photographs. We used logistic regression and classification and regression trees (cart) to (1) evaluate habitat selection, (2) construct models to calculate the probability of nesting, and (3) explore relationships between reproductive output and habitat conditions. We assessed model accuracy via bootstrap and jackknife cross-validation techniques. By examining goshawk habitat relationships at multiple spatial scales across several study areas, we detected unifying spatial patterns and structural conditions surrounding goshawk nesting habitat. Our ability to discriminate goshawk nest sites from available habitat decreased as landscape scale increased, and different factors influenced goshawks at different scales. The presence and arrangement of forest structural types interacted to influence site suitability for nesting. At the 1-ha scale, the stage of stand development

(i.e., stand initiation, stem exclusion, understory reinitiation, old growth), low topographic position, and tree basal area reliably discriminated between nests and random sites. Low topographic position and basal area were more influential than stand structure. At the landscape scale, modeling indicated that conditions at different scales interact to influence selection of habitat for nesting. A core area exists surrounding goshawk nests in which stem exclusion and understory reinitiation stands with canopy closure $\geq 50\%$ serve as apparent protection against potentially detrimental effects associated with more open forest (e.g., predators and micro-climate). Among several models tested, the model that best discriminated between nests and random sites encompassed 83 ha surrounding the nest and incorporated habitat characteristics from multiple scales nested within that range. This model had a cross-validated classification accuracy of 75%. Positive correlations were found between fledging rate and tree basal area within 1 ha of the nest ($F_{3,77} = 2.89$, $P = 0.0407$), and between fledging rate and the percentage of landscape occupied by "stem exclusion" stands of low canopy closure (i.e., $<50\%$) at landscape scales ≥ 60 ha ($F_{3,77}$, $0.041 \leq P \leq 0.089$). Spatial modeling also showed that timber harvest can be managed to maintain or enhance goshawk nest site suitability over time in the Interior Northwest, and that a non-harvest strategy can be just as detrimental to nesting habitat as can be aggressive, maximum-yield forestry. We conclude that (1) northern goshawk nesting habitat becomes less distinguishable from the landscape with increasing area, and (2) habitat management based on exclusionary buffers should be re-evaluated in light of the way different habitat factors interact across spatial scales. We present case studies illustrating how landscape scale modeling can be implemented to (1) predict the influences of alternative silvicultural prescriptions on the suitability of potential nesting habitat over time, and (2) characterize large landscapes with respect to abundance and distribution of suitable nesting habitat.

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1306. Spatiotemporal responses of reptiles and amphibians to timber harvest treatments.

Goldstein, Michael I.; Wilkins, R. Neal.; and Lacher, Thomas E.

Journal of Wildlife Management 69(2): 525-539. (2005)

NAL Call #: 410 J827; ISSN: 0022-541X

Descriptors: commercial activities/ ecology/ terrestrial habitat/ land zones/ Amphibia/ Reptilia: forestry/ clearcutting/ selective timber harvest treatments/ community structure/ forest and woodland/ bottomland hardwood forest/ Texas/ Tyler County/ amphibians/ chordates/ reptiles/ vertebrates

Abstract: We compared the influence of clearcut and selective timber harvest treatments on spatial and temporal variability of amphibians and reptiles in an east Texas bottomland hardwood forest. The dataset represented a time series of 5 years post-treatment. A total of 18,645 amphibians and reptiles was captured in 144 pitfall arrays. We used 9 plots Q clearcut, 3 select cut, and 3 untreated). Each plot had 16 arrays and was bisected by 1 of 3 streams. Pitfall captures represented 46 species (16 amphibians, 30 reptiles). When analyzed with a traditional ANOVA approach, these data suggested an increase in reptile species richness in response to clearcut treatments; amphibian species richness did not respond to treatment.

When analyzed as a time series, however, the data revealed fluctuations in site use by species and species groups, and these fluctuations were independent of treatment effects. Exploratory analyses of spatio-temporal dynamics showed that species richness and the relative abundance of common species displayed spatial patterns that remained consistent over time. In control and select cut treatments, spatial patterns of richness and abundance shifted over time and were not necessarily confined to areas adjacent to streams. In clearcuts, stationary habitat refugia were located within riparian management zones.
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1307. Species richness and nesting success of migrant forest birds in natural river corridors and anthropogenic woodlands in southeastern South Dakota.

Gentry, D. J.; Swanson, D. L.; and Carlisle, J. D. *Condor* 108(1): 140-153. (2006)

NAL Call #: QL671.C6; ISSN: 00105422

Descriptors: Edge effects/ forest fragmentation/ neotropical migrant/ nesting success/ parasitism rates/ woodlots

Abstract: Forest fragmentation is thought to be partially responsible for declines in many Neotropical migrant birds due to the combined effects of higher rates of brood parasitism and increased predation near forest edges. A majority of the forested habitat in the northern prairie region is found in riparian corridors, but this native habitat has been much reduced from its historical extent. However, additional woodland nesting habitat has been established within the last century in the form of isolated woodlots on farms. We compared abundance, species richness, and nesting success of migrant forest birds breeding in native riparian corridors and anthropogenic woodlots. The two habitats had similar bird abundances but native riparian woodlands were more species-rich than woodlots. We located a total of 650 nests, with 320 nests of 15 species in woodlots and 331 nests of 25 species in riparian corridors. Nesting success was not significantly different between the two habitats for all species combined or for individual species with ≥ 15 nests in each habitat. Nests above 5 m were more successful than lower nests, but distance to woodland edge did not influence nesting success. Nests initiated in the middle and late portions of the nesting season were more successful than early season nests, significantly so in woodlots. Thus, anthropogenic woodlots were as suitable as natural habitats for successful nesting. However, many of the Neotropical migrants occurring in riparian habitats were absent from woodlots, which suggests that riparian corridors are especially important habitats for breeding birds in the northern prairie region.
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1308. Species-specific edge effects on nest success and breeding bird density in a forested landscape.

Flaspohler, David J.; Temple, Stanley A.; and Rosenfield, Robert N.

Ecological Applications 11(1): 32-46. (2001)

NAL Call #: QH540.E23; ISSN: 1051-0761

Descriptors: commercial activities/ conservation measures/ reproduction/ ecology/ population dynamics/ terrestrial habitat/ land and freshwater zones/ Aves: forestry/ clearcutting/ habitat management/ forest management practices/ long term viability plans/ reproductive

productivity/ nesting success/ species-specific edge effects/ clearcut forested landscape/ population density/ nest density/ distribution within habitat/ forest and woodland/ northern hardwood forests/ Wisconsin/ Forest and Vilas Counties/ Nicolet National Forest/ birds/ chordates/ vertebrates

Abstract: Using natural nests of eight bird species, we provide one of the first multi-species tests for edge effects on reproductive success in a forested landscape. Our primary objective was to assess whether distance to the edge of recent clearcuts was related to nesting success in intact northern hardwood forests. Estimated nest success was generally lower for the two ground-nesting species than for the six canopy-nesting species. Brood parasitism was <3% for species which typically accept eggs of the Brown-headed Cowbird (*Molothrus ater*), and nest predation was the most common cause of nest failure. Probability of nest failure was influenced by distance to forest edge for the ground-nesting Hermit Thrush (*Catharus guttatus*) and Ovenbird (*Seiurus aurocapillus*), but not for six canopy-nesting species. For the Hermit Thrush and Ovenbird, nest success relative to decreasing distance to the edge was reduced during the nestling stage, but not the incubation stage. Nest density appeared to be higher in forest zones near the clearcut edge for ground-nesting and for several canopy-nesting species. Our data suggest that the effect of proximity to edge on nest success for ground-nesting species may penetrate 300 m into intact forest, while the effect of proximity to edge on nest density may penetrate farther. These data suggest that the creation of openings in forested landscapes reduces nest success and increases nest density for some species of migratory birds in a zone adjacent to the opening. This pattern supports the notion that "ecological traps" may exist for ground-nesting birds in areas near recently created forest openings. Because areas of contiguous forest (e.g., publicly owned forest) in the Upper Great Lakes remain relatively intact, they may serve as source habitat for regional songbird metapopulations.
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1309. Spotted owl home-range and habitat use in young forests of western Oregon.

Glenn, Elizabeth M.; Hansen, Michael C.; and Anthony, Robert G.

Journal of Wildlife Management 68(1): 33-50. (2004)

NAL Call #: 410 J827; ISSN: 0022-541X

Descriptors: Strigiformes/ Strigidae/ northern spotted owl/ *Strix occidentalis*/ Elliott State Forest And Northern Coast Range/ *Strix occidentalis Caurina*/ Akaike's information criterion/ spatially explicit models/ Oregon Coast Range/ northern spotted owl/ home range-territory/ habitat management/ habitat use/ ecological requirements/ terrestrial ecology/ land zones/ home-range/ spotted owl/ forest fringe/ young forests/ brood-egg/ habitat/ management/ behavior/ conservation/ radiotelemetry/ season/ ecosystems/ wildlife/ dispersion/ telemetry/ Oregon
Abstract: To assess spotted owl use of young forests, we studied home-range sizes and habitat-use patterns of 24 adult northern spotted owls (*Strix occidentalis caurina*) on 2 sites in the Oregon Coast Range: the Elliott State Forest (ESF) and state forest lands in the Northern Coast Range (NCR). Conifer forests at ESF were characterized by a mixture of old, mature, and pole-sized conifer, similar to other areas occupied by spotted owls in western Oregon,

USA. In contrast, conifer forests at NCR were younger than most other sites occupied by spotted owls in western Oregon and consisted primarily of conifers <80 years old. Broadleaf forest also was abundant (approx 22%) at both ESF and NCR. We used an information-theoretic approach and Akaike's Information Criterion (AIC) to evaluate a priori hypotheses about spotted owl home-range sizes and habitat-use patterns on our study areas. Considering previous knowledge about habitat requirements of the species, we predicted that owls occupying sites with fewer old conifer stands would have larger home ranges and that owls would select the oldest and most structurally diverse forest available for foraging and roosting. Our top model for evaluating home-range sizes indicated that the proportion of older conifer forest within the home range best explained the variability in home-range sizes. Although we found considerable variation in home-range size among owls, home-range sizes at ESF generally were smaller than home-range sizes at NCR, and home ranges at both sites were smaller than those reported for other study areas in western Oregon. Habitat-use patterns also varied widely among owls both within and between sites. Models containing distance to the nest tree, proximity to nearest forest edge, and proximity to nearest broadleaf-forest edge were the most parsimonious models for distinguishing owl locations from random points. On average, owl locations at both study areas were closer to ecotones between broadleaf forest and other cover types and farther from forest-nonforest ecotones than random points. Overall, we did not observe strong selection or avoidance of any cover type, although owls at ESF showed greatest use of older conifer forest while owls at NCR showed greatest use of broadleaf forest. Use of these habitat configurations and cover types by spotted owls had not been well documented prior to our study. The predictive power of our models was not great, however, indicating that factors in addition to those we included in our analysis may have influenced owl habitat-use patterns at our study areas. Based on our results, we recommend that managers at these sites maintain existing old and mature conifer forest, broadleaf forest, broadleaf-forest edges, and forested riparian areas as owl habitat; avoid timber harvest in core use areas; and plan the size of areas managed for spotted owls to reflect actual home-range and core-area sizes for owls in those forests.

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1310. Spotted owl turnover and reproduction in managed forests of north-coastal California.

Thome, Darrin M.; Zabel, Cynthia J.; and Diller, Lowell V. *Journal of Field Ornithology* 71(1): 140-146. (2000)
 NAL Call #: 413.8 B534; ISSN: 0273-8570
Descriptors: Strigidae/ Strigiformes/ Strix occidentalis caurina/ birds/ ecosystems/ endangered-threatened species/ forestry practices/ forests, mixed/ habitat alterations/ habitat management/ management/ mortality/ movements/ productivity/ reproduction/ wildlife/ spotted owl brood-egg/ fertility-recruitment/ turnover/ northern spotted owl/ California: Humboldt County/ California: Del Norte County
Abstract: Northern spotted owl (*Strix occidentalis caurina*) reproduction and turnover (when an owl died or shifted territories, and was replaced by another owl) were monitored at 51 locations on Simpson Timber Company lands, northwestern California, from 1991-1995. The

authors tested for differences in proportions of five stand age classes and reproductive success between spotted owl pair sites with (\geq or =1 turnover) and without turnovers. Owl pairs at sites without turnovers fledged more young, showed more consistent reproductive success, and were surrounded by a greater percentage of 21-to-40-yr-old stands than were owl pairs at sites with turnovers. The authors hypothesize that pairs with high mate fidelity and survival were more reproductively successful because those pairs had previous breeding experience together. By investigating turnover along with habitat features, they now have an indication of the relative quality of various habitats for spotted owls on managed, coastal forests of northern California.

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1311. Spring bird migration in Mississippi Alluvial Valley forests.

Wilson, R. Randy and Twedt, Daniel J. *American Midland Naturalist* 149(1): 163-175. (2003)
 NAL Call #: 410 M58; ISSN: 0003-0031
Descriptors: alluvial valley forests/ bottomland hardwood forest/ silvicultural management/ spring bird migration
Abstract: We surveyed forest songbirds during migration in bottomland hardwood forest stands and managed cottonwood (*Populus deltoides*) plantations in northeast Louisiana and west-central Mississippi between 24 March and 24 May 1996 and 1997. We detected more bird species in bottomland hardwood stands than in cottonwood stands. Within hardwood stands, we detected more individuals in stands subjected to uneven-aged timber harvest than in unmanaged stands. Early in migration, avian species composition was similar in both forest types, being comprised mainly of short-distance migrants. Bird species composition in these forest types became increasingly disparate as long-distance neotropical-nearctic migrants arrived. Ten bird species were characteristic of bottomland hardwood forests, whereas eight different species were characteristic of managed cottonwood plantations. Because these two forest types supported different bird communities, both forest types provide important inland stopover habitat during migration. Silvicultural management of bottomland hardwood forests that increases their understory vegetation will provide forested habitat for a more species rich and abundant population of songbirds during migration.
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1312. Stand age and habitat influences on salamanders in Appalachian cove hardwood forests.

