

REFERENCES FOR JOHNSON S SHUT-INS STATE PARK:

1. FIRE ECOLOGY:

<1>

Accession Number

BACD200000071230

Author/Editor/Inventor

Madden Elizabeth M [a]. Hansen Andrew J. Murphy Robert K.

Institution

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Title

Influence of prescribed fire history on habitat and abundance of passerine birds in northern mixed-grass prairie.

Source

Canadian Field-Naturalist. 113(4). Oct.-Dec., 1999. 627-640.

Abstract

To more effectively manage remaining native grasslands and declining populations of prairie passerine birds, linkages between disturbance regimes, vegetation, and bird abundance need to be more fully understood. Therefore, we examined bird-habitat relationships on mixed-grass prairie at Lostwood National Wildlife Refuge (NWR) in northwestern North Dakota, where prescribed fire has been used as a habitat management tool since the 1970s. We sampled bird abundance on upland prairie at 310 point count locations during 1993 and 1994 breeding seasons. We also measured vegetation structure and composition at each location. Complete fire histories were available for each point, with over 80% having been burned one to four times in the previous 15 years. Post-fire succession generally transformed vegetation structure from short, sparse, and grassy with few forbs and low litter immediately after fire, to increasing and moderate amounts of forbs, litter, and shrubs two to eight years postfire, to tall, dense, shrubby prairie with little forb, grass, or litter understory when fire was absent (>80 years). Most grassland birds (six of nine species examined) at Lostwood NWR were absent from prairie untreated with fire. Species richness and abundances of Baird's Sparrows (*Ammodramus bairdii*), Bobolinks (*Dolichonyx oryzivorus*), Grasshopper Sparrows (*A. savannarum*), Le Conte's Sparrows (*A. leconteii*), Sprague's Pipits (*Anthus spragueii*), and Western Meadowlarks (*Sturnella neglecta*) were positively related to an index of amount of fire, and these species were absent from unburned units. In contrast, Common Yellowthroats (*Geothlypis trichas*) and Clay-colored Sparrows (*Spizella pallida*) both reached highest abundance on unburned prairie. To provide maximum grassland bird diversity, managers of mesic, mixed-grass prairie generally should provide areas with short (2-4 year), moderate (5-7 year), and long (8-10 year, or more) fire return intervals. Because long-term rest may create habitat unfavorable for most species of grassland passerines in mesic, northern mixed prairie, periodic defoliations by disturbances such as fire should be considered essential to restore and maintain native biodiversity.

<2>

Accession Number

BIOA199800254517

Author/Editor/Inventor

Andersen Alan N [a]. Braithwaite Richard W [a]. Cook Garry D [a]. Corbett Laurie K [a]. Williams Richard J [a]. Douglas Michael M. Gill A Malcolm. Setterfield Samantha A. Muller Warren J.

Institution

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Title

Fire research for conservation management in tropical savannas: Introducing the Kapalga fire experiment.

Source

Australian Journal of Ecology. 23(2). April, 1998. 95-110.

Abstract

Fire is a dominant feature of tropical savannas throughout the world, and provides a unique opportunity for habitat management at the landscape scale. We provide the background and methodology for a landscape-scale savanna fire experiment at Kapalga, located in Kakadu National Park in the seasonal tropics of northern Australia. The experiment addresses the limitations of previous savanna fire experiments, including inappropriately small sizes of experimental units, lack of replication, consideration of a narrow range of ecological responses and an absence of detailed measurement of fire behaviour. In contrast to those elsewhere in the world, Australia's savannas are sparsely populated and largely uncleared, with fires lit primarily in a conservation, rather than pastoral, context. Fire management has played an integral role in the traditional lifestyles of Aboriginal people, who have occupied the land for perhaps 50 000 years or more. Currently the dominant fire management paradigm is one of extensive prescribed burning early in the dry season (May-June), in order to limit the extent and severity of fires occurring later in the year. The ecological effects of different fire regimes are hotly debated, but we identify geo-chemical cycling, tree demography, faunal diversity and composition, phenology, and the relative importance of fire intensity, timing and frequency, as critical issues. Experimental units ('compartments') at Kapalga are 15-20 km² catchments, centred on seasonal creeks that drain into major rivers. Each compartment has been burnt according to one of four treatments, each replicated at least three times: 'Early' - fires lit early in the dry season, which is the predominant management regime in the region; 'Late' - fires lit late in the dry season, as occurs extensively in the region as unmanaged 'wildfires'; 'Progressive' - fires lit progressively throughout the dry season, such that different parts of the landscape are burnt as they progressively dry out (believed to approximate traditional Aboriginal burning practices); and 'Unburnt' - no fires lit, and wildfires excluded. All burning treatments have been applied annually for 5 years, from 1990 to 1994. Six core projects have been conducted within the experimental framework, focusing on nutrients and atmospheric chemistry, temporary streams, vegetation, insects, small mammals, and vertebrate predators. Detailed measurements of fire intensity have been taken to help interpret ecological responses. The Kapalga fire experiment is multidisciplinary, treatments have been applied at a landscape scale with replication, and ecological responses can be related directly to measurements of fire intensity. We are confident that this experiment will yield important insights into the fire ecology of tropical savannas, and will make a valuable contribution to their conservation management.

<3>

Accession Number

BIOA199800038730

Author/Editor/Inventor

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Institution

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Title

Methods of breaking seed dormancy in the endangered species *Iliamna corei* (Sherff) Sherff (Malvaceae), with special attention to heating.

Source

Natural Areas Journal. 17(4). Oct., 1997. 313-323.

Abstract

Iliamna corei (Sherff) Sherff, an herbaceous perennial plant listed by the U.S. Fish and Wildlife Service as endangered, is known only from a single site, on Peters Mountain in Giles County, Virginia. Seed dormancy in this species is due to a waterimpermeable seed coat. Dormancy was broken in a high percentage of seeds by mechanical scarification, dipping in boiling water, dry-heating, and soaking in concentrated sulfuric acid. However, soaking in absolute ethanol, shifting from low to high temperature regimes, or alternate freezing and thawing did not break seed dormancy. Fire was effective in breaking dormancy of seeds on the soil surface, but not in those covered with 3 cm of soil. Seeds matured and sown in 1989 in greenhouse flats and burned each June from 1990 to 1995 had germinated to the following percentages by September 1995: buried and nonburned-2%, nonburied and nonburned-3%, buried and burned-3%, and nonburied and burned-39%. After five heating (to 80-90degreeC)/incubation (25/15 degreeC) cycles, germination in flats from the burning experiment had increased to the following: buried and nonburned-60%, nonburied and nonburned-61%, buried and burned 45%, and nonburied and burned-71%. Furthermore, at least 65% of 1,800 seeds were viable and germinable after more than 3 years in the "seed bank." Thus, seeds of *I. corei* (1) require fire to germinate, (2) are capable of forming a long-lived seed bank, and (3) exhibit a continuum with regard to degree of seed coat dormancy. These results and those of others on the biology of *I. corei* and two of its closely related species, *I. remota* Greene and *I. rivularis* (Dougl.) Greene, were used to modify Buttrick's (1992) conceptual model of the population dynamics of *I. corei* in relation to fire and canopy development.

<4>

Accession Number

BIOA199799609979

Author/Editor/Inventor

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Institution

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Title

Public attitudes and knowledge about ecosystem management on department of defense land in Florida.

Source

Conservation Biology. 11(3). 1997. 770-781.

Abstract

New ecosystem management policies at Eglin Air Force Base, Florida, emphasize the need for public education and involvement in the changing focus of natural resource practices. To collect

baseline information for ecosystem management, we measured and compared the knowledge, attitudes, and interests of critical Eglin audiences: recreational users and neighboring citizens. Factor analysis of surveys of 700 permitted recreational users and 1000 neighboring citizens revealed four content areas for measuring knowledge and attitudes: (1) native and endangered species, (2) fire ecology, (3) forest resources, and (4) ecosystem management. Overall, both audiences lacked basic ecological knowledge and held neutral to slightly positive attitudes toward the key content areas. Recreational users were significantly more knowledgeable than general citizens about native and endangered species, fire ecology, and forests. However, citizens held significantly more positive attitudes toward native and endangered species conservation and ecosystem management concepts. Eglin's consumptive recreationists (hunters and anglers) held the most negative views. Sociodemographic information from the surveys suggest that the recreational users and neighboring citizens are a stable, educable population that would respond positively to programs aimed at improving knowledge of and attitudes toward ecosystem management goals at Eglin.

<5>

Accession Number

BIOA199497369899

Author/Editor/Inventor

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Institution

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Title

In search of allelopathy in the Florida scrub: The role of terpenoids.

Source

Journal of Chemical Ecology. 20(6). 1994. 1355-1380.

Abstract

The hypothesis was tested that allelopathic agents released from fire-sensitive plants of the Florida scrub community deter the invasion of fire-prone sandhill grasses. The structures of the constituents of four endemic scrub species, *Conradina canescens*, *Calamintha ashei*, *Chrysoma pauciflosculosa*, and *Ceratiola ericiodes*, were established and their phytotoxic activity against two grasses of the sandhill was examined. Effects of the secondary metabolites from the above scrub species and their degradation products upon the germination and radicle growth of little bluestem (*Schizachyrium scoparium*) and green sprangletop (*Leptochloa dubia*), two native grasses of the Florida sandhill community, were determined. The studies included determination of the water solubility and release mechanism of terpenes and other allelopathic agents from the source plants and their aqueous transport to the target species. Some of the natural products were nontoxic until activated by light and/or oxidation after release from the source plant into the environment.

<6>

Accession Number

BIOA199395106782

Author/Editor/Inventor

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Institution

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Title

Wetland vegetation recovery after fire: Eweburn Bog, Te Anau, New Zealand.

Source

New Zealand Journal of Botany. 30(4). 1992. 383-399.

Abstract

Following a fire in a sphagnum-wirerush mossland (*Sphagnum cristatum*-*Empodisma minus*) in Te Anau Basin, permanent transects were established and recovery of the wetland monitored annually using visual estimation of plant cover. Within four and a half years of the fire, total plant cover had reached 90% or more throughout the wetland, having been reduced by the fire to as low as 7%. Wetter parts of the wetland were less severely burnt and recovered more quickly than drier parts. In the latter, herbs and grasses, including naturalized species, were important early colonists but mostly non-persistent. Rhizomatous species were important components of the cover throughout the wetland. While the wetland had apparently almost recovered in terms of vegetation cover and species diversity by four and a half years, the vegetation composition differed from that prior to the fire, principally in terms of species dominance, and to some extent, species presence. It is suggested that, over time, the vegetation composition will slowly approach the pre-fire condition. Similar patterns have been observed after fire in other New Zealand wetlands and these are reported.

<7>

Accession Number

092040026

Authors

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Title

FIRE ECOLOGY OF RED PINE *PINUS-RESINOSA* IN NORTHERN VERMONT USA.

Source

Canadian Journal of Forest Research 21 (6). 1991. 882-889.

Abstract

Red pines (*Pinus resinosa* Ait.) in northern New England exist within small islands of fire-prone habitat surrounded by relatively nonflammable, deciduous forest. We studied the fire history and age structure of six red pine stands at an upland site in northwestern Vermont. Red pine is dominant in the canopy but rare in seedling and sapling size classes. Red pine is usually dependent on fires for regeneration. Fire scars record at least 17 different fires in the study area between the early 1800s and 1922. No fires are recorded between 1922 and 1987. The survival of numerous saplings in burned stands indicates that most of the fires were light surface fires. At least eight fires preceded periods of red pine recruitment recorded by the ages of living trees. These fires were probably locally intense, tree-killing fires. A similar regime of frequent, nonlethal fires and infrequent, lethal fires occurs in other parts of red pine's range.

<8>

Accession Number

088002796

Authors

Engle D M. Bidwell T G. Ewing A L. Williams J R.

Institution

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Title

A TECHNIQUE FOR QUANTIFYING FIRE BEHAVIOR IN GRASSLAND FIRE ECOLOGY STUDIES.

Source

Southwestern Naturalist 34 (1). 1989. 79-84.

Abstract

A technique is described and demonstrated which uses time-temperature curves to quantify combustion zone fire behavior for research on grassland fire effects. The time-temperature parameters of degree seconds, residence time, and maximum temperature can be used to quantitatively document fire behavior in grassland fire ecology studies. Time-temperature relationships appear to be a powerful tool because they relate to the fuel and combustion characteristics of tallgrass prairie fires.

<9>

Accession Number

085046259

Authors

Beukes P C.

Institution

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Title

RESPONSES OF GRAY RHEBOK AND BONTBOK TO CONTROLLED FIRES IN COASTAL RENOSTERVELD.

Source

South African Journal of Wildlife Research 17 (3). 1987. 103-108.

Abstract

The influence of veld burning on vegetation structure and on the distribution of grey rhebuck and bontebok was investigated by measuring vegetation characteristics and counting grey rhebuck and bontebok in study plots that had been burnt at different times. Both grey rhebuck and bontebok favoured areas with a veld age (time after the last burn) of four years and less. Younger vegetation types had a higher density of shrubs and forbs lower than 250 mm (the main food plants of grey rhebuck). Bontebok probably selected younger veld because of the greater availability and accessibility of nutritious grass material. The importance of a suitable burning programme to provide enough preferred habitat for both species is stressed.

<10>

Accession Number

079067364

Authors

Kercher J R. Axelrod M C.

Institution

ENVIRONMENTAL SCIENCES DIV., LAWRENCE LIVERMORE NATL. LAB.,
LIVERMORE, CALIF. 94550.

Title

A PROCESS MODEL OF FIRE ECOLOGY AND SUCCESSION IN A MIXED-CONIFER FOREST.

Source

Ecology 65 (6). 1984. 1725-1742.

Abstract

A forest succession simulator, SILVA, was developed for the mixed-conifer forest (7 major species *Pinus ponderosa*, *P. lambertiana*, *P. jeffreyi*, *Abies concolor*, *Pseudotsuga menziesii*, *Libocedrus decurrens*, *Quercus kelloggii*) of the Sierra Nevada, California, to simulate the effects of fire on forest dynamics. SILVA is an extensive modification of a simulator for forests of the northeastern USA. The simulation includes the time development of the growth in tree diameter, tree height and leaf-area index. Recruitment and mortality are modeled stochastically. Modifications include fire ecology, temporal seed-crop patterns, and seedling-survival factors unique to Sierra Nevada forest. The probability of mortality from fire is determined by the height of crown scorch (a function of fire intensity, diameter at breast height, and bark thickness). The model stimulates the dynamic and structural responses of communities to many factors. For 500-yr simulations from an initial clear-cut condition, the time-averaged basal-area ratios of *P. ponderosa* to *A. concolor* were 5.2:1 and 1:16 for elevations of 1524 m and 1829 m, respectively. At 1524 m, the ratio of *P. ponderosa* to *A. concolor* decreased 59% when fire suppression was introduced. Fire provides *P. ponderosa* with a strong competitive advantage. Its growth form and growth rate are significant factors in its ability to evade fire. Rank correlations of species were compared with data for stands of ponderosa pine and white fir. Correlations were significant at 1% and 10% levels, respectively.

<11>

Accession Number

069001611

Authors

Raison R J.

Institution

Div. For. Res., CSIRO, P.O. Box 4008, Canberra, A.C.T., Aust.

Title

Modification of the soil environment by vegetation fires, with particular reference to nitrogen transformations: A review.

Source

Plant & Soil 51(1). 1979. 73-108.

Abstract

This review emphasizes the complex nature of the effects of fire on soils and hence on the growth and stability of plant communities. Fire alters many ecosystem processes both directly and as a result of changes to vegetation and the pattern of grazing. A considerable body of knowledge, the result of numerous studies, provides a reasonably good conceptual basis for predicting the effects of fire on soil fertility. However, the effects on soil biological processes of plant ash, and its interaction with soil heating and micro-environmental conditions are poorly understood. Some excellent work has examined the influence of fire on various components of the nutrient cycle, but

the significance of isolated effects to the nutrient budget of entire ecosystems, where there exists many regulatory and compensating ecological processes, was not well studied. The best measures of the effects of fire on nutrient budgets are probably available for heathlands. The efficient use of fire as a management tool should be based on sound ecological principles. The effects of fire vary with each ecological situation and currently insufficient data exist to allow accurate prediction of its full long-term effects on many ecosystems which are regularly burned. Clearly, there exists a need for integrated regional study of the long-term effects of fire on the stability and productivity of plant communities. In addition, current fire ecology research is limited by a lack of reference areas having a known burning history, and continued establishment and maintenance of such areas should be a high research priority.

2. GLADES:

<1>

Accession Number

BACD200000237231

Author/Editor/Inventor

Baskin Jerry M [a]. Baskin Carol C [a].