Ford, W. M.; Chapman, B. R.; Menzel, M. A.; and Odom, R. H. *Forest Ecology and Management* 155(1-3): 131-141. (2002)
 NAL Call #: SD1.F73; ISSN: 03781127.
Notes: doi: 10.1016/S0378-1127(01)00553-9.
Descriptors: clearcutting/ Cove hardwoods/ habitat connectivity/ Salamanders/ Southern Appalachians/ biodiversity/ hardwoods/ landforms/ Drift-fence arrays/ forestry/ amphibians/ clearcutting/ species diversity/ species richness/ United States/ Amphibia/ Amphiuma means/ Caudata/ Desmognathus/ Desmognathus aeneus/ Desmognathus monticola/ Desmognathus ocoee/ Desmognathus quadramaculatus/ Eurycea/ Eurycea bislineata/ Gyrinophilus/ Gyrinophilus porphyriticus/ Monticola/ Notophthalmus/ Notophthalmus viridescens/

Plethodon/ Plethodon glutinosus/ Plethodon jordani/
Plethodon serratus/ Pseudotriton/ Pseudotriton ruber/
Reptilia/ Salamandridae

Abstract: We surveyed cove hardwood stands aged 15, 25, 50, and ≥ 85 years following clearcutting in the southern Appalachian Mountains of northern Georgia to assess the effects of stand age and stand habitat characteristics on salamander communities using drift-fence array and pitfall methodologies from May 1994 to April 1995. Over a 60,060 pitfall trapnight effort, we collected 3937 salamanders represented by *Desmognathus aeneus*, *Desmognathus monticola*, *Desmognathus ocoee*, *Desmognathus quadramaculatus*, *Eurycea bislineata*, *Gyrinophilus porphyriticus*, *Pseudotriton ruber*, *Plethodon glutinosus*, *Plethodon serratus*, and *Notophthalmus viridescens*. Analysis of covariance with pitfall array to stream distance as the covariate showed that salamander species richness and diversity measures and numbers of *Desmognathus aeneus* and *Desmognathus ocoee* were highest in stands ≥ 85 years. *Eurycea bislineata* and *Plethodon glutinosus* were more abundant in stands ≤ 50 years old than in stands ≥ 85 years. Within cove hardwood stands, species richness and diversity measures and relative abundances of *Desmognathus* spp. and *Gyrinophilus porphyriticus* were negatively correlated with distance to stream. Species richness and diversity were positively correlated to amounts of emergent rock. Species richness, diversity and relative abundances of *Desmognathus* spp. were correlated with basal area within stands and extent of connected mesic, cove hardwood habitat and amount of cove habitat within 1 km radius among stands. *Eurycea bislineata* was negatively correlated with landform index, a measure of surrounding landform sheltering, and *Plethodon glutinosus* was positively correlated with elevation in cove hardwood stands. Our research indicates stand age is an important factor in explaining the abundance and community composition of salamanders in southern Appalachian cove hardwood communities. Because southern Appalachian woodland salamander communities are slow to recover and are substantially changed following disturbances such as clearcutting, populations in small, isolated cove hardwood stands might be more vulnerable to extirpation or may require longer recovery times than those in larger coves. Managers may need to assess habitat features such as cove extent and habitat connectivity to minimize impacts on these taxa by forest management activities in southern Appalachian cove hardwood communities.

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1313. Stand-level response of breeding forest songbirds to multiple levels of partial-cut harvest in four boreal forest types.

Harrison, R. B.; Schmiegelow, F. K. A.; and Naidoo, R. *Canadian Journal of Forest Research* 35(7): 1553-1567. (2005)

NAL Call #: SD13.C35; ISSN: 00455067.

Notes: doi: 10.1139/x05-076.

Descriptors: biodiversity/ combustion/ ecosystems/ harvesting/ boreal forests/ forest songbirds/ ground nesters/ retention levels/ forestry/ avifauna/ boreal forest/ clearcutting/ ecological impact/ harvesting/ songbirds/ species diversity/ biodiversity/ combustion/ ecosystems/ forests/ harvesting/ shrubs/ Alberta/ Canada/ North America/ Aves/ Passeri

Abstract: We investigated whether impacts on boreal forest

songbird communities in northwestern Alberta could be mitigated through a harvesting system that attempts to emulate the local natural disturbance regime. The EMEND (Ecosystem Management by Emulating Natural Disturbance) project is a multidisciplinary experiment to compare clearcuts and partial-retention cuts in four upland cover types with uncut forest and with experimentally burned stands. We studied breeding birds at EMEND between 1998 (pretreatment) and 2000, focusing on their responses to partial harvesting. Partial cuts were generally intermediate (and varied in a linear fashion) between clearcuts and undisturbed forest for community and species measures. Species that declined in abundance in partial cuts were typically dependent on shrubs and trees, whereas species that benefited were typically ground nesters. While partial cutting offered some advantages over clear-cutting in conserving short-term avian diversity, we suggest that low retention levels (i.e., 10%, 20%) cannot be justified from this perspective. The benefits that accrued in these treatments were relatively small, and species that declined or disappeared were typically characteristic of mature forest habitats. Higher retention levels (i.e., 50%, 75%) may conserve some species of concern, but the extent to which these treatments offer productivity advantages over lower residuals requires further study.

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1314. Stand structure and small mammals in young lodgepole pine forest: 10-year results after thinning.

Sullivan, T. P.; Sullivan, D. S.; and Lindgren, P. M. F.

Ecological Applications 11(4): 1151-1173. (2001)

NAL Call #: QH540.E23; ISSN: 10510761

Descriptors: biodiversity/ crop trees/ old-growth forest/ *Pinus contorta*/ precommercial thinning/ silviculture/ small mammals/ species richness and diversity/ stand density/ stand structure/ tree growth/ wildlife habitat/ community composition/ forest management/ stand structure/ thinning/ Canada/ *Clethrionomys gapperi*/ *Pinus contorta*

Abstract: Management of forested landscapes for biological diversity is a major objective across North America. Perhaps the greatest potential to diversify future forests lies in the vast areas of young second-growth stands which may be managed silviculturally to accelerate ecosystem development. This study was designed to test the hypotheses that large-scale precommercial thinning, at ages 17-27 yr, to various stand densities would, over the 10-yr period since treatment, enhance: (1) productivity of lodgepole pine (*Pinus contorta*) crop trees, (2) stand structure attributes, and (3) species richness and diversity of forest floor small-mammal communities. Study areas were located near Penticton, Kamloops, and Prince George in south-central British Columbia, Canada, in three forest ecological zones. Each study area had three stands thinned to densities of ~500 (low), ~1000 (medium), and ~2000 (high) stems/ha, with an unthinned juvenile pine and old-growth pine stand for comparison. Understory vegetation was measured in all stands in 1990, 1993, and 1998, and coniferous tree layers were measured in 1998. Small-mammal populations were sampled intensively in 1990, 1991, and 1998. Mean diameter increments of trees in the low-density stands were significantly higher than those in the medium- and high-density stands at all study areas. Mean height increments of trees were similar in the medium- and high-density stands and significantly higher

than that in the low-density stands at Penticton and Prince George. Crown volume index (biomass) of herbs was highest in the thinned stands by 1998, but there was no difference among stands for shrubs and trees; volume of mosses was highest in the old-growth stands. Mean species richness and diversity of herbs, shrubs, and trees were similar among stands at 2, 5, and 10 yr after thinning. However, mean species diversity and structural diversity of coniferous trees were significantly higher in the low- and medium-density stands than in the high-density and unthinned stands 10 yr after thinning. Total structural diversity of all vegetation in the low-density stands was significantly greater than that of the medium-density, unthinned, and old-growth stands in 1998. Mean total abundance of all small mammals was similar among stands in 1990-1991, but the low-density and old-growth stands had the most mammals in 1998. Mean abundance of southern red-backed voles (*Clethrionomys gapperi*) was consistently higher (2.1-3.3 times) in the old-growth stands than in unthinned stands. In seven of nine cases, mean abundance of red-backed voles was similar among old-growth and thinned stands. Mean species richness and species diversity of small mammals were highest in the low-density and medium-density stands. Heavily thinned lodgepole pine stands developed structural attributes such as large diameter trees, large crowns, and structurally diverse vegetative understories. Forest floor small-mammal communities reflected the compositional and structural diversity of these managed stands.

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1315. Stand structures used by northern spotted owls in managed forests.

Irwin, Larry L.; Rock, Dennis F.; and Miller, Gregory P.

Journal of Raptor Research 34(3): 175-186. (2000)

NAL Call #: QL696.F3J682; ISSN: 0892-1016

Descriptors: *Strix occidentalis*/ foraging habitat/ managed forests/ nesting habitat/ northern spotted owl/ Oregon

Abstract: The authors compared vegetative structures in 4-16-ha patches in forest stands used by 12 pairs of northern spotted owls (*Strix occidentalis caurina*) for nesting (N = 44) and foraging (n = 38) with habitat structures in 50 stands located randomly throughout annual home ranges in a young and mid-successional forest landscape (25-79 year-old stands) in the foothills of the western Cascades in Oregon. Forest stand structures influenced selection for stands used for foraging and nesting by spotted owls, and abundance of these structures varied with successional development as represented by five age classes. Conifer saplings (10-19 cm in diameter at breast height [dbh]) and trees 50-79 cm dbh were more abundant in foraging areas than nest sites or random sites. Large snags (>40 cm dbh) tended to be more abundant, down woody debris was more abundant, and cover of herbs and low-growing shrubs (<0.5 m) was lower in stands in which owls hunted frequently than in randomly located stands of the same age classes. Owls nested in trees as young as 41 years old, although 65% of nest trees were older than 120 years of age. The authors found 22 (50%) nests in forest stands 46-79 years of age, whereas owls repeatedly foraged in stands as young as 27 years of age. Silviculturists should be able to create foraging habitat for northern spotted owls in managed forests by emphasizing control of tree densities and form, woody debris, and understory vegetation. Suitable nesting habitat might best be facilitated via

retaining legacy trees. Future research should determine the relative contribution of managed forests to owl conservation.

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1316. Status of American martens in coastal forests of the Pacific states.

Zielinski, W. J.; Slauson, K. M.; Carroll, C. R.; Kent, C. J.; and Kudrna, D. G.

Journal of Mammalogy 82(2): 478-490. (2001)

NAL Call #: 410 J823; ISSN: 00222372.

Notes: doi: 10.1644/1545-1542(2001)082

<0478:SOAMIC>2.0.CO;2.

Descriptors: conservation/ distribution/ marten/ *Martes americana*/ Pacific states/ coniferous forest/ conservation status/ historical record/ passerines/ population distribution/ United States/ Coniferophyta/ *Martes americana*/ Mustelinae/ Passeriformes

Abstract: American martens (*Martes americana*) are associated strongly with mature conifer forests and once occurred throughout the mountains of the coastal Pacific states. We sought to document the distribution of martens in this region using historical records and to understand recent change in their distribution. We described the distribution of martens from 1900 to 1949 using museum and trapping records and compared it to recent (1989-1998) detections at camera and track-plate stations. Martens were detected at only 12 of the 237 (5.1%) survey sample units in coastal California, Oregon, and Washington. Martens are absent from most of the historical range of the Humboldt marten (*M. a. humboldtensis*) in California and also may have declined on the Olympic Peninsula of Washington. Few data exist from northwestern Oregon and southwestern Washington, but the limited amount of protected public land and absence of reported road kills are reasons for concern for populations in this region. Martens still occur in the central and southern coastal mountains of Oregon. Our results suggest that conservation of martens in coastal forests will require new initiatives to protect existing populations and new efforts to document all populations of martens in this region. Conservation measures should include a reevaluation of timber harvest plans that affect habitat in coastal forests, interagency cooperation on a coastal marten conservation assessment, and the collection of new survey information, especially on private lands in southwestern Washington and northwestern Oregon.

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1317. Structural characteristics of forest stands within home ranges of Mexican spotted owls in Arizona and New Mexico.

Ganey, Joseph L.; Block, William M.; and Ackers, Steven H.

Western Journal of Applied Forestry 18(3): 189-198. (2003)

NAL Call #: SD388.W6; ISSN: 0885-6095

Descriptors: forestry/ terrestrial ecology: ecology, environmental sciences/ wildlife management: conservation/ forest habitat management/ applied and field techniques/ radio marking/ applied and field techniques

Abstract: As part of a set of studies evaluating home-range size and habitat use of radio-marked Mexican spotted owls (*Strix occidentalis lucida*), we sampled structural characteristics of forest stands within owl home ranges on two study areas in Arizona and New Mexico. Study areas

were dominated by ponderosa pine (*Pinus ponderosa*)- Gambel oak (*Quercus gambelii*) forest (Arizona) or mixed-conifer forest (New Mexico). We describe structural characteristics of forest stands used by spotted owls for both foraging and roosting, in terms of central tendencies and variability in structural characteristics among stands. Our results indicated that stands used for foraging were more variable than stands used for roosting. Observed distributions of structural variables were consistent with recommendations in the recovery plan governing management of owl habitat with a few potentially important exceptions. We also provide additional recommendations for application in forest management, based both on observed data and on extensive collective experience with the owl and its habitat.

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1318. Structural characteristics of wet montane forests in east-central British Columbia.

DeLong, S. C.; Arocena, J. M.; and Massicotte, H. B.

Forestry Chronicle 79(2): 342-351. (2003)

NAL Call #: 99.8 F7623; ISSN: 00157546

Descriptors: *Abies lasiocarpa/ Picea engelmannii/ snags/ stand structure/ wildlife habitat/ woody debris/ ecosystems/ management/ supports/ wood/ wet montane forests/ forestry/ coarse woody debris/ forest management/ montane forest/ silviculture/ snag/ stand structure/ ecosystems/ forests/ management/ wood/ Canada*

Abstract: Structural characteristics of forest stands were examined along a post-fire age chronosequence for wet montane sub-boreal and sub-alpine forests in the northern portion of the Rocky Mountains in British Columbia, Canada. The objective was to develop criteria that could be used to assess the extent to which managed stands approximate the structural characteristics of natural stands. Twelve and fifteen stands were sampled in wet montane sub-boreal and high-elevation subalpine forests, respectively. Tree density, variation in tree size, snag density by size class and coarse woody debris volume were examined for young (0-70 years), mature (71-140 years), and old (> 140 years) stands. Apart from a general increase in average tree size and a decrease in snag density, changes in other stand attributes over time since disturbance were limited, especially when compared to forests in drier climates at similar latitudes. The combination of low density and large variability in tree size of the young wet montane sub-boreal stands appear to be unusual for low elevation forests that originate from stand-replacing wildfire. In the study area, current management practices of salvage-logging fire-killed stands and planting relatively high densities of spruce on harvested sites should be examined in light of our data. This study illustrates the importance of developing area-specific ecosystem management guidelines relating to stand structure.

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1319. Suggestions for a silvicultural prescription for cerulean warblers in the Lower Mississippi Alluvial Valley.

Hamel, Paul B.

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. 567-575.

Notes: 0196-2094 (ISSN).

Descriptors: *conservation measures/ reproduction/ ecology/ terrestrial habitat/ land zones/ Dendroica cerulea: habitat management/ silvicultural prescription/ Arkansas/ Tennessee/ reproduction/ breeding biology/ management implications/ habitat utilization/ forest and woodland/ Arkansas/ Desha County/ Tennessee/ Lauderdale and Shelby Counties/ Aves, Passeriformes, Parulidae/ birds/ chordates/ vertebrates*

Abstract: Conservation of species with high Partners in Flight concern scores may require active habitat management. Cerulean Warbler (*Dendroica cerulea*) occurs at low numbers in the Lower Mississippi Alluvial Valley in the western part of its breeding range. A study of the breeding ecology of the species was initiated in 1992 on three sites there. Characteristics of individual trees used by the birds have been measured in detail. Elements of the vegetation utilized by male Cerulean Warblers, by female Cerulean Warblers, and as nests have been identified. A silvicultural prescription designed to produce these elements is being prepared as an experimental manipulation of habitats for the birds. The development of this suggested silvicultural prescription offers an example for development of similar prescriptions for other forest canopy dwelling bird species. One difficulty may be in assessing the response of the birds to the treatments when the available habitat exceeds the amount needed to support the spatial needs of the local small population, whether the measured response is one of abundance or of productivity. This is because the response may be smaller than can be detected by the experimental design used to conduct the experiment; available birds may not be numerous enough to produce a detectable response.

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1320. Summer and fall use of logging residue piles by female short-tailed weasels.

Lisgo, Kimberly A.; Bunnell, Fred L.; and Harestad, Alton S.

In: Proceedings of the Symposium on the Ecology and Management of Dead Wood in Western Forests, General Technical Report-PSW 181/ Laudenslayer, W. F.; Shea, P. J.; Valentine, B. E.; Weatherspoon, C. P.; and Lisle, T. E.; Albany, CA: Pacific Southwest Research Station, Forest Service, U.S. Department of Agriculture, 2002. pp. 319-329.

Notes: 0196-2094 (ISSN); Symposium held November 2-4, 1999 in Reno, NV.

<http://www.fs.fed.us/psw/publications/documents/gtr-181/>
Descriptors: *conservation measures/ nutrition/ diet/ prey/ ecology/ population dynamics/ predators/ terrestrial habitat/ land zones/ North America/ Canada/ Mustela erminea: habitat management/ mammalian prey/ Rodentia/ food availability/ mammalian prey abundance/ habitat utilization/ logging residue pile use/ seasonal changes and influences/ conservation implications/ forest/ forest and woodland/ Alberta/ Edmonton/ Owl River/ Mammalia, Carnivora, Mustelidae/ carnivores/ chordates/ mammals/ rodents/ vertebrates*

Abstract: Female short-tailed weasels (*Mustela erminea*) used piles of logging residue more than expected and used areas without logging residue less than expected when they were in 3-year-old regenerating aspen (*Populus tremuloides*) cutblocks during summer and fall ($P < 0.001$). Female weasels may prefer piles of logging residue because they offer greater amounts of food, larger numbers

of rest sites, and greater availability of travel corridors. Our data indicate that food abundance, specifically the southern red-backed vole (*Clethrionomys gapperi*), best explains the preferential use of logging residue piles by female weasels. Recommendations for the management of logging residue piles are discussed,

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1321. Summer habitat use and home-range analysis of the endangered Indiana bat.

Menzel, J. M.; Ford, W. M.; Menzel, M. A.; Carter, T. C.; Gardner, J. E.; Garner, J. D.; and Hofmann, J. E.

Journal of Wildlife Management 69(1): 430-436. (2005)

NAL Call #: 410 J827; ISSN: 0022541X.

http://www.fs.fed.us/ne/newtown_square/publications/other_publishers/OCR/ne_2005_Menzel001.pdf

Descriptors: corridors/ Euclidean distance analysis/ habitat use/ riparian habitat/ bats/ endangered species/ habitat use/ riparian zone/ summer/ *Myotis sodalis*/ Riparia

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1322. Survey of amphibians and reptiles in two types of managed forests in central Pennsylvania.

Yahner, Richard H.; Piergallini, Nell H.; and Ross, Bradley D.

Journal of the Pennsylvania Academy of Science 74(2-3): 48-51. (2001)

NAL Call #: Q11.J682; ISSN: 1044-6753

Descriptors: commercial activities/ ecology/ population dynamics/ land and freshwater zones/ Amphibia/ Reptilia: forestry/ management practices/ fauna and abundance relationships/ survey study/ community structure/ population density/ comparison of different types of managed forests/ Pennsylvania/ Centre County/ Faunal survey/ managed forest habitat/ amphibians/ chordates/ reptiles/ vertebrates

Abstract: Amphibian and reptile populations were surveyed at two study sites in central Pennsylvania for a 5-year period (1994-98). The Barrens Grouse Habitat Management Area (GHMA) site was managed by an even-aged system of timber harvesting, and the Toftrees site was irrigated with treated effluent (irrigated wastewater). Eleven species (190 individuals) of amphibians and reptiles were recorded at the Barrens GHMA and Toftrees study sites combined. At both study sites, fewer species and individuals were found in the reference sectors (e.g., undisturbed) than in the managed (disturbed) sectors, which to some extent was a function of a greater sampling effort in the managed sector of each study site. A major difference between the two sites was in the common species observed, with salamanders predominating at the Barrens GHMA site and frogs at the Toftrees site. This study suggests that both timber-harvesting practices and wastewater irrigation may negatively affect the distribution and abundance of amphibian and reptile populations in central Pennsylvania.

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1323. Survival and nest success of female wild turkeys in a Louisiana bottomland hardwood forest.

Wilson, Walker B.; Chamberlain, Michael J.; and Kimmel, Frederick G.

Proceedings of the Annual Conference Southeastern Association of Fish and Wildlife Agencies 59:

126-134. (2005)

NAL Call #: SK1.S6; ISSN: 0276-7929

Descriptors: conservation measures/ reproduction/ ecology/ population dynamics/ terrestrial habitat/ land zones/ *Meleagris gallopavo*: habitat management/ reproductive productivity/ survival/ forest and woodland/ bottomland hardwood forest/ survival and nest success of females/ management implications/ Louisiana/ Iberville/ Point Coupee and St. Martin parishes/ Aves, Galliformes, Phasianidae/ birds/ chordates/ vertebrates

Abstract: Survival of female wild turkeys (*Meleagris gallopavo*) influences turkey productivity. Although patterns of survival and productivity have been extensively researched in most forested landscapes, little information is available for female turkeys in bottomland hardwood systems, although importance of these systems is widely recognized. Therefore, we captured and radiomarked 39 female wild turkeys in a bottom-land hardwood forest in south-central Louisiana during 2001-2004. Mean annual survival was 0.67. Survival was greatest during preincubation (1.00) potentially because of increased habitat sampling and movement during this period. Fall-winter survival was high (0.93), likely attributable to stable foraging resources and a lack of illegal and legal harvest during this period. Lowest survival occurred during incubation (0.75) and brood-rearing (0.83), primarily as a result of increased risks of predation associated with nesting and brood rearing. Nest initiation rates (33%) were among the lowest reported, likely attributable to high nest loss from predation and flooding prior to completion of laying. Nest success of females reaching onset of incubation was 38%. Our findings suggest that the wild turkey population on our study site balances exceptionally low productivity with relatively high adult female survival. To ensure sustainable populations of wild turkeys, managers should monitor relationships between survival and productivity. Specific to our study site, improvements in nesting habitat may be needed to increase nest success and recruitment.

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1324. Swainson's warbler habitat selection in a managed bottomland hardwood forest.

Peters, K. A.; Lancia, R. A.; and Gerwin, J. A.

Journal of Wildlife Management 69(1): 409-417. (2005)

NAL Call #: 410 J827; ISSN: 0022541X.

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Descriptors: bottomland hardwoods/ even-aged/ habitat selection/ *Limnothlypis swainsonii*/ productivity/ riparian/ shearing/ South Carolina/ Swainson's warbler/ deciduous forest/ habitat selection/ passerines/ *Limnothlypis swainsonii*/ Riparia

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1325. Synthesis of large-scale bird conservation plans in Canada: A resource for forest managers.

Cooper, J. M. and Manning, E. T.

NCASI Special Report (06-05): 1-53. (2006)

Descriptors: bird conservation regions/ Canadian federal bird management plans/ Canadian Species at Risk Act/ North American Landbird Conservation Plan

Abstract: There are four major bird management plans in effect in Canada: the North American Landbird Management Plan, the North American Waterfowl Management Plan, the Canadian Shorebird Conservation Plan, and Wings Over Water (the Canadian waterbird conservation plan). These plans cover almost all native bird species that occur regularly in Canada. All of these plans operate under the North American Bird Conservation Initiative (NABCI). The intent of this report is to increase awareness of the four major Federal bird plans among the forest industry, to provide forest managers a common reference point relative to the Federal government's perspective on managing various types of birds in Canada, and to synthesize information on birds that is most relevant to forest management planning. About 634 species of birds occur in Canada. We reviewed all of those bird species and identified species which may be affected by forestry operations. Effects of forestry on birds may be positive, negative, or mixed depending on the species, specific management practices, spatial scale, and time scale. We also reviewed the Bird Conservation Region (BCR) concept, a tool developed for the North American Bird Conservation Initiative. BCRs are ecologically defined units that share similar avifaunas and provide a consistent spatial framework for bird conservation across North American landscapes. The BCR concept is very relevant to the forest industry because most of the forest bird conservation planning processes currently underway in Canada are related to BCRs and the priority forest bird species within each. The plan most relevant to the forest industry is the Partners in Flight North American Landbird Conservation Plan (NALCP). It provides a continental synthesis of priorities and objectives to guide conservation actions for landbirds, many of which are forest-dwelling species. The primary objective of the NALCP is to maintain a representative diversity of avifauna in all ecoregions of Canada and the U.S. Many of the 448 species covered by the NALCP breed in forested landscapes and may be directly or indirectly affected by forestry operations in positive and negative ways over various temporal and spatial scales, depending on the species and practice in question. We estimate that 48 of those species, which are all on Watch or Stewardship Lists, are of interest to the forest industry, as special management may be required to conserve populations. Other species that may be affected by forestry operations are thought to be secure under current conditions. The North American Waterfowl Management Plan (NAWMP) is an international (Canada, U.S., Mexico) action plan to conserve migratory waterfowl (ducks, geese, and swans) throughout the continent. The NAWMP was initiated in 1986, updated in 1998, and is a partnership of federal, provincial/state and municipal governments, non-governmental organizations, industry and many individuals. The primary objective of the NAWMP is to restore North American waterfowl populations to levels recorded during the 1970s, a period of relative abundance for waterfowl populations. Notably, there are several species that have already exceeded these objectives. Of the 39 waterfowl species that occur in Canada and that are

covered by the NAWMP, only 8 species are thought to be potentially affected by forestry operations; most of these species are cavity-nesting ducks. The Canadian Shorebird Conservation Plan (CSCP) is a national plan designed to promote the conservation of shorebirds in Canada. The plan is intended to cooperate with other bird conservation initiatives including the U.S. Shorebird Conservation Plan, the Western Hemispheric Shorebird Reserve Network, the North American Waterfowl Management Plan, and Wings Over Water. The CSCP's stated vision is to ensure that healthy populations of shorebirds are distributed across their range and diversity of habitats in Canada and throughout their global range. Of the 47 shorebird species covered by the CSCP, we suggest only 4 species (listed as Not at Risk in Canada by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) are potentially impacted by forestry operations: lesser yellowlegs, greater yellowlegs, solitary sandpiper, and American woodcock. Wings Over Water (WOW), Canada's Waterbird Conservation Plan is the Canadian component of North American Waterbird Conservation Plan. The purpose of the plan is to sustain or restore, throughout the lands and waters of North America, Central America, and the Caribbean, the distribution, diversity, and abundance of populations and habitats of waterbirds. We suggest that only 5 of the 93 species covered by WOW are potentially impacted by forestry operations in Canada: Bonaparte's Gull, Green Heron, and Sandhill Crane ('Not at Risk'), and Great Blue Heron fannini subspecies ('Special Concern') and Marbled Murrelet ('Threatened'). We briefly reviewed linkages between Canada's Species At Risk Act and the 4 bird conservation plans, mainly as they may lead to future bird species conservation priorities at federal and provincial levels. Finally, we provide concluding remarks on the plans' similarities, differences, and relevance to the forest industry. The four bird conservation plans reviewed in this report have clear, but mainly indirect, relevance to forest management in Canada. The plans provide strategic-level guidance on goals and objectives for national and international conservation of birds, and on issues and threats for birds, but provide only high-level commentary on management actions or strategies. Specific management recommendations are lacking. The forest industry will need to rely on provincial and corporate guidelines, biodiversity management policy, effective operational-level actions, and formation of partnerships with other stakeholders to help attain the goals and objectives of the four federal bird conservation plans discussed herein. © 2006 by the National Council for Air and Stream Improvement, Inc. © 2008 Elsevier B.V. All rights reserved.

1326. Tassel-eared squirrel population, habitat condition, and dietary relationships in north-central Arizona.

Dodd, N. L.; States, J. S.; and Rosenstock, S. S.