Institution

[a] School of Biological Sciences, University of Kentucky, Lexington, KY, 40506-0225 USA.

Title

Vegetation of limestone and dolomite glades in the Ozarks and midwest regions of the United States.

Source

Annals of the Missouri Botanical Garden. [print] 87(2). Spring, 2000. 286-294.

Abstract

Literature on the vegetation of limestone and dolomite (cedar) glades in the Ozarks of Missouri and Arkansas and in the midwestern United States (Illinois, Indiana, Ohio, Wisconsin) is reviewed. Dominant plants in these glades are C4 perennial prairie grasses, of which little bluestem (*Schizachyrium scoparium* (Michx.) Nash) is the most important. Without removal of invading woody plants by fire or other means, succession in these rocky, calcareous openings is to forest. They differ from cedar glades in the southeastern United States, which are dominated by C4 annual grasses (primarily *Sporobolus vaginiflorus* (Torr. ex Gray) Wood) and do not require management or natural disturbances to maintain them. We suggest that the anthropogenic, prairie-grass-dominated openings in the Ozarks and Midwest be called xeric limestone (or dolomite) prairies and that the term cedar glades be used for an edaphic climax dominated by C4 summer annual grasses in natural openings on limestone or dolomite bedrock.

<2>

Accession Number

BACD199900314906

Author/Editor/Inventor

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Institution

[a] Department of Forest Botany and Nature Conservation, Agricultural University, Al. 29 Listopada 46, 31-425, Cracow Poland.

Title

Secondary forest succession in abandoned glades of the Pieniny National Park.

Source

Polish Journal of Ecology. 47(2). 1999. 175-189.

Abstract

The research was conducted in two abandoned glades in the Pieniny National Park (Western Carpathians), where mapping and measurements of invading trees and shrubs had been made in July 1988. Based on re-measurements carried out in 1995, the role of different woody species in secondary forest succession was evaluated. During seven years between consecutive censuses process of succession in both glades displayed substantial convergence. Sycamore *Acer pseudoplatanus* L. was the main species invading meadows, followed by the hazel *Corylus avellana* L. Silver fir *Abies alba* Mill. was common among seedlings, but less numerous among larger saplings. Both sycamore and silver fir seem to be able to invade dense herbaceous vegetation, but higher growth rates allow sycamore to dominate in the early stage of secondary succession.

<3>

Accession Number

BIOA199799288187

Author/Editor/Inventor

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Institution

Inst. Terrestrial Ecol., Natural Environ. Res. Council, Monks Wood, Abbots Ripton, Huntingdon, Cambridgeshire PE17 2LS, UK.

Title

Open corridors appear to facilitate dispersal by ringlet butterflies (*Aphantopus hyperantus*) between woodland clearings.

Source

Conservation Biology. 10(5). 1996. 1359-1365.

Abstract

We studied the ringlet butterfly (*Aphantopus hyperantus*) in an area of woodland in eastern England. *A. hyperantus* occurs in open fields, rides (grassy tracks), and glades within the woodland. Mark-recapture methods showed that exchange rates of adult *A. hyperantus* between fields and glades can be predicted better by distance-via-rides than by direct distance. Behavioral observations showed that *A. hyperantus* readily moved from glades into rides but rarely moved from glades into dense woodland. The rides are likely to be corridors that act as conduits between fields and glades. In the *A. hyperantus* system, connectivity could reduce local extinctions and increase rates of recolonization in the event of local extinction.

<4>

Accession Number

BIOA199698773966

Author/Editor/Inventor

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Institution

[a] Div. Life Sci., Univ. Tex. at San Antonio, San Antonio, TX 78249 USA.

Title

Comparison of cedar glades and associated woodlands of the southern Edwards Plateau.
Source
Texas Journal of Science. 48(1). 1996. 55-67.

<5>

Accession Number

BIOA199698741059

Author/Editor/Inventor

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Institution

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Title

Population sizes and within-deme movement of *Trimerotropis saxatilis* (Acrididae), a grasshopper with a fragmented distribution.

Source

Oecologia. 105(3). 1996. 343-350.

Abstract

Capture-mark-recapture studies were initiated in 1990 on four Missouri populations of the lichen grasshopper, *Trimerotropis saxatilis*. This grasshopper lives only on glade habitat, predominantly in the Ozark Mountains. Genetic data suggest that no gene flow occurs among *T. saxatilis* populations. Lichen grasshopper population size (both present and historical), and the likelihood of movement within and between glades, are the subjects of this study. Population sizes on all glades were found to be small (lt 280 individuals) and to vary from year to year. Inbreeding effective sizes were found to be much larger than census sizes. On one of the sites, Graham Cave Glade, population size was calculated for 5 years; in 3 of those years (1991, 1993 and 1994) our studies of this population also tested for movement of *T. saxatilis* individuals among different regions of the moderately subdivided glade. Maintenance of Graham Cave Glade (burning and clearing) was initiated after the 1991 capture-mark-recapture season. Comparisons of before and after-burning intraglade movement probabilities did not show a significant difference. Grasshoppers more frequently remained in the part of the glade where they were previously captured, but were able to move about the moderately subdivided glade. The presence of a closed-canopy forest, rather than distance, appears to be an effective dispersal barrier.

3. OZARKS:

<1>

Accession Number

BMCD200000110032

Author/Editor/Inventor

Bruhn J N [a]. Wetteroff J J, Jr [a]. Mihail J D [a]. Jensen R G. Pickens J B.

Institution

[a] Dept. Plant Microbiology and Pathology, Univ. of Missouri, Columbia, MO, 65211 USA.

Title

Characteristics of harvest disturbance within tree populations in upland Ozark forests of MOFEP.

Source

Phytopathology. [print] 90(6 Supplement). June, 2000. S10-S11.

<2>

Accession Number

BACD200000237231

Author/Editor/Inventor

Baskin Jerry M [a]. Baskin Carol C [a].

Institution

[a] School of Biological Sciences, University of Kentucky, Lexington, KY, 40506-0225 USA.

Title

Vegetation of limestone and dolomite glades in the Ozarks and midwest regions of the United States.

Source

Annals of the Missouri Botanical Garden. [print] 87(2). Spring, 2000. 286-294.

Abstract

Literature on the vegetation of limestone and dolomite (cedar) glades in the Ozarks of Missouri and Arkansas and in the midwestern United States (Illinois, Indiana, Ohio, Wisconsin) is reviewed. Dominant plants in these glades are C4 perennial prairie grasses, of which little bluestem (*Schizachyrium scoparium* (Michx.) Nash) is the most important. Without removal of invading woody plants by fire or other means, succession in these rocky, calcareous openings is to forest. They differ from cedar glades in the southeastern United States, which are dominated by C4 annual grasses (primarily *Sporobolus vaginiflorus* (Torr. ex Gray) Wood) and do not require management or natural disturbances to maintain them. We suggest that the anthropogenic, prairie-grass-dominated openings in the Ozarks and Midwest be called xeric limestone (or dolomite) prairies and that the term cedar glades be used for an edaphic climax dominated by C4 summer annual grasses in natural openings on limestone or dolomite bedrock.

<3>

Accession Number

BACD200000227828

Author/Editor/Inventor

Zheng Daoian [a]. Chen Jiquan [a]. Song Bo. Xu Ming. Sneed Phil. Jensen Randy.

Institution

[a] School of Forestry and Wood Products, Michigan Technological University, Houghton, MI, 49931 USA.

Title

Effects of silvicultural treatments on summer forest microclimate in southeastern Missouri Ozarks.

Source

Climate Research. [print] 15(1). May 15, 2000. 45-59.

Abstract

ABSTRACT: The effects of silvicultural treatments (e.g., even-aged management, EAM, and unevenaged, UAM) on 4 microclimatic variables (air temperature, incoming solar radiation, humidity, and soil temperature) were examined in oak forests of southeastern Missouri Ozarks, USA. Nine mobile climatic stations were used to collect field data during the summers of 1995 (pre-harvest), and 1997 and 1998 (post-harvest). Spatial variation of air temperature at 2 m height increased 96 and 35% (2-year average) after harvest in UAM and EAM sites, respectively, as

quantified by 95% confidence intervals (CI). UAM increased the variability of air temperature at the lower end of the daily range in the CI more than at the upper end, while EAM had a stronger effect on raising spatial variation at the upper end of the CI than at the lower end. Spatial variation of soil temperature within an 80 x 80 m grid increased significantly during daytime after harvest, especially at the surface, but did not change much during nighttime. EAM resulted in a larger increase of soil temperature variation than did UAM. Greater amplitudes of diurnal soil temperatures (especially at the surface) were observed at depths of 0, 5, and 10 cm and were more evident at the EAM site after harvest. The duration of variation in post-harvest soil surface temperature during daytime was about 3 times longer than pre-harvest at the EAM site. Spatial variation in radiation increased 56 and 128% in UAM and EAM sites after harvest, respectively. Except for radiation, significance levels of differences in means of microclimatic variables were reduced after harvest among the 3 Ecological Land Types (ELTs); the spatial variation of microclimate was smaller among ELTs within the same treatment than between treatments. Our results suggested that, usually, EAM affected the microclimate more than UAM did, especially in raising soil temperatures on northeast slopes (ELT18).

<4>

Accession Number

BACD200000176124

Author/Editor/Inventor

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Institution

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Title

Effect of spatial scale on relationship between plant species richness and microclimate in a forested ecosystem.

Source

Polish Journal of Ecology. 48(1). 2000. 77-88.

Abstract

This study examined how the correlation between plant species richness and microclimate varies when aggregation scales change from 10 to 3000 m. We measured soil moisture and air, soil, and soil surface temperatures in the Southeastern Missouri Ozarks. Measurements were taken every 10 m along a 4250 m transect during the 1996 growing season. Plants up to 2 m above ground were sampled using 1 X 1 m² plots to record average height and coverage by species. We found that the correlation between understory plant species richness and temperature was, in general, highly dependent on spatial scale. The correlation coefficients were small, or even negative, at small scales, and the highest correlation occurred around the 1500 m scale. Univariate linear regression analysis at 1500 m scale indicated that growing season mean temperatures of air, soil, and soil surface explained 83%, 76%, and 74% of the total variance in species richness, respectively. Microclimate variables, including seasonal mean, minimum, and maximum temperatures of air, soil, and soil surface and seasonal soil moisture, explained 98% of the total variance in plant species richness ($R^2 = 0.98$, $n = 277$, $P < 0.01$) at 1500m scale. The results from this study suggest that the species-energy theory was adequately supported at certain spatial scales (around 1500 m in this case), but less supported at other scales within the range under study. The findings indicate the

necessity, feasibility, and difficulty to incorporate spatial scales explicitly into the species-energy theory.

<5>

Accession Number

BACD200000103208

Author/Editor/Inventor

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Institution

[a] Dept. of Soil and Atmospheric Sciences, School of Natural Resources, University of Missouri, Columbia, MO, 65211 USA.

Title

Effect of soil compaction and organic matter removal on two earthworm populations and some soil properties in a hardwood forest.

Source

Pedobiologia. 43(6). Dec., 1999. 802-807.

Abstract

Earthworms can alter the physical, chemical, and biological properties of a forest ecosystem. Any physical manipulation to the soil ecosystem may, in turn, affect the activities and ecology of earthworms. The effects of organic matter removal (logs and forest floor) and soil compaction on earthworm activities were measured in a central hardwood region (oak-hickory) forest in the Missouri Ozarks. Soils in this region are characterized by a cherty residuum that is primarily of the Clarksville series (Loamy-skeletal, mixed, mesic Typic Pale-dults). Earthworms were collected from a 15 cm depth each spring and fall for 2 years by the handsorting method and estimated on a per meter square basis. Two earthworm species, *Diplocardia ornata* and *Diplocardia smithii*, were the most dominant native species found in the site. Organic matter removal decreased the average individual biomass of both species. However, these species responded differently to soil compaction. Soil compaction affected *D. ornata* adversely and *D. smithii* favorably. This suggests that the degree of soil compaction was not restrictive to *D. smithii* (2-mm dia) but it was to *D. ornata* (5 mm dia). Moreover, the apparent better soil environmental conditions resulting from the remaining organic matter in compacted soil enhanced *D. smithii* population and growth. Sampling position affected *D. ornata* but not *D. smithii*. Other factors influencing the ecology and activity of these two species will require further study.

<6>

Accession Number

BACD199900314183

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Title

Season-long fecundity, survival, and viability of ovenbirds in fragmented and unfragmented landscapes.

Source

Conservation Biology. 13(5). Oct., 1999. 1151-1161.

Abstract

From 1992-1995, we compared the season-long fecundity of marked Ovenbirds (*Seiurus aurocapillus*) on three sites in large (>2000-ha) forest patches in a fragmented landscape in central Missouri (U.S.A.) with four sites in a contiguously forested landscape of almost 2 million ha in the Missouri Ozarks. Our purpose was to determine to what extent the negative effects of fragmentation on nests affect individual bird's annual productivity. To measure annual productivity, we determined the proportion of territorial males that ultimately succeeded in raising young in a season and multiplied this proportion by the average brood size obtained from nest observations. Fewer pairs successfully raised young in the fragmented landscape (50 ± 11%) than in the unfragmented landscape (70 ± 7%). In the fragmented landscape, 25 ± 6% of pairs raised at least one Brown-headed Cowbird (*Molothrus ater*), whereas only 1 ± 1% of pairs raised cowbirds in the unfragmented landscape. Lower season-long success and increased brood parasitism led to annual productivity of 0.70 and 1.47 juvenile females per female in the fragmented and unfragmented landscapes, respectively. Territory size (mean = 2.76 ha) was not affected by landscape, but density was lower in the fragmented landscape (1.6 ± 0.41 males per 10 ha) than in the unfragmented landscape (2.2 ± 0.32). The ratio of second-year to after-second-year males did not vary with landscape. Male pairing success (67 ± 6%) and survival (0.621 ± 0.21) was not affected by landscape. We concluded that it was unlikely that sites in the fragmented landscape contained viable Ovenbird source populations, whereas populations in the unfragmented Ozark region were likely to be sources in most years. Nevertheless, any changes in the Ozarks that increase nest predation or parasitism may have consequences for the regional population of Ovenbirds and other forest-breeding Neotropical migrants in the midwest.

<7>

Accession Number

BACD199900314083

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Title

Population density as a predictor of genetic variation for woody plant species.

Source

Conservation Biology. 13(5). Oct., 1999. 1079-1087.

Abstract

As the focus of conservation biology shifts toward multispecies and ecosystem conservation and management, a principal question becomes how we manage species to conserve their long-term evolutionary potential. Few criteria exist for prioritizing which populations within a species should be protected to conserve maximal genetic variation. We designed this study to explore the genetic consequences of using population density as a criterion for selecting populations of woody plant species for conservation. Population density may be an effective gauge of genetic variation for two reasons. First, density often reflects ecological population size, particularly for continuously distributed species, and density is much easier to measure in the field than population size. Second, from an individual species' perspective, population density may be an indicator of habitat quality. We evaluated the relationship between standard genetic diversity indices and densities of seedlings,

small trees, and large trees, and we investigated the association between genotypic composition and density measures with canonical correlation analysis for three common tree species (*Carya tomentosa*, *Sassafras albidum*, and *Quercus alba*) from the Missouri Ozarks. We found that population density was not correlated with genetic diversity in large populations of plant species, but density was associated with genotypic composition of populations. That is, populations with small densities had different genotypes than those with large densities. To sample a maximal amount of regional genotypic variation, we recommend choosing plant populations representing a range of densities. Findings from our study should be generally applicable to plant populations that have occupied habitats long enough for natural selection to affect local genotypic composition. Used in conjunction with other established criteria, population density may be a useful rule of thumb for conservation practitioners concerned with the maintenance of adaptive genetic variation in plant species.

<8>

Accession Number

BACD199900243158

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Title

Reconstruction of early nineteenth-century vegetation and fire regimes in the Missouri Ozarks.

Source

Journal of Biogeography. 26(2). March, 1999. 397-412.