Journal of Wildlife Management 67(3): 622-633. (2003)

NAL Call #: 410 J827; *ISSN:* 0022541X

Descriptors: Arizona/ diets/ forest management/ fungi/ habitat relationships/ *Pinus ponderosa*/ *ponderosa pine*/ *Sciurus aberti*/ tassel-eared squirrels/ diet/ forest management/ fungus/ habitat structure/ mark-recapture method/ population dynamics/ rodent/ United States

Abstract: We examined the seasonal population dynamics of tassel-eared squirrels (*Sciurus aberti*) in north-central Arizona, USA, during 1996-1997 to assess relationships

with forest structural habitat condition and dietary fungi use. Our 8 study sites averaged 66 ha and exhibited considerable variation in ponderosa pine (*Pinus ponderosa*) habitat structure. We conducted capture-recapture trapping during 3 seasons each year, for a total of 56,016 trap days and 2,542 captures of 450 squirrels. We attained population estimates with mean standard error $\pm 10\%$. Density across periods ranged from 0.05 to 1.03 squirrels/ha, and fluctuated widely at all our study sites, particularly between April and August trapping periods. Indices of recruitment averaged 0.14 juveniles/female. Survival rates averaged 0.78, with winter survival (0.63) significantly lower than other periods. We analyzed 382 fecal samples for seasonal hypogeous and epigeous fungi, of which 21 taxa were detected. Mean fecal fungal content was significantly higher in August (70.8% relative frequency) than in January (28.2%) and April (9.4%). Recruitment was strongly and positively related to both the number of interlocking canopy trees and August fungal content in fecal samples. August fecal fungal content was positively related to basal area for all tree species. Across all periods, squirrel density was positively related to fecal fungal diversity. Winter squirrel survival was inversely related to snow cover duration and positively related to dietary fungal diversity. Squirrel density fluctuations between April and August were positively tied to pine quadratic mean diameter. Forest management and restoration practices emphasizing intensive, widespread thinning may adversely impact tassel-eared squirrels and the fungi that provide food. Integrating squirrel habitat needs of interlocking canopies and other structural attributes in forest management will benefit squirrel populations.

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1327. Temporal and spatial use of even-aged reproduction stands by bird communities in central Pennsylvania.

Talbott, S. C. and Yahner, R. H.

Northern Journal of Applied Forestry 20(3): 117-123. (2003)
NAL Call #: SD143.N6; ISSN: 07426348

Descriptors: bird communities/ even-aged reproduction stands/ Pennsylvania/ residual trees/ biodiversity/ ecosystems/ plants (botany)/ rain/ vegetation/ wind/ bird communities/ even-aged reproduction stands/ forestlands/ residual trees/ forestry/ biodiversity/ birds/ breeding/ ecosystems/ forestry/ Pennsylvania/ plants/ rain/ reproduction/ wind/ Aves/ *Dendroica pensylvanica*/ *Mniotilta varia*

Abstract: In 1992, the Pennsylvania Bureau of Forestry adopted a new forest management practice known as even-aged reproduction with reservation (EAR), which replaces clearcutting on state forestlands. The EAR guidelines mandate the retention of at least 12 trees/ha and 24-36 m²/ha of basal area, representing a diversity of overstory and understory species. During summer 1998, we compared the temporal (breeding season vs. midsummer) and spatial (edge versus interior) use of EAR stands by birds. In addition, we compared observed vs. expected use of overstory trees in EAR stands. In each of ten representative EAR stands, we sampled birds twice per season along two-edge and two-interior transects. Total species richness and abundance (all species combined), species richness and abundance of ground-shrub foragers, and species richness of canopy-sallier foragers were significantly ($P < 0.05$) higher in the breeding season than

in mid-summer. Eight of 20 common bird species analyzed also were significantly ($P < 0.05$) more abundant during the breeding season (e.g., black-and-white warbler and chestnut-sided warbler), and one species was significantly ($P < 0.05$) more abundant during mid-summer. Total species richness, total abundance, and abundance of ground-shrub foragers were significantly higher ($P < 0.05$) in interiors compared to edges of EAR stands. Five species also were significantly ($P < 0.05$) more abundant in interiors of EAR stands, whereas no species was more common in edges. All species combined and three foraging guilds showed differential use ($P < 0.05$) of overstory tree species; eight species also differed significantly in their use of abundant tree species. Based on our findings, we believe that EAR stands are excellent substitutes for clearcuts on state forestlands, although we caution that our findings were based only on one yr of data. We recommend the continued retention of a diversity of overstory trees, especially snags and rough-barked trees, in both edges and interiors of EAR stands for use by a variety of bird species during both the breeding season and mid-summer.
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1328. Temporal patterns in aquatic and avian communities following selective logging in the Upper Great Lakes region.

Flaspohler, D. J.; Huckins, C. J. F.; Bub, B. R.; and Van Dusen, P. J.

Forest Science 48(2): 339-349. (2002)

NAL Call #: 99.8 F7632; ISSN: 0015749X

Descriptors: brook char/ forest songbirds/ macroinvertebrates/ riparian/ stream communities/ biodiversity/ ecosystems/ hardwoods/ lakes/ population statistics/ watersheds/ habitat quality/ forestry/ community structure/ organismal community/ *Salvelinus fontinalis*

Abstract: We surveyed populations of birds, fish, and aquatic macroinvertebrates in and along riparian systems within northern and mixed-hardwood forests that varied in time since last selection logging. Thirteen headwater stream sites from the Otter River watershed in Michigan's Upper Peninsula were included in the study. We detected a significant negative correlation between a standard index of habitat quality for coldwater streams (Great Lakes Environmental Assessment Section [GLEAS]) and time since last selective logging. Brook char (*Salvelinus fontinalis* Mitch.) abundance was also negatively correlated with year of forest cut as was the abundance of selected aquatic macroinvertebrate orders (Ephemeroptera, Plecoptera, and Trichoptera) that are sensitive to anthropogenic disturbance. Thus, relative to more recently logged stands, stands with older cuts had higher indices of habitat quality, more brook char, and the dominant aquatic macroinvertebrates tended to be those generally associated with higher quality coldwater streams. In contrast, bird species richness was positively related to year of last selective logging. As expected, basal area was lower and ground cover was greater in more recently logged stands. Thus, bird species richness was higher in stands with less basal area (recent cuts) than in stands with more basal area (older cuts). Percent ground cover showed a strong positive correlation with bird species richness. Twelve bird species were detected only in recently logged (since 1990) stands. The results of this multitaxa study suggest that selective logging of riparian forests is

associated with changes in local animal abundance and diversity, and these effects appear to persist for approximately 30 yr postharvest.

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1329. Temporal patterns of northern goshawk nest area occupancy and habitat: A retrospective analysis.

Desimone, S. M. and DeStefano, S.

Journal of Raptor Research 39(3): 310-323. (2005)

NAL Call #: QL696.F3J682; ISSN: 08921016

Descriptors: Accipiter gentilis/ habitat/ historical nest areas/ landscape change/ northern goshawk/ Oregon/ habitat selection/ landscape change/ nest site/ raptors/ temporal analysis

Abstract: We studied occupancy and habitat associations of Northern Goshawks (*Accipiter gentilis*) at nest areas in south-central Oregon in 1992-94. We surveyed 51 pre-1992 nest areas (i.e., historical breeding areas first discovered during 1973-91) for goshawks and used aerial-photograph interpretation to document forest cover conditions and changes over time between areas that were occupied by goshawks and those where we did not detect goshawks (no-response sites). We also surveyed for new nests during 1992-94. Of 38 occupied nests first found in 1992-94 (i.e., post-1992 nest areas), 86% (33/38) were in mid-aged (mean stand DBH 23-53 cm, <15 trees/ha >53 cm DBH) or late (≥ 15 trees/ha >53 cm DBH; mean stand DBH >53 cm) closed (>50% canopy closure) structural-stage forest. Occupancy of historical (pre-1992) nest areas by goshawks was 29% (15/51). Of 46 pre-1992 nest areas that we examined for habitat change, 15 were occupied by goshawks in 1994 and had more mid-aged closed and late closed forest in 12-, 24-, 52-, 120-, and 170-ha circular areas centered on nest locations than did 31 no-response areas. There was no difference in the amount of late closed and mid-aged closed forest in pre-1992 nest areas compared with occupied pre-1992 nest areas. A logistic regression model for all occupied nest areas confirmed that late closed and mid-aged closed forest variables were important indicators of forest conditions that supported breeding pairs. Goshawks were more likely to persist in the historical nest areas that had about 50% of mature and older closed-canopy forest within the 52ha scale. We recommend retaining existing late closed, late open, and mid closed structure within 52ha scale of the nest site. Moreover, late closed and mid closed structure combined should not fall below 50% within the 52-ha scale and should exceed 40% within the 170-ha scale surrounding the nest site. To optimize conditions for breeding goshawks, we recommend retaining large trees (>53 cm DBH) to help preserve stand integrity, maintain closed canopies, and provide connectivity to alternative nest sites within nest areas. © 2005 The Raptor Research Foundation, Inc. © 2008 Elsevier B.V. All rights reserved.

1330. Terrestrial activity, abundance and species richness of amphibians in managed forests in South Carolina.

Hanlin, Hugh G. and Martin, F. Douglas

American Midland Naturalist 143(1): 70-83. (2000)

NAL Call #: 410 M58; ISSN: 0003-0031

Descriptors: bufo terrestris/ loblolly pine/ pinus taeda/ slash pine/ southern toad/ *Carya* spp./ *Pinus elliotii*/ *Pinus* spp./ *Pinus taeda*/ *Quercus* spp./ South Carolina/ United States

Abstract: We determined the relative abundance, days of

surface activity and indices of species diversity, evenness and richness for amphibians inhabiting three differently managed forests surrounding a Carolina bay in South Carolina following restoration. We collected animals daily for 3 y (Oct. 1993-Sept. 1996) using drift fences with pitfall traps in three forest types: loblolly pine (*Pinus taeda*), slash pine (*P. elliotii*) and mixed hardwoods (predominantly oak, *Quercus* spp. and hickory, *Carya* spp.). Captured animals were marked and recaptures were recorded but not included in statistical analyses, except in our evaluation of activity. We compared results to those of a more limited study conducted before restoration. Amphibians were significantly more numerous and more active in the mixed hardwood forest than in the pine forest types. However, the hardwood forest had the lowest species diversity in 2 of the 3 y of the study. The slash pine habitat had the highest diversity in all 3 y and for the 3 y combined. Because the evenness index (J') values differ in step with the species diversity index (H') it appears that the evenness component of diversity, rather than the richness component, is what is determining H' variation. A summer subset of these data and summer data from an earlier study of 1977-1978 is in marked contrast with yearlong patterns. For our summer data each forest type had the highest H' value in one of the years of the study and again the J' values parallel the differences in H' . Large numbers of southern toads (*Bufo terrestris*) reduced evenness, and therefore species diversity, for all three habitats particularly the mixed hardwoods where this species was especially abundant. Proportionally lower numbers of *B. terrestris* in the summer samples increased J' and H' indices. Overall lower abundance and H' values in the summers of 1994-1996 compared with 1977-1978 may be the result of habitat alteration during the restoration of the Carolina bay. © NISC

1331. Territory occupancy, reproductive success, and nest site characteristics of goshawks on managed timberlands in central and northern California 1993-2000.

Richter, David J.

California Fish and Game 91(2): 100-118. (2005)

NAL Call #: 410 C12; ISSN: 0008-1078

Descriptors: Accipitridae/ Falconiformes/ *Accipiter gentilis*/ wildlife-human relationships/ behavior/ biogeography/ breeding grounds/ breeding success/ California/ California Forest Practice Rules/ commercial enterprises/ conservation/ wildlife management/ disturbances/ forests/ ecosystems/ forestry practices/ habitat alterations/ fragmented habitat/ habitat management/ land zones/ managed timberlands/ nest abandonment/ nest site characteristics/ premature dispersal/ reproduction/ productivity/ reproductive success/ territorial defense/ home range-territory/ territory occupancy

Abstract: In the eight years of this study (1993-2000), 106 goshawk territories were surveyed (71 on private timberlands, 35 on public timberlands) from 14 California counties. The uncorrected mean territory occupancy rate was 46% and the corrected mean territory occupancy rate was 55%. This study indicates that reliance only on two to 8-ha buffers is producing territory occupancy rates that are comparable to those found for fragmented habitats. Territories monitored of $>$ or $=$ 4 years showed that 46-54% (based on search protocol used) of these territories no longer meet the California forest Practice Rules (CFPR)

definition of having an active nest site. Productivity at successful nests (1.7) and productivity at active nests (1.4) were at the lower end of the recorded ranges in the Northern Goshawk Status Review; although the active nest value was nearly at the mean. It is unknown whether the values found represent the normal range for California goshawk nests or if the values are reflective of environmental constraints. Monitoring of non-altered nest sites as controls for comparison to sites that have experienced habitat alteration would provide useful insight into the issue of the potential impact of habitat alteration/fragmentation on goshawk productivity. I provide management recommendations designed to increase territory viability, territory occupancy, and protect against nest abandonment and premature dispersal of fledglings.
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1332. Timber harvest and calving site fidelity of moose in northwestern Ontario.

Welch, Ian D.; Rodgers, Arthur R.; and McKinley, R. S. *Alces* 36: 93-103. (2000); ISSN: 0835-5851
Descriptors: commercial activities/ conservation measures/ reproduction/ reproductive behavior/ habitat utilization/ land and freshwater zones/ Canada/ *Alces alces* (Cervidae): forestry/ habitat management/ birth/ breeding site/ habitat preference/ calving site fidelity/ timber harvesting/ Ontario/ Artiodactyla, Mammalia/ chordates/ mammals/ vertebrates
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1333. Tools for blending economic and ecological objectives on private forestlands.

Wigley, T. Bently; Mitchell, Michael S.; Van Deusen, Paul C.; and Lancia, Richard A. *Transactions of the North American Wildlife and Natural Resource Conference* 66: 68-83. (2001)
NAL Call #: 412.9 N814; ISSN: 0078-1355
Descriptors: commercial activities/ conservation measures/ terrestrial habitat/ land and freshwater zones/ Aves: forestry/ habitat management/ forest and woodland/ South Carolina/ private forestlands/ economics/ ecology/ birds/ chordates/ vertebrates
Abstract: In this paper, we describe the harvest-scheduling program (Habplan), predictive wildlife models that we developed, and the benefits and challenges associated with incorporating predictive wildlife models into harvest scheduling programs.
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1334. Tree diseases, canopy structure, and bird distributions in ponderosa pine forests.

Lundquist, J. E. and Reich, R. M. *Journal of Sustainable Forestry* 23(2): 17-45. (2006); ISSN: 10549811.
Notes: doi: 10.1300/J091v23n02_02.
Descriptors: diversity/ forest health/ Insect pests/ pathogens/ spatial models/ sustainability
Abstract: We examined how canopy patterns at the landscape scale can influence bird community composition, abundance, or distribution. Our long-term goal is to determine how diseases and other small-scale disturbances that change canopy patterns influence bird distribution. Little is known about these relationships, partly because most measures of disturbance are based on timber production metrics. We developed a spatially dependent metric referred to as canopy closure roughness,

which was significantly correlated to bird diversity on 4 ha sample plots, and used it to generate a spatial model showing the distribution of bird diversity at a resolution of 30m over an area of 1 million acres (the entire Black Hills National Forest). Number of bird species per stand varied between 2 and 16. Number of species and bird diversity were positively related to intensity of tree cutting. Most common bird species were yellow-rumped warbler, dark-eyed junco, Townsend's solitaire, blackcapped chickadee and red-breasted nuthatch. The spatial model of bird diversity showed clusters of high diversity at different locations within the forest. These methods may help lead to better tools for managing the linkages between specific disturbances and bird usage and enable more effective disturbance management by offering a platform for spatial planning. © by The Haworth Press, Inc. All rights reserved.
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1335. Use and selection of bridge and tree roosts by Rafinesque's big-eared bats in an intensively managed landscape.

Loeb, S. C.: 21-22. (2007).
Notes: Conference: 17th Colloquium on Conservation of Mammals in the Southeastern United States, Destin, Florida, February 15-16, 2007.
Descriptors: bats/ habitat use/ roosting/ behavior/ Rafinesque's big-eared bat/ *Corynorhinus rafinesquii*/ South Carolina
Abstract: Rafinesque's big-eared bat (*Corynorhinus rafinesquii*) is listed as a species of special concern by every state within its range. Thus, information on its habitat requirements, particularly roosting requirements, is critical to its conservation. Rafinesque's big-eared bats commonly roost in bridges and buildings, particularly during summer. Even when anthropogenic structures are used as the primary roost, tree roosts are also used. The objectives of this study were to determine: 1) seasonal use of bridges and trees, and 2) use and selection of tree roosts by Rafinesque's big-eared bats on the Savannah River Site in the Upper Coastal Plain of South Carolina. Bridges, a barn, and most roost trees were checked at least once per week from May through October 2005 and 2006 and 1-2 times per month from November 2005 through April 2006. Rafinesque's big-eared bats were captured in bridges and roost trees, radio-tagged, and followed 1-24 days from May through October 2005 (n=12) and 2006 (n=15). Characteristics of tree roosts and randomly selected trees were measured and compared. Bridge/barn occupancy was high throughout summer, declined through the fall, and was lowest from December through February. Tree roost occupancy followed a similar pattern but was generally lower than bridge/barn occupancy. Eighteen roost trees were located; the majority (55.6%) were in basal cavities of black tupelo (*Nyssa sylvatica*). Other species used were oaks, sweetgum, American beech, and river birch with tupelo being selected over other species. Height, percent bark, and distance to nearest tree did not differ between roost and random trees. However, DBH and number of cavities of roost trees were significantly greater than random trees. These results suggest that conservation of large tupelo and other large cavity trees in bottomland hardwoods are important for providing Rafinesque's big-eared bats with alternate roosting sites in highly managed habitats.
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1336. Use by bats of patches of residual trees in logged areas of the boreal forest.

Hogberg, Lauren K.; Patriquin, Krista J.; and Barclay, Robert M. R.

American Midland Naturalist 148(2): 282-288. (2002)

NAL Call #: 410 M58; ISSN: 0003-0031

Descriptors: Lasionycteris noctivagans/ Myotis lucifugus/ Myotis septentrionalis/ Vespertilionidae/ Chiroptera/ Microchiroptera/ terrestrial ecology/ bat activity monitoring/ Alberta/ boreal forest/ foods-feeding/ forests/ ecosystems/ forestry practices/ habitat alterations/ habitat management/ habitat use/ Peace River vicinity/ wildlife-human relationships/ Canada/ commercial enterprises/ conservation/ wildlife management/ disturbances/ land zones/ nutrition/ Microchiroptera/ silviculture/ boundary/ habitat/ activity/

Abstract: Previous studies have shown that bat activity is greater along forest-clearcut edges than in the center of clearcuts or in the forest interior. Residual patches of trees in logged areas may also provide habitat for bats. To investigate this, we monitored bat activity at three locations within cutblocks: along the outside edge of the forest cutblock, in the center of the clearcut portion of the cutblock and along the outside edge of the residual patches of trees, at the EMEND (Ecosystem Management by Emulating Natural Disturbance) study site in northern Alberta, during the summer of 2000. Our results indicate that small maneuverable species such as *Myotis lucifugus* and *M. septentrionalis* were equally active along the edge of residual patches and the forest edge of cutblocks and least active in the center of cutblocks. Larger species, such as *Lasionycteris noctivagans*, showed no preference. Thus, patches of residual trees provide commuting habitat, and potentially foraging habitat, for bats.

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1337. Use of farmland riparian strips by declining and crop damaging birds.

Deschenes, M.; Belanger, L.; and Giroux, J. F.

Agriculture, Ecosystems and Environment 95(2-3): 567-577. (2003)

NAL Call #: S601.A34; ISSN: 01678809

Descriptors: bird conservation/ crop damage/ farmland/ Quebec/ riparian habitats/ agricultural land/ behavioral ecology/ birds/ crop damage/ riparian vegetation/ species conservation/ Canada

Abstract: Riparian strips prevent river bank erosion, help to maintain water quality, and contribute to the maintenance of biodiversity in agro-ecosystems. These areas are often perceived by farmers as potential breeding habitats of animals and plants that are harmful to crops. Consequently, the vegetation in riparian strips is periodically subjected to grazing, mowing, burning and/or herbicide spraying. Bird use was compared among six types of farmland riparian strips (grazed, grassy herbaceous, non-grassy herbaceous, low shrubby, tall shrubby, and wooded) in the agricultural landscape of southern Quebec (Canada). These strip types constituted a gradient with respect to plant diversity, vegetal structure, and plant cover control or disturbance. The objectives of this study were to document the avian communities of these riparian strip habitats to determine (1) their respective contribution to bird conservation and (2) their role as potential breeding habitats for crop damaging bird species. Bird abundance and species richness were greater in the wooded and tall shrubby strips than in the

other riparian strips. Abundance of crop damaging species was significantly greater in wooded strips than in any other type; however, Red-winged Blackbirds, the most abundant bird species recorded and the species most likely to damage crops in the study area, did not differ in abundance among the six strip types, nor in adjacent crop fields.

Diversified riparian strip habitats that include trees and tall shrubs can contribute to the preservation of avian diversity in agricultural landscapes, without providing significant breeding habitats for birds harmful to agriculture.

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1338. Use of group-selection and seed-tree cuts by three early-successional migratory species in Arkansas.

Alterman, Lynn E.; Bednarz, James C.; and Thill, Ronald E. *Wildlife Biology* 117(4): 353-363. (2005)

NAL Call #: SK351.W663; ISSN: 0043-5643

Descriptors: commercial activities/ conservation measures/ reproduction/ ecology/ terrestrial habitat/ land zones/ *Dendroica discolor*/ *Icteria virens*/ *Passerina cyanea*: forestry/ Practices/ abundance/ habitat use and nesting success relations/ management implications/ habitat management/ reproductive productivity/ nesting success/ population dynamics/ habitat utilization/ forest and woodland/ mixed forest habitat/ Arkansas/ Ouachita National Forest/ Aves, Passeriformes, Emberizidae/ birds/ chordates/ vertebrates

Abstract: Silviculture in the Ouachita National Forest in Arkansas and Oklahoma has shifted in recent years from mostly even-aged management to a mix of even- and uneven-aged regeneration systems, including group-selection. Researchers have described presence/absence of early-successional bird species in forest openings created by even- and uneven-aged silviculture, but few have examined nest success. We examined occupancy and nest success of three early-successional species-Indigo Bunting (*Passerina cyanea*), Yellow-breasted Chat (*Icteria virens*), and Prairie Warbler (*Dendroica discolor*)-within 6- and 7-year-old openings created by group-selection (uneven-aged, =0.8 ha) and seed-tree (even-aged, 11-16 ha) cuts in Arkansas. We found 54 Indigo Bunting nests in openings created by seed-tree cuts and 28 in openings created by group-selection cuts (hereafter "seed-tree stands" and "group-selection stands," respectively). We found 50 Yellow-breasted Chat nests in seed-tree stands, but only 2 were found in group-selection stands. We found 14 Prairie Warbler nests in seed-tree and none in group-selection stands. Mayfield nest success for Indigo Bunting was 30.9% in seed-tree stands and 41.9% in group-selection openings, but there was no difference in daily nest survival (0.952 +/- 0.009 and 0.964 +/- 0.010, respectively; [chi]² = 0.792, P = 0.37). Our data suggest that Indigo Buntings can nest successfully in both regenerating seed-tree and group-selection stands; however, group-selection openings may be too small to support nesting Yellow-breasted Chats and Prairie Warblers. Public concerns about clear-cutting have resulted in increased use of uneven-aged management by the USDA Forest Service. However, before widespread implementation of group-selection cutting, additional research should be conducted to evaluate the effects of this management strategy on Neotropical migratory bird communities.

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1339. Use of mixedwood stands by wintering white-tailed deer in southern New Brunswick.

Sabine, D. L.; Ballard, W. B.; Forbes, G.; Bowman, J.; and Whitlaw, H.

Forestry Chronicle 77(1): 97-103. (2001)

NAL Call #: 99.8 F7623; ISSN: 0015-7546

Descriptors: availability/ browse/ forest plantations/ forests/ habitat selection/ mixed forests/ seasonal variation/ wild animals/ wildlife management/ winter/

Odocoileus virginianus

Abstract: On the northern edge of their range, white-tailed deer (*Odocoileus virginianus*) congregate during winter to cope with severe climate conditions. The winter habitat use of deer was documented in southern New Brunswick, Canada, during December 1993-April 1997, where winters are of moderate severity, and tested predictions concerning the influence of food and cover availability on habitat use by deer under different snow depth regimes. Sixty-three radio-collared deer were monitored during the winters of 1995-97. Within wintering areas, deer showed a preference for mixedwoods. Mixedwood stands provided only moderate amounts of food and cover relative to some other cover types, but were the only type to provide both simultaneously. Current habitat management guidelines in parts of northeastern North America consider critical habitat for wintering deer to be softwood-dominated stands. These guidelines may not provide adequate habitat in this region, since deer appear to use mixedwood stands under some conditions.

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1340. The use of sheep in forest vegetation management.

Newsome, T.

FRDA Report 251: 67-74. (Sept. 1996)

NAL Call #: SD14.B7F7; ISSN: 0835-0752.

Notes: Literature review.

Descriptors: forests/ sheep/ predation/ plant communities/ weeds/ grasses/ weed control/ *Epilobium angustifolium*/ *Poaceae*/ *Populus tremuloides*/ *Salix*/ *Valeriana*/ seedlings/ wildlife/ plant competition/ feeding preferences/ grazing/ diameter/ British Columbia

This citation is from AGRICOLA.

1341. Using a GIS model to assess terrestrial salamander response to alternative forest management plans.

Gustafson, Eric J.; Murphy, Nathan L.; and Crow, Thomas R.

Journal of Environmental Management 63(3): 281-292. (2001)

NAL Call #: HC75.E5J6 ; ISSN: 0301-4797.

http://nrs.fs.fed.us/pubs/jrnl/2001/nc_2001_Gustafson_001.pdf

Descriptors: spatial models/ GIS/ forest management/ risk assessment/ terrestrial salamanders/ timber

Abstract: A GIS model predicting the spatial distribution of terrestrial salamander abundance based on topography and forest age was developed using parameters derived from the literature. The model was tested by sampling salamander abundance across the full range of site conditions used in the model. A regression of the predictions of our GIS model against these sample data showed that the model has a modest but significant ability to predict both salamander abundance and mass per unit

area. The model was used to assess the impacts of alternative management plans for the Hoosier National Forest (Indiana, USA) on salamanders. These plans differed in the spatial delineation of management areas where timber harvest was permitted, and the intensity of timber harvest within those management areas. The spatial pattern of forest openings produced by alternative forest management scenarios based on these plans was projected over 150 years using a timber-harvest simulator (HARVEST). We generated a predictive map of salamander abundance for each scenario over time, and summarized each map by calculating mean salamander abundance and the mean colonization distance (average distance from map cells with low predicted abundance to those with relatively high abundance). Projected salamander abundance was affected more by harvest rate (area harvested each decade) than by the management area boundaries. The alternatives had a varying effect on the mean distance salamanders would have to travel to colonize regenerating stands. Our GIS modeling approach is an example of a spatial analytical tool that could help resource management planners to evaluate the potential ecological impact of management alternatives.

This citation is from Treesearch.

1342. Using conservation plans and bird monitoring to evaluate ecological effects of management: An example with fuels reduction activities in southwest Oregon.

Alexander, John D.; Seavy, Nathaniel E.; and Hosten, Paul E.

Forest Ecology and Management 238(1-3): 375-383. (2007)

NAL Call #: SD1.F73; ISSN: 0378-1127

Descriptors: commercial activities/ conservation measures/ ecology/ terrestrial habitat/ Aves: forestry/ ecological impact assessment/ conservation measures/ conservation plans/ forest management activities/ habitat management/ community structure/ environmental indicators/ forest and woodland/ management activities ecological impact assessment/ birds/ chordates/ vertebrates

Abstract: Increasingly, regional conservation plans are using information about how animals respond to changes in habitat characteristics to provide guidelines for management. However, the ability of these plans to effectively guide management remains largely untested. To test a regional bird conservation plan developed by Partners in Flight, we compared bird abundance in untreated stands to that of stands where shrub cover had been reduced to lower the risk of fire. We used these data to evaluate whether birds identified as focal species in the conservation plan increased or decreased in abundance as a result of the treatments. Over a two-year period, two of 12 Partners in Flight oak woodland and chaparral focal species were more abundant at treated units in both years; no species were consistently less abundant at treated units in both years. These results suggest small-scale (7-42 ha) treatments are consistent with the objectives identified in the Partners in Flight regional conservation plan because they benefited species associated with edges, but did not have negative effects on shrub-associated species. We suggest that this is a result of the small size of treatments and the retention of shrub patches in treated areas. An alternative explanation is that the bird/habitat relationships used to develop the conservation plans do not apply in this study area. We tested this hypothesis by comparing the

correlations between habitat characteristics and bird abundance with the information in the conservation plans. In all but one case, the direction of the correlation agreed with information in the conservation plan. This project illustrates that even though the ability of conservation plans to predict the ecological effects of management activities may be limited, they can play an important role in interpreting the results of ecological monitoring.
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1343. Using ground foraging ant (Hymenoptera: Formicidae) functional groups as bioindicators of forest health in northern Arizona ponderosa pine forests.