Abstract

Aim The purpose of this study was to reconstruct early nineteenth-century vegetation and fire regimes to examine the role of fire, topography, and substrate interactions in shaping landscape and regional vegetation patterns. **Location** Our study area was the Current River watershed of the Ozark Highlands in south-central Missouri, USA. **Methods** We combined analysis of early nineteenth-century Public Land Survey (PLS) notes and dendrochronology-based fire histories to reconstruct vegetation and disturbance regimes of pine-oak (*Pinus-Quercus*) woodlands. Three methods were used to display and analyse PLS data within a Geographic Information System (GIS): (1) simple point distributions for each tree species; (2) section line descriptions of each tree species and other coded features (e.g. 'prairie'); and (3) spatial interpolation of the point-tree data. Vegetation patterns were then related to geological parent material, topography, and mean fire-return intervals from 23 sites using correlation and Canonical Correspondence Analysis (CCA). **Results** The most striking patterns in the early 1800 s were extensive stands of shortleaf pine (*Pinus echinata* Mill.) and oak-dominated 'barrens' (savanna) in the frequently burned areas south-west of the Current River, and more mesophytic, fire-sensitive species (red oaks (*Quercus rubra* L., *Q. coccinea* Muenchh.), maples (*Acer rubrum* L., *Acer saccharum* Marsh), eastern red cedar (*Juniperus virginiana* L.) in a fire shadow north-east of the river. Several kilometre-wide ecotones of pine-mixed hardwood encompassed the major pineries and barrens. Fire-return intervals and relative dominance of several tree species were strongly correlated at both fine (3-64 km²) and coarse (> 100 km²) spatial scales. At fine scales, relative dominance of shortleaf pine increased with increasing fire frequency

during 1701-1820. Relative dominance of black oak (*Q. velutina* Lam.), and to a lesser extent post oak (*Q. stellata* Wang.), decreased with increasing fire frequency. Shortleaf pine and these xerophytic oak species occurred on similar bedrock types but were strongly differentiated by fire regimes. Main conclusions Fires exerted strong constraints on vegetation composition and patterns. Historical patterns of Native American occupancy in the region are consistent with the reconstructed vegetation and fire histories and suggest that anthropogenic fire regimes played an overriding role in the development of Ozark vegetation in the 1800s.

<9>

Accession Number

BACD199900208948

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Title

Plethodontid salamander response to silvicultural practices in Missouri Ozark forests.

Source

Conservation Biology. 13(3). June, 1999. 623-632.

Abstract

There is little information on the effects of tree harvest on salamander populations in the midwestern United States. We present data on plethodontid salamander densities in replicated stands of three forest age classes in the southeastern Ozarks of Missouri. Forest age classes consisted of regeneration-cut sites <5 years old, second-growth sites 70-80 years old, and old-growth sites >120 years old. Salamander abundance on 21, 144-m² plots was determined by area- and time-constrained searches. We also compared age-class habitat characteristics, including downed woody debris, canopy cover, ground area cover, herbaceous vegetation, and woody vegetation. Salamander density was lowest in newly regenerated forests and highest in forests >120 years old. Comparisons of recently regenerated forests with mature forests >70 years old indicated that terrestrial salamanders were reduced to very low numbers when mature forests had been intensively harvested. This reduction may result from a decrease in microhabitat availability. Forest age-class comparisons further indicated that salamander abundance slowly increased over time after forests had regenerated. Management decisions that take into account plethodontid salamander abundance and their response to forest structural diversity are important components in sustaining ecosystem integrity while maximizing economic yield.

<10>

Accession Number

BACD199900004468

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Title

Short-term effects of understory and overstory management on breeding birds in Arkansas oak-hickory forests.

Source

Journal of Wildlife Management. 62(4). Oct., 1998. 1411-1417.

Abstract

Relatively little is known about the effects of uneven-aged forest management practices on eastern forest birds, despite the fact that such methods are now commonly practiced. In 1993-94, we studied the short-term effects of uneven-aged forest management on bird communities in oak-hickory forests of northwestern Arkansas. We estimated bird abundance in mature forests and on managed plots receiving either a heavy cutting of understory vegetation (understory treatment) or a combination of both understory cutting and selective cutting in the forest overstory (full treatment). Two nesting guilds and 7 of 14 species with adequate sample size showed significant treatment effects. Ovenbirds (*Seiurus aurocapillus*), worm-eating warblers (*Helminthos vermivorus*), Acadian flycatchers (*Empidonax virescens*), and the understory-nesting guild were most abundant in mature forest. Indigo buntings (*Passerina cyanea*), white-breasted nuthatches (*Sitta carolinensis*), and eastern wood-pewees (*Contopus virens*) were more abundant on full treatment plots. Tufted titmice (*Baeolophus bicolor*) were most abundant on mature forest and understory treatment plots. The canopy-nesting guild was most abundant on understory and full treatment plots. Our results suggest that if removal of understory vegetation was practiced widely in the Arkansas Ozarks as part of uneven-aged management, populations of some ground- and shrub-nesting forest interior species of birds could be negatively affected, whereas a few forest canopy and edge species may respond positively. Future research on this type of uneven-aged management should examine effects of removing varying amounts of understory vegetation on both forest interior bird populations and forest regeneration.

<11>

Accession Number

BIOA199800378997

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Title

Vegetation of limestone and dolomite glades in the Ozarks and Midwest regions of the United States: A review.

Source

American Journal of Botany. 85(6). June, 1998. 29.

<12>

Accession Number

BIOA199800179403

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Title

Improving estimates of acceptable growing stock in young upland oak forests in the Missouri Ozarks.

Source

Northern Journal of Applied Forestry. 15(1). March, 1998. 28-32.

Abstract

Estimates of regeneration or growing stock in young oak forests may be too high unless criteria are established that define explicitly acceptable growing stock. In young hardwood stands, crown class can be used to identify acceptable growing stock because it is related to the future growth and survival of reproduction. A method is presented for assigning crown class categories to hardwood stems based on their diameters (dbh). Young upland oak forests originating from clearcuts in the Missouri Ozarks were sampled to determine the relationship between dbh and crown class. Stands were 19 to 25 yr old. Threshold diameters (TD) separating one crown class category from another were determined using regression analyses. TD was not significantly affected by species group, and in some cases by aspect and slope position. Quadratic mean stand diameter (QMSD) was significantly related to TD. As QMSD increased so did TD. When QMSD equals 3 in., trees with dbh \geq 3.9 in. are allocated to the codominant and dominant crown class category, and those \geq 2.5 in. to the dominant, codominant, and intermediate category. TD can be used to assign a crown class category to individual trees, thereby improving estimations of acceptable growing stock. By this method, crown class can be used to define acceptable growing stock and evaluate stocking, yet it does not have to be measured in stand inventories.

<13>

Accession Number

BIOA199800030669

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Title

Temperature and its variability in oak forests in the southeastern Missouri Ozarks.

Source

Climate Research. 8(3). Oct. 9, 1997. 209-223.

Abstract

This paper examines air and soil temperature, their variabilities, and their relationships with decomposition and ground flora diversity within an oak *Quercus* forest in the southeastern Missouri Ozarks (USA). We conducted 3 experiments with 9 mobile weather stations at Missouri Ozark Forest Ecosystem Project (MOFEP) study sites from September 1994 to August 1995. We used the cotton strip assay technique to quantify decomposition rate and Simpson's diversity index to evaluate the diversity of the ground flora. We found that air temperature at each site differed significantly from every other site ($p < 0.001$) based on a temporal scale of 20 min; this was also the case for soil temperature ($p < 0.001$). The spatial variation of soil temperature was consistently greater than that of air temperature. The spatial variation of air temperature increased with increasing spatial scale. Spatial variation of soil temperature increased rapidly from the 0 to ca 40 m scale, then decreased slowly before it began to increase again at a spatial scale of ca 700 m. Temperature was not highly correlated to decomposition rate in the study area (correlation coefficients were 0.51 and 0.64 for air and soil temperature, respectively). The spatial variation of

temperature was inversely related to the species diversity of the ground flora (R^2 was 0.87, 0.93, and 0.76 for air, soil surface, and soil temperature, respectively, at the 400 m scale). These results suggest that temperature variation can be quite significant, even at the stand level, and can impact some ecological patterns and processes at the same scale.

<14>

Accession Number

BIOA199799812215

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Title

The importance of gap processes in the development and maintenance of oak savannas and dry forests.

Source

Journal of Ecology. 85(5). 1997. 635-645.