Stephens, S. S. and Wagner, M. R.
Environmental Entomology 35(4): 937-949. (2006)
NAL Call #: QL461.E532; ISSN: 0046225X
Descriptors: bioindicators/ forest health/ Formicidae/ functional groups
Abstract: Reintroduction of fire and thinning have been suggested as the main practices to regain forest health in ponderosa pine forests of northern Arizona. Recent silvicultural programs and the occurrence of catastrophic wildfires have created a range of disturbance severities and a mosaic of forest conditions. Sixteen stands were randomly selected to create a completely randomized experimental design with four treatments, (1) unmanaged, (2) thinned, (3) thinned and burned, and (4) wildfire, with four replicates of each treatment. We assessed changes occurring in ground foraging ant functional groups at the stand scale as related to these treatments. A pitfall trapping scheme was implemented during the summer months of 2002 and 2003. A total of 18,009 specimens were collected representing 20 species from 10 genera. We found that traditional biodiversity measures, such as species richness, diversity, and dominance were a less satisfactory measure of treatment impact on ants than functional group analysis, which allowed us to consider the ecosystem role of each species. We found that different functional groups were dominant under different levels of disturbance severity and suppressed or excluded other functional groups that were less suited to the disturbance intensity. Maintaining a diversity of habitat types is suggested for supporting ecologically diverse ant functional groups and improve forest health. © 2006 Entomological Society of America. © 2008 Elsevier B.V. All rights reserved.

1344. Using individual tree selection silviculture to restore northern goshawk habitat: Lessons from a southwestern study.

Shepperd, Wayne D.; Asherin, Lance A.; and Edminster, Carlton B.
In: Beyond 2001: A silvicultural odyssey to sustaining terrestrial and aquatic ecosystems? Proceedings of the 2001 National Silvicultural Workshop, General Technical Report-PNW 546; Portland, OR: Pacific Northwest Research Station, Forest Service, U.S. Department of Agriculture, 2002. pp. 1-9.
Notes: 0363-6224 (ISSN); Workshop held May 6-10, 2002 at Hood River, OR.
Descriptors: commercial activities/ conservation measures/ terrestrial habitat/ land zones/ *Accipiter gentilis atricapillus*: forestry/ Individual tree selection silviculture/ habitat management/ habitat restoration/ use of individual tree

selection silviculture evaluation/ forest and woodland/ Arizona/ Kaibab Plateau/ Aves, Falconiformes, Accipitridae/ birds/ chordates/ vertebrates
© Thomson Reuters Scientific

1345. Using objective function penalties to elicit owl and late seral capabilities.

Fletcher, L. Russell
In: Seventh Symposium on Systems Analysis in Forest Resources, General Technical Report-NC 205; St. Paul, MN: North Central Forest Experiment Station, Forest Service, U.S. Department of Agriculture, 2000. pp. 122-129.
Notes: ISSN: 0363-616X.
<http://www.ncrs.fs.fed.us/pubs/gtr/other/gtr-nc205/pdffiles/p46.PDF>
Descriptors: commercial activities/ conservation measures/ techniques/ terrestrial habitat/ land and freshwater zones/ *Strix occidentalis caurina* (Strigidae): forestry/ habitat management/ ecological techniques/ forest and woodland/ California/ forest habitat conditions/ modeling/ long term forest management plan/ Strigidae/ Strigiformes, Aves/ birds/ chordates/ vertebrates
Abstract: This paper addresses the issues of modeling northern spotted owl (*Strix occidentalis caurina*) habitat and late seral conditions within the long-term forest ecosystem management plan. The results presented here are from management plans constructed for several large northern California management units using the ecosystem planning express, or Ep(x) analysis process developed by VESTRA Resources. Before incorporation of the owl and seral policy constraints into the final preferred alternative linear program run, we first developed a set of strategies and objective function formulations designed to elicit owl and late seral acres for various periods in the planning horizon, primarily to see what the model was capable of producing in those periods or groups of periods. Final policy constraints were then revised based on this knowledge. The results of this strategy were that the landowner and wildlife policy analysts were able to more efficiently converge on the objectives of timber harvest and wildlife protection, and to save countless hours of linear programming run time.
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1346. Variability in vegetation effects on density and nesting success of grassland birds.

Winter, M.; Johnson, D. H.; and Shaffer, J. A.
Journal of Wildlife Management 69(1): 185-197. (2005)
NAL Call #: 410 J827; ISSN: 0022541X.
Notes: doi: 10.2193/0022-541X(2005)069<0185:VIVEOD>2.0.CO;2.
Descriptors: bobolink/ clay-colored sparrow/ density/ *Dolichonyx oryzivorus*/ nesting success/ *Passerculus sandwichensis*/ Savannah sparrow/ *Spizella pallida*/ tallgrass prairie/ variability/ vegetation structure/ grassland/ habitat management/ nesting success/ population density/ vegetation dynamics/ vegetation structure/ Aves/ *Dolichonyx oryzivorus*/ Galliformes/ *Passerculus sandwichensis*/ *Spizella pallida*
Abstract: The structure of vegetation in grassland systems, unlike that in forest systems, varies dramatically among years on the same sites, and among regions with similar vegetation. The role of this variation in vegetation structure on bird density and nesting success of grassland birds is poorly understood, primarily because few studies have

included sufficiently large temporal and spatial scales to capture the variation in vegetation structure, bird density, or nesting success. To date, no large-scale study on grassland birds has been conducted to investigate whether grassland bird density and nesting success respond similarly to changes in vegetation structure. However, reliable management recommendations require investigations into the distribution and nesting success of grassland birds over larger temporal and spatial scales. In addition, studies need to examine whether bird density and nesting success respond similarly to changing environmental conditions. We investigated the effect of vegetation structure on the density and nesting success of 3 grassland-nesting birds: clay-colored sparrow (*Spizella pallida*), Savannah sparrow (*Passerculus sandwichensis*), and bobolink (*Dolichonyx oryzivorus*) in 3 regions of the northern tallgrass prairie in 1998-2001. Few vegetation features influenced the densities of our study species, and each species responded differently to those vegetation variables. We could identify only 1 variable that clearly influenced nesting success of 1 species: clay-colored sparrow nesting success increased with increasing percentage of nest cover from the surrounding vegetation. Because responses of avian density and nesting success to vegetation measures varied among regions, years, and species, land managers at all times need to provide grasslands with different types of vegetation structure. Management guidelines developed from small-scale, short-term studies may lead to misrepresentations of the needs of grassland-nesting birds.
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1347. Variation in fire regimes of the Rocky Mountains: Implications for avian communities and fire management.

Saab, Victoria A.; Powell, Hugh D.; Kotliar, Natasha B.; and Newlon, Karen R.

Studies in Avian Biology 30: 76-96. (2005)

NAL Call #: QL671.S8; ISSN: 0197-9922.

Notes: Literature review.

Descriptors: conservation measures/ ecology/ terrestrial habitat/ abiotic factors/ physical factors/ land zones/ habitat management/ fire management/ forest and woodland/ mountain forests/ United States/ Rocky Mountains/ Aves/ birds/ chordates/ vertebrates

Abstract: Information about avian responses to fire in the U.S. Rocky Mountains is based solely on studies of crown fires. However, fire management in this region is based primarily on studies of low-elevation ponderosa pine (*Pinus ponderosa*) forests maintained largely by frequent understory fires. In contrast to both of these trends, most Rocky Mountain forests are subject to mixed severity fire regimes. As a result, our knowledge of bird responses to fire in the region is incomplete and skewed toward ponderosa pine forests. Research in recent large wildfires across the Rocky Mountains indicates that large burns support diverse avifauna. In the absence of controlled studies of bird responses to fire, we compared reproductive success for six cavity-nesting species using results from studies in burned and unburned habitats. Birds in ponderosa pine forests burned by stand-replacement fire tended to have higher nest success than individuals of the same species in unburned habitats, but unburned areas are

needed to serve species dependent upon live woody vegetation, especially foliage gleaners. Over the last century, fire suppression, livestock grazing, and logging altered the structure and composition of many low-elevation forests, leading to larger and more severe burns. In higher elevation forests, changes have been less marked. Traditional low-severity prescribed fire is not likely to replicate historical conditions in these mixed or high-severity fire regimes, which include many mixed coniferous forests and all lodgepole pine (*Pinus contorta*) and spruce-fir (*Picea-Abies*) forests. We suggest four research priorities: (1) the effects of fire severity and patch size on species' responses to fire, (2) the possibility that postfire forests are ephemeral sources for some bird species, (3) the effect of salvage logging prescriptions on bird communities, and (4) experiments that illustrate bird responses to prescribed fire and other forest restoration methods. This research is urgent if we are to develop fire management strategies that reduce fire risk and maintain habitat for avifauna and other wildlife of the Rocky Mountains.

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1348. Viability of Bell's sage sparrow (*Amphispiza belli* ssp. *belli*): Altered fire regimes.

Akcakaya, H. R.; Franklin, J.; Syphard, A. D.; and Stephenson, J. R.

Ecological Applications 15(2): 521-531. (2005)

NAL Call #: QH540.E23; ISSN: 10510761

Descriptors: Amphispiza belli ssp. belli/ coastal subshrub vegetation/ dynamic spatial structure/ fire rotation interval/ habitat model/ landscape model/ metapopulation/ sage sparrow/ San Diego County, California/ Viability/ fire history/ habitat management/ passerines/ population modeling/ population viability analysis/ California

Abstract: We modeled the viability of a Bell's Sage Sparrow (*Amphispiza belli* ssp. *belli*) metapopulation under different fire regimes in the foothills and mountains of San Diego County, California, USA. The approach integrates a landscape model, which predicts the vegetation composition and age under three fire regimes, a habitat model, which interprets the resulting landscape in terms of its suitability for the Sage Sparrow, and a metapopulation model, which predicts the viability of the species based on a dynamic spatial structure as determined by the landscape and the habitat models. Bell's Sage Sparrow depends on early-successional shrubland (chaparral) habitat, especially when the availability of preferred open coastal subshrub vegetation is limited. The three fire rotation intervals (FRI) used in the landscape model were "current" (30-yr), representing the effect of increased human ignitions; "natural" (90-yr), representing the historic shrubland fire regime at higher elevations without the effect of human ignitions; and "long" (150-yr), representing a hypothetical endpoint (very low fire frequency for southern California shrublands). The results indicated that the viability of the Sage Sparrow was highest under the "current" fire regime scenario, slightly lower (especially when population growth rate was low) under the "natural" scenario, and lowest under the "long" fire regime scenario. © 2005 by the Ecological Society of America.

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1349. Vole use of coarse woody debris and implications for habitat and fuel management.

Ucitel, Dalit; Christian, Donald P.; and Graham, Jonathan M.

Journal of Wildlife Management 67(1): 65-72. (2003)
NAL Call #: 410 J827; ISSN: 0022-541X

Descriptors: conservation measures/ ecology/ terrestrial habitat/ land zones/ *Clethrionomys gapperi*: habitat management/ habitat utilization/ coarse woody debris in forest/ management significance/ forest and woodland/ Coniferous forest/ Montana/ Missoula County/ Mammalia, Rodentia, Muridae/ chordates/ mammals/ rodents/ vertebrates

Abstract: Woody debris is an increasing management focus in forests, representing multiple and sometimes conflicting values. Fuel management may prioritize removal of coarse woody debris (CWD) to minimize wildfire occurrence, intensity, or both. Conversely, management for wildlife habitat or other ecological values often focuses on retention of CWD. We modeled and quantified CWD use by red-backed voles (*Clethrionomys gapperi*), tested whether voles move selectively in portions of forest stands with greater CWD, and correlated stand-level measures of CWD as habitat to fuel loads, providing a basis of comparison for CWD quantitative guidelines. Voles used CWD at a greater rate than expected based on availability and traveled in portions of stands with greater CWD coverage (21-27 trails made by individual voles in each of 5 forest stands). A strong correlation between stand-measure CWD coverage and fuel-load measure ($r = +0.96$) provides a basis for comparing CWD guidelines. We concluded that current guidelines from different research fields disagree. Only 2 of the 5 stands we sampled fit with guidelines for fuel management and ectomycorrhizae in the northern Rocky Mountains. Coarse woody debris coverage in all of our stands was well below recommendations for small mammals in coastal forests.

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1350. Why are Black Hills whitetails declining?

DePerno, Christopher S.; Jenks, Jonathan; Griffin, Steven L.; and Rice, Leslie A.

South Dakota Conservation Digest 67(1): 13-15. (2000); ISSN: 0038-3279

Descriptors: *Odocoileus virginianus*/ agricultural practices/ aspen/ behavior/ diurnal rhythm/ ecosystems/ food supply/ forestry practices/ forests, coniferous/ forests, mixed/ habitat alterations/ habitat management/ habitat surveys/ habitat use/ mammals/ microhabitat/ mortality/ nutrition/ overwintering/ ponderosa pine/ roads/ seasonal activities/ starvation/ telemetry/ urbanization/ white spruce/ wildlife/ livestock/ white-tailed deer/ South Dakota: Pennington and Lawrence Counties/ Wyoming: Crook and Weston Counties
Abstract: The decline of white-tailed deer herds in the Black Hills of South Dakota and far eastern Wyoming are due to habitat deterioration. Researchers have gathered information that will: aid the understanding of microhabitats used by deer; provide necessary insight into the quantity of forage biomass present on the landscape; help identify reasons for the decline of the white-tailed deer population; and aid in identifying forest management practices that could improve habitat quality and stabilize or increase the white-tailed deer herd in the study area.

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1351. Wildlife and invertebrate response to fuel reduction treatments in dry coniferous forests of the western United States: A synthesis.

Pilliod, D. S.; Bull, E. L.; Hayes, J. L.; and Wales, B. C. Provo, UT: Rocky Mountain Research Station, Forest Service, U.S. Department of Agriculture; General Technical Report-RMRS 173, 2006. 34 p.
Notes: 02775786 (ISSN).