Abstract

1. We examined the dynamics of a *Quercus*-dominated dry forest-savanna complex in the Ozark Highlands of the central United States, focusing on regeneration patterns within gaps. The study area includes one of very few temperate *Quercus* ecosystems not degraded by fire suppression, logging or excessive grazing. 2. We compared patterns of tree seedling establishment, tree height growth and postfire survival in gaps between savanna, found only on south and west aspects in our study area, and dry forest, found only on north and east aspects, to determine which factors contributed to maintaining structural differences. 3. Canopy gaps constituted 42% of savanna area compared with 17% for dry forest. Mean canopy gap size in savanna was 316 m² compared with 185 or dry forest, but gap sizes were highly variable and the difference was not significant. Remnants of canopy trees were found in 37 of 38 gaps, indicating that gaps in both savanna and dry forest can usually support trees. 4. Savanna and dry forest gaps were generally favourable for seedlings and growth of small trees. Seedlings of most woody species were widespread in the understoreys of both savanna and dry forest but were more abundant in gaps than under closed canopies. Species had different height growth patterns depending on site, with growth rates ordered as follows: *Quercus velutina* in savanna > *Q. velutina* in forest > *Q. stellata* in forest > *Q. stellata* in savanna. Site differences were significant for *Q. stellata* but not for *Q. elutina*. 5. Tree survival in two surface fires was significantly lower in gaps in savanna compared with gaps in dry forest. Survival within individual gaps was inversely related to grass cover. In savanna, survival of small trees (2.5-7 cm d.b.h.) ranged from > 80% for gaps with < 5% grass cover to < 50% survival in gaps with > 90% grass cover. 6 Canopy gaps in the Ozarks are created primarily by windfall and drought-related dieback, but fire influences the timing and rate of gap infilling. Understanding the interactions among these disturbances may help clarify the dynamics of many temperate woodlands once dominated by surface fires.

<15>

Accession Number

BIOA199799737196

Author/Editor/Inventor

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Title

Oak regeneration and overstory density in the Missouri Ozarks.

Source

Canadian Journal of Forest Research. 27(6). 1997. 869-875.

Abstract

Reducing overstory density is a commonly recommended method of increasing the regeneration potential of oak (*Quercus*) forests. However, recommendations seldom specify the probable increase in density or the size of reproduction associated with a given residual overstory density. This paper presents logistic regression models that describe this relation for a forest in the Ozark Highlands of Missouri that has been managed for 40 years by the single-tree selection system. In general, density of oak reproduction of a given size increases with decreasing residual stand basal area. However, the corresponding increase in the reproduction density at all levels of overstory density indicates low predictability of individual stands. The models nevertheless describe the average trend in the highly stochastic regeneration process. They also suggest that stand densities must be kept low (e.g., basal areas $\lt 14 \text{ m}^{-2} \text{ cntdot ha}^{-1}$) to sustain the requisite recruitment of reproduction into the overstory under the single-tree selection method.

<16>

Accession Number

BIOA199699228349

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Title

Nest site fidelity in female wild turkey: Potential causes and reproductive consequences.

Source

Condor. 98(3). 1996. 589-594.

Abstract

We studied nest site fidelity of female Wild Turkeys in the Arkansas Ozarks during 1992-94. Sixty-nine percent of surviving females returned to breed on their previous breeding areas. Older females had higher return rate compared to younger females. Females did not appear to base their return decision on the previous year nest success. Females that returned to their previous nesting areas laid larger clutches than females that did not return and nests of returned females survived longer than those of females that moved to new areas. Nest site fidelity did not associate with future reproductive success; nest success of females that returned and those that switched breeding areas was similar. Spring dispersal distance and size of prenesting ranges were similar between females that returned and females that moved to new areas between years. Females that nested in habitats that appeared to provide reduced protection from predation relocated in the following year independently of whether their previous nests actually were depredated. Increased social status and experience may account for correlation between habitat quality and breeding site fidelity.

<17>

Accession Number

BIOA199699102012

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Title

Effects of long-term annual and periodic burning on tree survival and growth in a Missouri Ozark oak-hickory forest.

Source

Forest Ecology & Management. 82(1-3). 1996. 1-9.

Abstract

In a Missouri Ozark Mountains oak-hickory forest, long-term annual and periodic burning regimes decreased survival of *Carya* and *Erythrobalanus* oak species, but had little impact on survival of *Quercus stellata*. Reductions in survival of *Carya* and *Erythrobalanus* species were greater in periodically- than in annually burned plots. Compared with *Q. stellata* mortality, *Carya* mortality was less closely related to pretreatment diameter, possibly because of drought-related mortality between 1972 and 1984. *Erythrobalanus* mortality was likely related to drought both during the first measurement interval, between 1949/1951 and 1964, and during the last period, between 1972 and 1984. Survival increased with pretreatment diameter for *Q. stellata* and peaked at an intermediate diameter for the *Erythrobalanus* species. The relationship between diameter and survival was likely associated with self-thinning and natural life-span limits of trees and was modified by fire regimes. Fire accelerated the loss of small-diameter trees in all species. The results suggest that use of fire as a tool to influence species composition oak-hickory forests must include considerations of stand age, species life-span, stages of stand development and environmental stresses.

<18>

Accession Number

BIOA199699100620

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Title

Habitat sampling and habitat selection by female wild turkeys: Ecological correlates and reproductive consequences.

Source

Auk. 113(3). 1996. 636-646.

Abstract

Habitat sampling can allow much more effective habitat selection for long-term activities such as nesting and may be directly linked to fitness. We studied the process of habitat sampling and selection in female Wild Turkeys (*Meleagris gallopavo*) in the Arkansas Ozarks. In particular, we tested the prediction that movements prior to selecting nesting habitat correlate with the quality of selected habitat. Our results supported the prediction that greater habitat sampling (as reflected by

greater area covered prior to nesting) allows acquisition of better nesting habitat; greater movements were correlated with choice of better nesting sites with more cover that allow higher nest survival. Attributes of individual birds and habitat dispersion influenced movement patterns and access to quality habitats. In addition, extent of habitat sampling early in the season correlated with reproductive performance by affecting renesting. Distance between subsequent nest locations was inversely related to the movements early in the season and also depended upon length of incubation before nest predation. Females that sampled larger areas after depredation of their first nest and did so outside of their prenesting range were more successful than other females.

<19>

Accession Number

BIOA199699038107

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Title

Shortleaf pine seed production in natural stands in the Ouachita and Ozark Mountains.

Source

Southern Journal of Applied Forestry. 20(2). 1996. 74-80.

Abstract

Seed production of shortleaf pine (*Pinus echinata* Mill.) was monitored from 1965 to 1974 to determine the periodicity of seed crops in both woods-run stands and seed-production areas. One bumper and two good seed crops occurred during the 9-yr period. The two largest crops occurred in successive years, then seed production was low for 4 yr before another good crop occurred. Mean annual seed production ranged from 84,000/ac in the western Ouachitas to 167,000/ac in seed-production areas in the southern Ozarks. Certain stand-level variables significantly influenced seed production. Seed production was positively related to stand age and negatively related to pine and hardwood basal areas; although frequently significant, no consistent relationship occurred with stand elevation. Results indicate that shortleaf pine seed production will usually be adequate for natural regeneration within most of the study area.

<20>

Accession Number

BIOA199698724896

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Title

Ecological and behavioral correlates of variation in seasonal home ranges of wild turkeys.

Source

Journal of Wildlife Management. 60(1). 1996. 154-164.

Abstract

We examined the effects of habitat distribution, age, sex, and body mass on variation in seasonal home ranges of eastern wild turkeys (*Meleagris gallopavo silvestris*). During 1992-94 we obtained

and analyzed 11,354 locations of 156 wild turkeys in the Arkansas Ozarks. In particular, we tested the prediction that home range size and seasonal range juxtaposition covary with social status and physiological condition of an individual. Participation in breeding, age, and body mass strongly influenced spring and summer range sizes and range use in both sexes. As predicted, adult wild turkeys had smaller home ranges during the breeding season and greater overlap among seasonal ranges than yearlings. Successful females had a higher probability of using their breeding area during fall and winter than unsuccessful females. Habitat availability and distribution and acorn harvest were significant correlates of winter range size and use for females. Spring and prenesting ranges of females in our study area were the largest reported for eastern wild turkeys. We attributed this pattern to high nest predation which might cause extensive nest site selection movements.

<21>

Accession Number

BIOA199598474351

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Title

The influence of drought on red oak group species growth and mortality in the Missouri Ozarks.

Source

Canadian Journal of Forest Research. 25(7). 1995. 1119-1127.