Descriptors: dry coniferous forests/ fuel reduction/ habitat/ invertebrates/ prescribed fire/ thinning/ United States, western region/ wildlife

Abstract: This paper synthesizes available information on the effects of hazardous fuel reduction treatments on terrestrial wildlife and invertebrates in dry coniferous forest types in the West. We focused on thinning and/or prescribed fire studies in ponderosa pine (*Pinus ponderosa*) and dry-type Douglas-fir (*Pseudotsuga menziesii*), lodgepole pine (*Pinus contorta*), and mixed coniferous forests. Overall, there are tremendous gaps in information needed to evaluate the effects of fuel reduction on the majority of species found in our focal area. Differences among studies in location, fuel treatment type and size, and pre- and post-treatment habitat conditions resulted in variability in species responses. In other words, a species may respond positively to fuel reduction in one situation and negatively in another. Despite these issues, a few patterns did emerge from this synthesis. In general, fire-dependent species, species preferring open habitats, and species that are associated with early successional vegetation or that consume seeds and fruit appear to benefit from fuel reduction activities. In contrast, species that prefer closed-canopy forests or dense understory, and species that are closely associated with those habitat elements that may be removed or consumed by fuel reductions, will likely be negatively affected by fuel reductions. Some habitat loss may persist for only a few months or a few years, such as understory vegetation and litter that recover quickly. The loss of large-diameter snags and down wood, which are important habitat elements for many wildlife and invertebrate species, may take decades to recover and thus represent some of the most important habitat elements to conserve during fuel reduction treatments. Management activities that consider the retention of habitat structures (such as snags, down wood, and refugia of untreated stands) may increase habitat heterogeneity and may benefit the greatest number of species in the long run.

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1352. Wildlife conservation in agroforestry buffer zones: Opportunities and conflict.

Naughton Treves, Lisa and Salafsky, Nick

In: Agroforestry and biodiversity conservation in tropical landscapes/ Schroth, G.; Fonseca, G. A.; Harvey, C. A.; Gascon, C.; Vasconcelos, H. L.; and Izac, A. M., 2004.
Notes: 1559633565 (ISBN).

Descriptors: commercial activities/ conservation measures/ terrestrial habitat/ comprehensive zoology: farming and agriculture/ wildlife conservation/ agroforestry buffer zones/ forestry/ habitat management/ forest and woodland

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1353. Wildlife habitat management: Concepts and applications in forestry.

McComb, Brenda C.

Boca Raton, FL: CRC Press; 319 pp. (2007).

Notes: Chapters include: Silviculture and Habitat Management: Uneven-Aged Systems; Silviculture and Habitat Management: Even-Aged Systems; Riparian Area Management; Dead Wood Management

NAL Call #: QL82.M33 2007; ISBN: 9780849374890.

Descriptors: wildlife habitat improvement/ forest management/ wildlife management

Abstract: Emphasizes increased communication between disciplines and cooperative approaches to management; demonstrates the Landscape Management Systems Model for illustrating habitat change under alternative management approaches; presents case studies using real data from varying forest types from across the United States and Canada; includes more than 150 figures and examples from forests across North America; discusses adaptive management and dynamic forest planning to meet habitat objectives.

This citation is from AGRICOLA.

1354. Wildlife habitat management practices on private non-industrial forestlands.

Bottoff, J.

In: Managing for wildlife habitat in westside production forests, General Technical Report-PNW 695/ Harrington, T. B. and Nicholas, G. E.; Portland, OR: Pacific Northwest Research Station, Forest Service, U.S. Department of Agriculture, 2007. pp. 61-64.

Notes: 08874840 (ISSN).

Descriptors: coarse woody debris/ habitat management practices/ non-industrial private forestlands/ wildlife trees

Abstract: Non-industrial private forestlands (NIPF), also known as family-owned forests or family forests, represent one of the bigger challenges facing forestland managers (including timber harvesters, foresters, and forest wildlife biologists) in Washington State and probably beyond.

Those practicing traditional forestry (timber harvest based revenue production) may be particularly challenged, and professionally rewarded, when working with NIPF landowners due to the combination of diverse past site management and highly variable landowner objectives. Many of these objectives may or may not be related to forest management and income production (Gootee 2004). One of the biggest impediments to effective wildlife habitat management is getting the practicing forestland managers to understand the objectives and recognize opportunities to protect, enhance, and create wildlife habitat. There may be a professional/personal conflict with accepting and implementing landowner wildlife objectives as co-equal with timber management and especially as a primary objective. Perkey (1989) stated it succinctly: "those of us involved with management of the private non-industrial forest must learn to use our silvicultural knowledge effectively to accomplish non-silvicultural landowner objectives, including wildlife habitat management." These challenges are continuing to be met through the Forest Stewardship Program (FSP) now within the Small Forest Landowner Office (SFLO) of the Washington State Department of Natural Resources (DNR). The wildlife goal of the FSP has been to implement practices that protect, enhance, and even create wildlife habitat in conjunction with standard timber management activities and done in such a way that

is cost effective for the landowner and easily learned by the onsite forest worker. Most of the techniques are based on well-documented long-term observations and emerging science. For effective development and implementation of wildlife habitat practices it is essential to understand the background and motivation of these forestland owners and the relationship of these forested parcels within the forested landscape.

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1355. Wildlife management.

Palmer, Bruce

In: Forest management for Missouri landowners/

Palmer, Bruce.

Jefferson City, MO: Missouri Department of Conservation, 2003; pp. 43-49.

http://mdc.mo.gov/documents/forest/private/forest_manag.pdf

Descriptors: wildlife/ forest management/ silvicultural practices/ Missouri

1356. Wildlife management issues and opportunities in slash pine forests.

Mengak, Michael T. and Castleberry, Steven B.

In: Slash Pine: Still Growing and Growing! Proceedings of the Slash Pine Symposium, General Technical Report-SRS 76/ Dickens, E. D.; Barnett, J. P.; Hubbard, W. G.; and Jokela, E. J.; Asheville, NC: Southern Research Station, Forest Service, U.S. Department of Agriculture, 2004. pp. 79-83.

Notes: Symposium held at Jekyll Island, Georgia.

http://www.srs.fs.usda.gov/pubs/gtr/gtr_srs076.pdf

Descriptors: commercial activities/ ecology/ terrestrial habitat/ land zones/ comprehensive zoology: forestry/ slash pine timber production/ wildlife management/ conservation measures/ slash pine forests/ habitat utilization/ forest and woodland/ United States, southeastern region

Abstract: The slash pine (*Pinus elliottii*)-longleaf pine (*P. palustris*) cover type currently occupies over 13 million acres (8.7 percent of total forested acres) in the southeastern United States. Despite the large acreage and numerous studies in longleaf forests, only a limited number of studies have examined wildlife utilization and management of slash pine stands. Natural slash pine sites are low in soil phosphorous and have low potential as white-tailed deer (*Odocoileus virginianus*) habitat. Regular prescribed fire improves the palatability and nutritional content of forage for deer. Similarly, thinning and burning slash pine plantations improves habitat for turkey (*Meleagris galapavo*) and quail (*Colinus virginianus*). The gopher tortoise (*Gopherus polyphemus*) is a keystone species found in the slash pine ecosystem. Burrows dug by gopher tortoises are used by over 50 other species of vertebrates and invertebrates. The flatwoods salamander (*Ambystoma cingulatum*), a federally threatened species, has experienced a rangewide population decline that is thought to be related to habitat conversion and fragmentation as longleaf pine stands are converted to slash and loblolly pine. Management for slash pine and wildlife are compatible but managers and landowners should manipulate vegetation to mimic natural conditions. Unfortunately, few studies examine the financial trade-offs between timber production and wildlife.

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1357. Wildlife response to salmon habitat enhancements on the Bear River, southwest Washington.

MacCracken, James G.

Northwestern Naturalist 81(2): 82. (2000)

NAL Call #: QL671.M8; ISSN: 1051-1733

Descriptors: Castor canadensis/ habits-behavior/ ecosystems/ forestry practices/ forests, coniferous/ habitat alterations/ habitat use/ mammals/ management/ red alder/ wildlife/ wildlife-habitat relationships/ beavers/ Alnus oregona/ Alnus spp./ Washington, southwestern area
Abstract: In 1997, large wood was added to 13 sites in the Bear River of southwest Washington and four kilometers of riparian red alder (*Alnus rubra*) forest were thinned and planted to conifer. Small mammal and amphibian abundance was similar ($P=0.45$) between thinned and control red alder stands from 1997-99. Beaver (*Castor canadensis*) activity increased and dam construction was often associated with an introduced large wood structure.
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1358. Wildlife species associated with non-coniferous vegetation in Pacific Northwest conifer forests: A review.

Hagar, J. C.

Forest Ecology and Management 246(1 SPEC. ISS.): 108-122. (2007)

NAL Call #: SD1.F73; ISSN: 03781127.

Notes: doi: 10.1016/j.foreco.2007.03.054.

Descriptors: biodiversity/ broad-leaved trees/ forest management/ forest understory/ wildlife habitat
Abstract: Non-coniferous vegetation, including herbs, shrubs, and broad-leaved trees, makes a vital contribution to ecosystem function and diversity in Pacific Northwest conifer forests. However, forest management has largely been indifferent or detrimental to shrubs and trees that have low commercial value, in spite of a paradigm shift towards more holistic management in recent decades. Forest management practices that are detrimental to broad-leaved trees and shrubs are likely to decrease habitat diversity for wildlife, but the number of species that may be affected has not previously been enumerated. I reviewed life history accounts for forest-dwelling vertebrate wildlife species and derived a list of 78 species in Oregon and Washington that are associated with non-coniferous vegetation. The diversity of direct and indirect food resources provided was the primary functional basis for associations of most species with non-coniferous vegetation. Thus, a diversity of herbs and broad-leaved trees and shrubs provides the foundation for food webs that contribute to diversity at multiple trophic levels in Pacific Northwest conifer forests. Given the number of species associated with non-coniferous vegetation in conifer-dominated forests, maintaining habitats that support diverse plant communities, particularly broad-leaved trees and shrubs, will be an important component of management strategies intended to foster biodiversity. Silvicultural practices such as modified planting densities, and pre-commercial and commercial thinning, can be used to control stand density in order to favor the development of understory herbs, shrubs, and a diversity of tree species within managed stands. Allowing shrubs and hardwood

trees to develop and persist in early seral stands by curtailing vegetation control also would benefit many species associated with non-coniferous vegetation.
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1359. Winter bird community differences among methods of bottomland hardwood forest restoration: Results after seven growing seasons.

Hamel, P. B.

Forestry 76(2): 189-197. (2003); ISSN: 0015-752X.

http://www.srs.fs.usda.gov/pubs/ja/ja_hamel005.pdf

Descriptors: Aves/ birds/ winter/ season/ biocenosis/ forest/ abundance/ diversity/ experiment/ vegetation/ succession/ Mississippi

Abstract: Forest community restoration in the primarily agricultural landscape of the Lower Mississippi Alluvial Valley (LMAV), USA, has been initiated for recreational, economic and biological objectives, including provision of habitat for migratory birds of late successional stands. A long-term demonstration experiment of succession under several afforestation treatments was established at the beginning of the 1995 growing season. Winter bird communities of these plots were sampled using area-search techniques. Abundance and distribution among treatments were compared for a total of 62 bird species observed in winters 1998/1999 to 2001/2002. Four to seven growing seasons after establishment, bird communities in stands of fast-growing trees (*Populus deltoides*) contained twice as many species as those in treatments involving slower-growing trees. The differences resulted from the addition of generalist forest-canopy-dwelling species to that suite of avian species of early successional habitats. These results confirmed accepted theory that considers vegetation structure to be a primary determinant of bird species occurrence and community composition. [from paper]
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1360. Winter habitat ecology of mountain caribou in relation to forest management.

Terry, Eliot L.; Mclellan, Bruce N.; and Watts, Glen S.

Journal of Applied Ecology 37(4): 589-602. (2000)

NAL Call #: 410 J828; ISSN: 0021-8901

Descriptors: Rangifer tarandus caribou/ Rangifer tarandus/ behavior/ ecosystems/ fir/ foods-feeding/ forestry practices/ forests, coniferous/ forests, old-growth/ habitat management/ habitat use/ mammals/ montane habitat/ overwintering/ succession/ wildlife-habitat relationships/ Caribou/ dispersion/ desert habitat/ winter/ silviculture/ mountain caribou/ subalpine fir/ Canada/ British Columbia
Abstract: 1. During winter, mountain caribou live in late successional and old-growth coniferous forests, where they feed almost exclusively on arboreal lichens. Because some of these forests are also valuable to the forest industry, caribou ecology and forest management remains a central conservation issue in British Columbia. To improve the understanding of caribou habitat use in relation to forest management, the authors investigated the winter habitat selection patterns of mountain caribou at a range of spatial scales between 1988 and 1993 in the northern Cariboo Mountains, British Columbia. 2. Within winter ranges, caribou selected forest stands dominated by subalpine fir (>80% *Abies lasiocarpa*) and with moderate slopes 16-

30%) during early winter (November and December). Although stands with moderately high timber volumes were used the most during early winter, caribou used these stands in proportion to their availability. Caribou primarily used open-canopy sub-alpine fir stands (i.e. parkland) later in the winter (January-March), where low stocking and inoperable time volumes reduced direct conflicts with forest harvesting. 3. Characteristics of subalpine forests at early winter caribou foraging areas did not differ significantly from random sites for most variables measured. However, a multivariate analysis indicated that sites used by caribou had slightly less total basal area, more moderate slopes and slightly heavier lichen loads than unused sites. 4. Within early winter foraging areas, caribou chose foraging paths with more trees and greater accessible lichen biomass per standing tree compared with random paths. Although windthrown trees and lichen litterfall were encountered infrequently, caribou rarely rejected these sources of lichen when encountered. 5. The relatively low basal area and minor component of economically valuable Engelmann spruce *Picea engelmannii* (<20%) at early winter caribou foraging areas suggests less conflicts with forestry compared with other caribou populations in southern British Columbia and Idaho. 6. Selection silvicultural systems may provide solutions to caribou-forestry conflicts, particularly in mid-elevation subalpine fir stands (1325-1525 m) that may have both operable timber volumes and high caribou numbers.

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1361. Winter habitat selection by Canada lynx in Maine: Prey abundance or accessibility?

Fuller, Angela K.; Harrison, Daniel J.; and Vashon, Jennifer H.

Journal of Wildlife Management 71(6): 1980-1986. (2007)
NAL Call #: 410 J827; ISSN: 0022-541X

Descriptors: Carnivora/ Felidae/ Lagomorpha/ Leporidae/ *Lepus americanus*/ *Lynx canadensis*/ food supply/ forests/ ecosystems/ forest harvest treatment/ forestry practices/ habitat alterations/ habitat management/ habitat use/ harvest treatment/ *Lepus americanus*/ *Lynx canadensis*/ Maine/ predators/ mammals/ foods-feeding/ mammalian prey density and accessibility/ density/ winter habitat preference/ wildlife-human relationships/ commercial enterprises/ conservation/ wildlife management/ diets/ disturbances/ land zones/ nutrition/ population ecology/ predation

Abstract: We related winter habitat selection by Canada lynx (*Lynx canadensis*), relative abundance of snowshoe hares (*Lepus americanus*), and understory stem densities to evaluate whether lynx select stands with the greatest snowshoe hare densities or the greatest prey accessibility. Lynx (3 F, 3 M) selected tall (4.4-7.3 m) regenerating clear-cuts (11-26 yr postharvest) and established partially harvested stands (11-21 yr postharvest) and selected against short (3.4-4.3 m) regenerating clear-cuts, recent partially harvested stands (1-10 yr), mature second-growth stands (>40 yr), and roads and their edges (30 m on either side of roads). Lynx selected stands that provided intermediate to high hare density and intermediate cover for hares (i.e., prey access) but exhibited lower relative preference for stand types with highest hare densities where coniferous saplings exceeded 14,000 stems/ha.

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1362. Winter habitat selection patterns of Merriam's turkeys in the southern Black Hills, South Dakota.

Lehman, C. P.; Rumble, M. A.; and Flake, L. D.

Western North American Naturalist 67(2): 278-291. (2007)
NAL Call #: QH1.G7; ISSN: 15270904

Descriptors: Black Hills/ Farmstead/ habitat/ *Meleagris gallopavo merriami*/ Merriam's turkey/ ponderosa pine/ selection/ South Dakota/ wild turkey

Abstract: In northern areas of their expanded range, information on Merriam's turkeys (*Meleagris gallopavo merriami*) is lacking, specifically pertaining to wintering behavior and factors associated with winter habitat selection. Forest managers need detailed quantification of the effects of logging and other management practices on wintering habitats needed by Wild Turkeys and other wildlife. Therefore, we examined winter habitat selection patterns within ponderosa pine (*Pinus ponderosa*) forests and determined factors associated with use of farmsteads by Merriam's turkeys in the southern Black Hills, South Dakota. We radio-marked 86 female Merriam's turkeys (70 adults and 16 yearlings) and monitored them during winter (1 December-31 March), 2001-2004. Female Wild Turkeys used recently burned pine forest less than expected but selected farmsteads and stands of mature ponderosa pine (<70% overstory canopy cover, >22.9 cm diameter at breast height [DBH] trees) for foraging sites. Within forests, female Wild Turkeys selected foraging sites with less understory vegetation and visual obstruction, and larger-diameter ponderosa pine. Ponderosa pine seed abundance varied among years, and pine seeds were most abundant in stands of 30-35 cm DBH with basal area of 22-28 m²·ha⁻¹. Abundance of pine seeds may have influenced use of farmsteads by Wild Turkeys, more so than ambient temperatures or snow depth. In the southern Black Hills, management should emphasize open- to mid-canopy and mature-structural-stage pine stands, where seed production was greatest. During winters when mast from pine is unavailable, farmsteads likely provide nutritional supplementation and may be important for maintaining Merriam's turkey populations.

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1363. Winter habitat use by American marten, *Martes americana*, in western Alberta boreal forests.

Proulx, Gilbert

Canadian Field Naturalist 120(1): 100-105. (2006)
NAL Call #: 410.9 Ot8; ISSN: 0008-3550

Descriptors: commercial activities/ conservation measures/ ecology/ terrestrial habitat/ land zones/ North America/ Canada/ *Martes americana*: forestry/ winter habitat use implications/ habitat management/ forestry management/ habitat utilization/ winter/ forest habitats/ forestry management implications/ forest and woodland/ winter habitat use/ Alberta/ Weyerhaeuser's Grande Prairie Forest Management Area/ Mammalia, Carnivora, Mustelidae/ carnivores/ chordates/ mammals/ vertebrates

Abstract: Although the American Marten (*Martes americana*) is found in most forest regions of Alberta, little is known about its choice of winter habitats. This study investigated winter habitat use by American Marten in Weyerhaeuser's Grande Prairie Forest Management Area (FMA) using snowtracking along 128.2 km of seismic lines inventoried in winters 1999, 2002, and 2005 with snowmobiles. American Marten tracks (n = 44) occurred significantly less frequently than expected (P 0.001) in

immature/young pole stands, but more frequently than expected ($P = 0.02$) in mature/old growth mixedwood stands. American Martens apparently used young forests, and mature/old coniferous and deciduous stands, according to their availability. Forest development plans should be developed locally to retain late successional forests that meet the winter habitat requirements of American Marten.
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1364. Wood thrush (*Hylocichla mustelina*) nesting ecology in relation to prescribed burning of mixed-oak forest in Ohio.

Artman, V. L. and Downhower, J. F.

Auk 120(3): 874-882. (2003)

NAL Call #: 413.8 AU4 ; ISSN: 00048038

Descriptors: conservation status/ forest ecosystem/ passerines/ population decline/ prescribed burning/ restoration ecology/ United States/ *Hylocichla mustelina*/ *Quercus*

Abstract: Prescribed burning is increasingly being used to restore and maintain oak-dominated (*Quercus* spp.) forests in the eastern United States. We assessed effects of prescribed burning on the nesting ecology of the Wood Thrush (*Hylocichla mustelina*). Recent declines in Wood Thrush populations have prompted concern about their conservation status. Low-intensity surface fires in mixed-oak forests resulted in reductions in midstory vegetation, a documented habitat requirement for Wood Thrushes, but local population levels of Wood Thrushes did not differ between burned and unburned areas. Wood Thrushes inhabiting recently burned areas selected nest sites where leaf litter cover, fern cover, densities of shrubs and saplings, and moisture levels were higher and where fire intensity was lower in comparison to random sites. Wood Thrushes also placed their nests higher off the ground, and in taller and larger-diameter trees and shrubs, in burned than in unburned areas. Reproductive success did not differ between burned and unburned areas. However, successful nests were placed higher off the ground and in areas with lower densities of shrubs and saplings than unsuccessful nests in both burned and unburned areas. Prescribed burning appeared to have minimal effects on nesting ecology of Wood Thrushes, given their flexibility in nest placement, with no adverse consequences in terms of reproductive success. Local variation in fire intensity and moisture levels also maintained availability of suitable nesting habitat within burned areas. Continued monitoring would be appropriate to further assess the response of Wood Thrushes to prescribed burning, particularly in consideration of their conservation status and the uncertainty associated with potential long-term effects of habitat change.

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1365. Wood thrush movements and habitat use: Effects of forest management for red-cockaded woodpeckers.

Lang, J. D.; Powell, L. A.; Krententz, D. G.; and Conroy, M. J.

Auk 119(1): 109-124. (2002)

NAL Call #: 413.8 AU4 ; ISSN: 00048038

Descriptors: habitat management/ habitat use/ movement/ prescribed burning/ silviculture/ thinning/ United States/ *Hylocichla mustelina*/ *Picoides borealis*/ *Pinus taeda*

Abstract: We monitored adult and juvenile breeding-season movements and habitat use of radio-tagged Wood

Thrushes (*Hylocichla mustelina*) at the Piedmont National Wildlife Refuge, central Georgia, USA. We investigated the effects that management for Red-cockaded Woodpeckers (*Picoides borealis*), thinning and burning >30 year old loblolly pine (*Pinus taeda*) habitat, had on Wood Thrushes, a ground-foraging and midstory-nesting species. Adult Wood Thrush pairs regularly moved long distances between nesting attempts (range 1 to 17,388 m). The only experimental effect we found on adult movements was a decrease in weekly emigration rates (Ψ) from thinned and burned compartments after silvicultural management. Adult males preferred riparian hardwoods with sparse to moderate cover and those preferences increased following management. Juveniles remained near their nest site ($\bar{x} = 177$ m, SE = 113) for an average 24 days (SE = 6.3), and then dispersed a mean 2,189 m (SE = 342). Before dispersal, juveniles preferred upland hardwood - pine mixed habitat ($P < 0.05$) with moderate overstory cover ($P < 0.05$). We found no management effects on dispersal distances or predispersal habitat use. However, juveniles from thinned and burned compartments dispersed to hardwood habitats with dense cover, whereas birds from control compartments dispersed to pine-dominated habitats with sparse cover. All juveniles dispersed to areas with habitat similar to what they used before dispersal. Small-scale thinning and burning for Red-cockaded Woodpeckers may have had little effect on Wood Thrush habitat use and movements because typical movements were often larger than the scale (stand or compartment) targeted for management.
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1366. Woodpecker abundance and tree use in uneven-aged managed, and unmanaged, forest in northern Maine.

Gunn, John S. and Hagan, John M.

Forest Ecology and Management 126(1): 1-12. (2000)

NAL Call #: SD1.F73; ISSN: 0378-1127

Descriptors: Piciformes/ Picidae/ habits-behavior/ birds/ distribution/ ecosystems/ forestry practices/ forests, deciduous/ forests, old-growth/ habitat alterations/ habitat management/ habitat use/ management/ status/ wildlife/ woodpeckers/ abundance/ silviculture

Abstract: We studied abundance and tree use (foraging and drumming) of the cavity-nesting woodpecker guild (seven species) in northern Maine to assess effects of uneven-aged forest management (an irregular shelterwood system) on woodpecker populations. Woodpecker abundance in managed and unmanaged hardwood stands showed no difference. Abundance in managed softwood stands was greater than in unmanaged softwood stands. Woodpeckers preferred (use greater than availability) to forage and drum on large-diameter (>30 cm) living trees (hardwood and softwood). Living trees used by woodpeckers, however, were commonly in a state of decline, with characteristics such as fungal conks, broken limbs, and broken tops. When dead trees were used, woodpeckers preferred large-diameter, recently-dead trees. Although we identified tree types preferred by woodpeckers, the abundance of preferred trees in a stand was a poor predictor of woodpecker abundance. The uneven-aged management we studied did not reduce the number of preferred trees or snags to a level that affected woodpecker abundance.

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1367. Woodpecker nest tree characteristics in upper Midwestern oak forests.

Adkins Giese, Collette L. and Cuthbert, Francesca J. *Canadian Field Naturalist* 119(3): 367-376. (2005)
 NAL Call #: 410.9 Ot8 ; ISSN: 0008-3550
Descriptors: conservation measures/ reproduction/ reproductive behavior/ ecology/ habitat utilization/ terrestrial habitat/ land zones/ Picidae: habitat management/ forest management/ breeding site/ nest trees/ characteristics and selection/ forest management implications/ Minnesota and Wisconsin/ habitat preference/ nest site selection/ forest and woodland/ oak forests/ Minnesota/ Houston and Fillmore counties/ Wisconsin/ La Crosse County/ Aves, Piciformes/ birds/ chordates/ vertebrates
Abstract: Characteristics of woodpecker nest trees have been widely studied in some regions of North America. However, there is little research from the Upper Midwest. Forest managers need information on woodpecker nest tree characteristics so they can recommend leaving during harvest trees that meet the needs of cavity-dwelling wildlife. Information specific to the Upper Midwest is especially important given that declines in several species of cavity nesting birds have been predicted by an environmental analysis of timber harvest in Minnesota. Our purpose was to identify attributes of nest trees used by primary cavity-nesting birds. We compared nest trees to unused trees and examined differences in nest trees among woodpecker species. We found 166 active woodpecker nests in upper midwestern oak forests in 1997 and 1998. For each nest tree, we recorded height, diameter, status, and aspects of tree decay. We also measured four potential nest trees (non-nest trees, within size requirements of cavity-nesting birds, with ≥ 2 indicators of heartwood decay) closest to each active nest tree. Additionally, we recorded these measurements for 137 randomly selected potential nest trees. Using paired t-tests and chi-square analysis, we found each woodpecker species had a unique set of characteristics that separated nest trees from potential nest trees. Using an extension of the McNemar test for related samples, we found woodpeckers as a group used trees that were larger, both in diameter and height, more often elm (*Ulmus americana*, *U. rubra*) or aspen (*Populus tremuloides*, *P. grandidentata*), more likely to have old cavities present, and with more decay indicators than adjacent potential nest trees. The Yellow-bellied Sapsucker (*Sphyrapicus varius*) differed from the other woodpecker species by nesting in living Trembling Aspens (*Populus tremuloides*) with intact tops, complete bark cover, and heartwood fungus. Diameters of nest trees differed significantly among woodpecker species, but unlike findings

from other studies, the height of nest hole and nest tree did not. Woodpecker nest entrances faced south or southeast significantly more often than by chance alone, even when excluding leaning trees. This study suggests that generic forest management for all woodpecker species may not be adequate because individual species have specific nest tree requirements. Management recommendations for cavity-nesting birds need to be tailored to meet the needs of a diversity of species.

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1368. Woodpecker-snag interactions: An overview of current knowledge in ponderosa pine systems.

Farris, Kerry L. and Zack, Steve
 In: Proceedings of the Symposium on Ponderosa Pine: Issues, Trends and Management, General Technical Report-PSW 198; Albany, CA: Pacific Southwest Research Station, Forest Service, U.S. Department of Agriculture, 2005. pp. 183-195.
Notes: 0196-2094 (ISSN); Literature review; Symposium held October 18-21, 2004 at Klamath Falls, Oregon.
Descriptors: conservation measures/ nutrition/ feeding behavior/ reproductive behavior/ ecology/ terrestrial habitat/ land zones/ Picidae: habitat management/ foraging/ breeding site/ nesting habitat/ habitat utilization/ snags/ forest management/ forest and woodland/ ponderosa pine forests/ United States/ Aves, Piciformes/ birds/ chordates/ vertebrates
Abstract: Standing dead trees (snags) with cavities are a critical ecological component of western coniferous forests. These structures provide foraging, roosting, and nesting habitat for numerous species of invertebrates, amphibians, reptiles, birds, and mammals. Snags may be created through a variety of interrelated processes including wildfire, drought, insects and disease. However, dead trees containing excavated cavities are primarily the result of nest excavation by woodpeckers. While the specific factors leading to cavity generation in certain snags is not well understood, the manner in which a tree dies likely plays a significant role. We provide an overview of woodpecker-snag interactions in relation to the major modes of tree mortality in ponderosa pine. Of particular interest is the effect of mortality agent on the temporal patterns of snag decomposition, woodpecker foraging use, and woodpecker cavity excavation. Generally, snags created by bark beetles, and/or fire decay fastest, and experience the greatest foraging and nesting use by woodpeckers. Consideration of these interrelationships may aid in snag management.

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