Abstract

The effects of drought on growth of red oak group species were studied by examining basal area increment and ring width index patterns of dominant *Quercus coccinea* Muenchh. (scarlet oak) and *Quercus velutina* Lam. (black oak) trees sampled in 1990-1991 on 62 continuous forest inventory plots located across the southeastern Missouri Ozark Mountains. Trees of both species were older on plots that had suffered high mortality and showed post-1979 reductions in growth rate compared with trees growing on low-mortality plots. *Quercus coccinea* trees from high-mortality plots that were dead at the time of sampling exhibited a distinct flattening in growth rate after the mid-1930s, although death did not occur for many years. Severe droughts in 1980 and 1986-1988 were associated with further accentuated reductions in growth rate in dead trees. Dead *Q. coccinea* that had grown on plots with lower mortality showed comparable reductions in basal area index and similar post-1979 growth patterns, but the departure in basal area index between living and dead trees occurred 2 decades later and was associated with a severe drought during 1953-1956. Additionally, dead trees on lower mortality plots grew faster than living trees for many years before the 1953-1956 drought, suggesting that rapid early growth rates may predispose trees to early death under certain conditions. The ring width index chronologies of both species growing on high- and low-mortality plots were significantly correlated with Palmer drought severity index values, further emphasizing that drought has an important influence on growth of red oak group species in the Missouri Ozarks. Analysis of first differences of ring width index chronologies indicated that severe drought had an additional of severe droughts in predisposing trees to eventual death.

<22>

Accession Number

BIOA199598467200

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Title

A dendrochronological study of black and scarlet oak decline in the Missouri Ozarks.

Source

Forest Ecology & Management. 75(1-3). 1995. 69-75.

Abstract

Examination of tree-ring data revealed important relationships regarding red oak decline in the Missouri Ozarks. Red oaks, mainly black and scarlet oak, exhibiting greater than 30% crown dieback had significantly lower present-day growth rates compared with trees with less than 30% dieback. Red oaks with declining crowns first showed significantly lower radial growth than trees that are healthy at present in the 10 years following years of severe drought in southeastern Missouri. These dates for initiation of radial growth decline varied by tree age, and were 1936 for 60-79-year-old trees and 1952 for 40-59-year-old trees.

<23>

Accession Number

BIOA199598003744

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Title

Fire frequency on an oak-hickory ridgetop in the Missouri Ozarks.

Source

American Midland Naturalist. 132(2). 1994. 393-398.

Abstract

Wedges taken from 24 post oaks (*Quercus stellata* Wang.) growing on a ridge in an oak-hickory stand were used to reconstruct the fire history in the Houston Ranger District in Missouri's Mark Twain National Forest. A chronology was constructed dating from 1734 to 1991. Fire frequency was greatest between 1740 and 1850 with a mean return interval of 2.8 yr. After 1850, the fire return interval increased to 24 yr. This change in fire return regimes is coincident with settlement of the area by Anglo-Americans.

<24>

Accession Number

BIOA199497511226

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Title

Pre-outbreak management recommendation for 60-year-old declining oak stands in the Ozarks.

Source

Northern Journal of Applied Forestry. 11(3). 1994. 98-101.

Abstract

A pre-outbreak management strategy was developed for 60-yr-old declining natural stands of scarlet and black oak. The series of management alternatives which maximized the net present worth of these stands growing on a moderate-quality site specifies individual-tree selective thinnings at ages 40 and 50, shelterwood cut at age 60, and final harvest at age 63. This strategy yielded the highest NPW of 331.77/ac, 8.3 mbf of sawlogs, and approximately 15 cords of pulpwood while reducing tree mortality by 20% over unmanaged stands. Recommendations for forest managers include as first priority the removal of oaks with 30% or greater crown dieback, and secondly, the removal of smaller diameter, overtopped scarlet and black oaks.

<25>

Accession Number

BIOA199395013755

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Title

Late spring migration and extralimital summer records of migrant birds in the Illinois Ozarks.

Source

Transactions of the Illinois State Academy of Science. 85(3-4). 1992. 221-225.

Abstract

We provide records of late spring migrant and summer vagrant birds in the Illinois Ozark region of southern Illinois. During three years (1989-1991) of intensive censuses, twenty migrant passerine species were encountered during late May or early June. Three other northern breeding passerine species were recorded in mid- and late June and are considered summer vagrants.

<26>

Accession Number

092051978

Authors

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Title

TREE-RING ANALYSIS OF FIRE HISTORY OF A POST OAK SAVANNA IN THE MISSOURI USA OZARKS.

Source

Natural Areas Journal 11 (2). 1991. 93-99.

Abstract

Fire scars from 43 trees were dated by dendrochronological methods to reconstruct the extent and frequency of fire in an area of post oak savannas in southern Missouri. Post oak (*Quercus*

stellata Wang.), shortleaf pine (*Pinus echinata* Mill.), and eastern red cedar (*Juniperus virginiana* L.) trees from the Caney Mountain Wildlife Refuge were used to construct two fire-scar chronologies. Fire frequency and extent was found to be greater between 1700 and 1810 on post oak savannas. The mean fire-free interval during the pre-1810 period was 4.3 years for an area of post oak savanna of approximately 2.5 km². Evidence for several fires at least 6 km² in extent was found from trees scarred in the years 1785, 1796, and 1806. A decrease in fire frequency on post oak savannas began in 1820, the time when native Americans began moving westward out of this area. In oak-pine woods, fire frequency was found to increase after 1850 with the settlement of the area in the 1860s by European-Americans.

<27>

Accession Number

091030766

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Title

MODERN POLLEN RAIN IN THE SOUTHWEST MISSOURI OZARKS USA.

Source

American Midland Naturalist 124 (2). 1990. 263-268.

Abstract

Bryophytic polsters and surface samples were collected from four sites in Shannon and Carter counties in the SE Missouri Ozarks to determine modern pollen rain. Regional pollen rain and variation in the local pollen rain are reflected by modern pollen spectra. Regional pollen rain was calculated by averaging the percentages of the various taxa in the pollen spectra from the 10 samples collected. In this area the average regional pollen rain is dominated by *Pinus* (18.5), *Quercus* (51.5), *Carya* (4.4) and *Ambrosia* (8.7). The data are consistent with the mosaic of pine-oak and oak-hickory-pine forests characteristic of this region.

<28>

Accession Number

089102701

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Title

THE GENETIC CONSEQUENCES OF HABITAT FRAGMENTATION.

Source

Annals of the Missouri Botanical Garden 77 (1). 1990. 13-27.

Abstract

The natural habitats of many species have become fragmented into small "islands," principally by human activities. In this paper we discuss the long-term genetic and evolutionary consequences of fragmentation as inferred from studies on populations that have undergone natural habitat fragmentation in the Ozark Mountains. The Ozarks are the highest land formation found in the

midwestern United States. Because of the absence of major geographical barriers around the Ozarks, plants and animals from diverse parts of the continent have been able to invade the area during post-Pleistocene climatic periods. Many of these invasions were short-lived, but the geological and topographical complexity of the Ozarks provided numerous relictual habitats. As a consequence, natural habitat fragmentation occurred from many species, and the fragmentation has often persisted for thousands of years. The genetic and ecological consequences of habitat fragmentation depend critically upon whether or not habitat fragmentation results in a complete cessation of dispersal between the habitat islands. If habitat fragmentation results in the complete genetic isolation of habitat islands, then each "island" becomes demographically independent and local extinction can occur. When there is no opportunity for recolonization, an "extinction ratchet" is possible in which each local extinction brings the global population irreversibly one step closer to total extinction. It is therefore critical to know if habitat fragmentation actually prevents dispersal or not. Unfortunately, studying dispersal patterns directly is usually not feasible. We show how genetic surveys can be used to answer this question. Given demographic fragmentation, we also show how genetic surveys can pinpoint species at high risk for local extinction. These suffer the most severe genetic consequences from habitat fragmentation, such as a drastic loss of genetic variability within habitat islands and inbreeding depression. On the positive side, the genetic variation of a fragmented species is not totally lost but is often present as fixed differences between different local populations. Indeed, a fragmented population is subject to less global loss of genetic variation than an equally sized panmictic population. Consequently, as long as the rate of local extinction is relatively small or counteracted by a recolonization program, a fragmented species can preserve almost all of its genetic variation at the global level for long periods of time. We discuss the optimal design for the recolonization program to prevent global extinction and to maintain high levels of global genetic variation.

<29>

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Title

POPULATION STATUS AND HABITAT CONDITIONS FOR THE RED-COCKADED WOODPECKER IN MISSOURI USA.

Source

Transactions of the Missouri Academy of Science 21 1987. 105-118.

Abstract

The population status and present habitat conditions for the red-cockaded woodpecker (*Picoides borealis*) were evaluated in the Missouri Ozarks during July 1983-August 1984. No red-cockaded woodpeckers and no evidence of their activities were located on 122 National Forest timber management compartments and other sites. Excavations found in living pines were attributed to pileated woodpeckers (*Dryocopus pileatus*) and yellow-bellied sapsuckers (*Sphyrapicus varius*). The original range of red-cockaded woodpeckers in Missouri is unknown, but probably extended through portions of eight southeastern counties based on the current distribution of individual old-growth trees. Overstory pine trees in 822 random plots were of sufficient age and basal area to

provide red-cockaded woodpecker habitat. Most areas contained large numbers of hardwoods in the overstory, however. Understory trees were mainly hardwoods of sufficient height and density to prevent use of the stands by red-cockaded. Management of habitat for this species in Missouri should include cutting pine stands on an 80-100 year rotation, elimination or reduction of hardwood understory, thinning of pine stands every 10 years, introduction of red heart in potential cavity trees, and linking of mature pine habitats. Minimum area requirements and managing sufficient area to maintain a minimum viable population should also be considered if reintroduction is undertaken. Forest management personnel should be trained to distinguish among excavations of red-cockaded woodpeckers, pileated woodpeckers, and yellow-bellied sapsuckers, and the appearance of natural wounds in living pine trees.

<30>

Accession Number

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Title

WINTER POPULATION DYNAMICS OF BLUE JAYS *CYANOCITTA-CRISTATA* RED-HEADED WOODPECKERS *MELANERPES-ERYTHROCEPHALUS* AND NORTHERN MOCKINGBIRDS *MIMUS-POLYGLOTTOS* IN THE OZARKS USA.

Source

American Midland Naturalist 115 (1). 1986. 52-62.

Abstract

Numbers of blue jays and red-headed woodpeckers in the Ozark region were examined to determine relationships between these two acorn-storing species during winter, using data from 49 Christmas Bird Counts conducted between 1957 and 1982. Numbers of northern mockingbird, a frugivore, were compared. Although red-headed woodpeckers occurred irregularly at over 90% of the count areas, and although blue jays were far more numerous than woodpeckers, abundances of these two species showed statistically significant positive correlations in 74% of the areas. When effects of long-term population changes were statistically partialled out, blue jay and mockingbird numbers were significantly correlated in 29% of the areas, but red-headed woodpecker and mockingbird numbers were correlated in only 10% of the areas. These results suggest that the significant relationship between blue jays and red-headed woodpeckers does not hold for all species wintering in the Ozark region, and are consistent with the hypothesis that the former two species covary as a function of mast crop availability. Comparisons within count areas of year-to-year variation in numbers of birds suggested that, in the Ozark region over the last 25 years, blue jay numbers have generally increased and mockingbird numbers have generally decreased in northern areas, with no obvious trend in red-headed woodpecker numbers. Few comparisons (< 10%) of year-to-year variation in bird numbers between count areas were significant for blue jay or red-headed woodpecker, although synchronous woodpecker fluctuations apparently occurred in eastern Kansas and northwestern Missouri. More than 25% of the correlation between count areas for numbers of mockingbirds were significant, suggesting that many areas within the Ozark region have experienced similar fluctuations in mockingbird numbers. Numbers of all three species were compared with yearly estimates of acorn and mast abundance in Missouri from 1959 to 1980. Red-

headed woodpecker and blue jay numbers were significantly correlated with mast abundance in Missouri at more count areas than were numbers of northern mockingbird. This relationship between bird numbers and mast abundance was stronger in the Ozark Plateau region than in Missouri as a whole. These results are consistent with the hypothesis of mast influence on jay and woodpecker numbers. Red-headed woodpeckers appeared more sensitive than jays to changes in mast abundance, and increases in numbers of jays may also be due to increasing urbanization in the Ozark region.

<31>

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Title

RESPONSES OF PLANTED NORTHERN RED OAK QUERCUS-RUBRA TO 3 OVERSTORY TREATMENTS.

Source

Canadian Journal of Forest Research 14 (4). 1984. 536-542.

Abstract

Northern red oak (*Q. rubra* L.) was planted in upland oak forests of the Missouri Ozarks USA. Plantings were made in 8 clearcut plots and in 16 plots thinned to 60% stocking. After 3 field growing seasons, the overstory was removed on one-half of the underplanted plots. The 2304 planted trees consisted of 4 classes of planting stock: small 1 + 0, large 1 + 0, 1 + 1, and container-grown. Shoots were clipped on 1/2 of the trees in each class. After 5 field growing seasons, average survival was 84%. Average heights of survivors were as follows: 118 cm for trees planted directly into clearcuts, 97 cm for underplanted-released trees, and 59 cm for underplanted-unreleased trees. Based on net shoot growth of trees after overstory removal, success probabilities were estimated using logistic regression analysis. The most successful trees were clipped 1 + 1 stock with initial shoot diameters (2 cm above the root collar) of 10 mm or more that were underplanted and subsequently released. For clipped 1 + 1 stock, success probabilities for a success criterion of 30 cm net height growth per year after overstory removal ranged 0.61-0.77 for 10-16 mm diameter trees; for a success criterion of 40 cm, success probabilities were 0.42-0.63, respectively.

<32>

Accession Number

077074948

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Title

Conversion of forestland in the Missouri Ozarks (USA).

Source

Transactions of the Missouri Academy of Science 16(0). 1982. 37-42.

Abstract

Conversion of forested areas to agricultural uses in the Missouri Ozark Region has generated concern over future timber supplies from this region. Thirty tracts within the USDA Forest Service Southwestern and Eastern Ozark Survey Units were examined to determine differences in quality of forest stands prior to conversion as well as the degree of conversion success. With the exception of bottomland sites in the Eastern Unit, original stand quality was found to be relatively poor with no apparent differences between regions in upland site quality. Due to poor tree form, low merchantable volumes and low stocking rates the pre-conversion forest stands of both regions were of questionable commercial value. The relative success of conversion appears to be greatly influenced by post-conversion treatments. No strong relationships were apparent among site characteristics, method of conversion and success of conversion.

<33>

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Title

Energetic constraints and adaptive significance of the floral display of a forest milkweed (*Asclepias quadrifolia*).

Source

Ecology (Washington D C) 63(6). 1982. 1857-1870.

Abstract

The number of flowers produced by *A. quadrifolia*, a perennial, woodland milkweed of the Ozarks (USA), is significantly correlated ($P < .001$) with both aboveground and belowground structural energy at time of flowering. About 3-5% of the total structural energy was devoted to flowers by plants of all sizes. In the year following the production of a pod or major herbivore damage by *Rhyssalus lineaticollis* or *Danaus plexippus*, a plant produced a significantly smaller stem with fewer flowers. Individual flowers are relatively inexpensive to produce (63.6 J, equalling 0.2% of the total structural energy of an average plant at time of flowering), but a single seed pod is expensive (10.40 kJ, equalling 21%). Most small flowering individuals lack sufficient resources to mature a pod. A typical seedling passes through a juvenile nonflowering period and a flowering period when it functions solely as a male (all initiated pods are aborted) before it accumulates enough reserves to become functionally hermaphroditic. Since flower production appears to be limited by available energetic reserves, a plant would have a selective advantage if those limited flowers ($\text{hivin } x = 29.6$ flowers per flowering plant) were grouped to maximize genetic contribution to the next generation. Total pollinarium removal increased with increasing umbel size, but pollinarium removal per flower peaked within the natural range of umbel sizes (10-25 flowers). Although mean umbel size in the field was 15-17 flowers, only 5 flowers were necessary to achieve maximal pod initiation per flower. The extra flowers cannot be explained adequately in terms of seed production, but are better understood in terms of enhancing pollen contribution

through the donation of pollinaria. A cost-benefit analysis suggested that the optimal umbel size for plants growing in typical woods habitat was approximately 12 flowers.

<34>

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075025186

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Title

Factors influencing diet selection by white-tailed deer (*Odocoileus virginianus*).

Source

Journal of Wildlife Management 46(3). 1982. 711-718.

Abstract

Variables characterizing the use and nutritive value of 34 spring and summer foods of white-tailed deer (*O. virginianus*) in the Missouri Ozarks (USA) were subjected to principal component analysis. Four factors, explaining 73.5% of the variation in the data, were extracted. Because the chemical and structural composition of spring and summer foods varied widely, selection of different forage types (forbs, fruits of woody species, leaves of woody species, grasses and grain) satisfied different nutritional needs. Forbs and grasses had high digestibility and contained high levels of protein, P and K. Leaves of woody species, although poorly digested, provided significant amounts of rapidly fermented cell solubles, had a high Ca content and probably were rapidly passed through the digestive system. Fruits of woody species were high in energy. Habitat in nonagricultural areas of the midwest should be managed to stimulate the production of each forage type if deer carrying capacity is to be increased.