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WILDLIFE OPENINGS IN THE SHAWNEE NATIONAL FOREST AND THEIR CONTRIBUTION TO HABITAT CHANGE

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ABSTRACT

Maintained openings in otherwise forested habitat have traditionally been considered beneficial to many forms of wildlife, but there have been recent concerns regarding their possible contribution to forest fragmentation. Currently, >1,500 wildlife openings in the Shawnee National Forest occupy <1.0% of the total area. In this paper, we describe certain physical and vegetational characteristics of these openings. We also compare land use and habitat surrounding the openings to that which existed prior to their establishment.

Since the late 1950s, forested acreage within a 1 km radius of sampled openings increased from 67 to 83% while agricultural and open lands declined from 33 to 16%. It is anticipated that open habitat in the Forest will continue to decline. In our opinion, continued maintenance of a reasonable number of openings would benefit a variety of wildlife, help maintain distinctive remnant plant communities, and not necessarily impact forest-interior species.

INTRODUCTION

The Shawnee National Forest (SNF), in extreme southern Illinois, is a discontinuous and diverse patchwork of timbered areas and oldfields interspersed with private lands. The area offers unique opportunities for natural resource management in a state that is 95% privately owned. In 1956, the U.S. Forest Service and the Illinois Department of Conservation initiated a cooperative program to establish

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and maintain openings and water holes for wildlife in the SNF; >1,500 such openings currently exist.

Wildlife management has traditionally emphasized the creation and maintenance of "edge" and diversity as a means of enhancing habitat for various species (Leopold 1933). Openings in forested habitat are considered especially beneficial to white-tailed deer (*Odocoileus virginianus*) (McCaffery and Creed 1969), wild turkey (*Meleagris gallopavo*) (Healy and Nenno 1983) as well as other game and nongame species (McCaffery et al. 1981). Concerns have been raised, however, regarding the potential negative impacts of habitat fragmentation, especially forests (Robbins 1979, Harris 1984). Similar concerns surfaced during recently-conducted appellate hearings relating to the Proposed Land and Resource Management Plan for the SNF. Specifically, the role of wildlife openings in the SNF has been questioned as well as their possible contribution to forest fragmentation (Tetreault 1988, Hussar 1988).

The Cooperative Wildlife Research Laboratory, Southern Illinois University-Carbondale recently conducted an inventory, classification, and evaluation of all wildlife openings in the SNF (Overcash and Roseberry 1986, 1987). In addition, land use surrounding current wildlife openings was compared to that which existed prior to establishment of the openings. The purpose of this paper is to describe (1) wildlife openings in the SNF in terms of number, size, density, dominant vegetation, and management; and (2) general land use and habitat patterns prior to and following establishment of the openings.

STUDY AREA

The SNF occupies 105,865 ha or 31% of the area within the original purchase boundary (U.S. Forest Service 1985). Only about 40% of the land was forested when acquisition was begun by the U.S. Forest Service in 1933; much of the remainder consisted of abandoned, highly eroded, "worn-out" farmland (Soady 1965). At present, approximately 90% of the SNF is forested. Native oak-hickory (*Quercus-Carya*) is the predominant type, but there is a substantial component of introduced southern pine (*Pinus* spp.) especially in the eastern portion of the SNF.

Eight natural divisions as defined by physiography, flora, and fauna (Schwegman 1973) are represented: the Southern Till Plain, Wabash Border Bottomlands, Lower Mississippi River Bottomland, Greater Shawnee Hills, Lesser Shawnee Hills, Ozark Hills, Coastal Plain Cretaceous Hills and Coastal Plain Bottomland divisions. Wildlife openings occur in all but the Wabash Border and Coastal Plains Bottomland, with 90% in the unglaciated Shawnee and Ozark Hills Divisions.

Administratively, the SNF is divided into 4 ranger districts: Murphysboro, Jonesboro, Vienna, and Elizabethtown. These contain 26, 13, 35, and 26% of the openings, respectively.

METHODS

Wildlife openings (n = 1,572) within the SNF were inventoried during July 1984-December 1985. Data were obtained from onsite visits to >600 openings and from U.S. Forest Service topographic maps and records. Land use within a 0.5 km radius (78 ha) of 1,137 openings was measured from ASCS aerial photographs

(1:12,000 and 1:20,000 scale) using a dot grid. Categories identified included deciduous and coniferous forest, intertilled cropland, pasture/hayfield, open habitat (primarily oldfields, clearcuts, newly-established plantations, and other wildlife openings), and water. To assess land use change over time, a subset of 80 openings was selected using stratified random sampling to represent the various physiographic regions and forest types. Land use within a 1.0 km radius (314 ha) of these openings was determined from recent (1980-1986) aerial photographs and compared with that which existed prior to establishment of the opening (determined from 1956-1959 aerial photos). Past and present land use on the same area was compared by paired *t* test ($\alpha = 0.05$). The composite sample (25,120 ha) contained 20% of all openings in the SNF (312) and represented 24% of its total area.

FINDINGS

Number, Size, and Distribution of Openings

Of the 1,572 openings initially identified, 1,528 were being maintained as of January 1986. Average size of individual openings was 0.5 ha (range 0.1 - 4.9); most (55%) were 0.3 to 0.6 ha, 20% were $\leq$0.2 ha, and 25% were $\geq$0.7 ha. Total area occupied was 789 ha or 0.74% of the entire SNF. Opening density averaged 1/68 ha; however, distribution tended to be somewhat more clumped than uniform. Over half (51%) were within 0.5 km of 2-4 other maintained openings, although 34% were relatively isolated (0-1 other openings within a 0.5 km radius).

Current Management and Dominant Vegetation

Current management emphasizes conversion of former fescue-dominated openings to tame legumes, maintenance of desirable early-successional native vegetation, and limited establishment of cereal grains. Management practices include mowing, burning, discing, and seeding on a 1-4 year rotation. Vegetational composition of openings varied greatly depending on method and frequency of treatment. Approximately 11% reflected annual-early perennial stages of secondary succession characteristic of recently-disturbed sites; 21% were in the perennial-forb stage with some early woody invasion; while 6% were dominated by woody vegetation such as persimmon (*Diospyros virginiana*), sassafras (*Sassafras albidum*), and sumac (*Rhus* spp). An additional 15% were predominately fescue (*Festuca* spp.), 13% contained mostly tame legumes, and slightly over 2% were in cereal grains. A relatively high proportion (10%) were characterized by native warm-season grasses such as little bluestem (*Schizachyrium scoparium*), big bluestem (*Andropogon gerardii*), and Indian grass (*Sorghastrum nutans*). These occurred primarily in the Cretaceous Hills and Southern Till Plain divisions. The remaining openings exhibited a variety of vegetational patterns depending on site conditions and past management history.

Surrounding Habitat

Habitat within 0.5 km of maintained openings was predominately forested. Deciduous forest occupied 70% of the total area sampled and coniferous forests 18%. Other nearby land-use types were open areas 6%, pasture and hayfields <4%, intertilled cropland 1%, and water <1%. A majority (62%) of the openings occurred in heavily forested ($\geq$90%) settings; only 10% were in areas <75% forested.

Past and Present Conditions

Land use patterns in the vicinity of maintained openings in the 1980's were compared with conditions immediately prior to or shortly after their establishment in the late 1950's. During this 30-year period, there were significant increases in deciduous and coniferous forest and water, and significant declines in cropland, pasture/hay, and open areas (Table 1). The overall pattern of change reflected a substantial increase in forested land (67% to 83%), a moderate decline in agricultural areas (16% to 12%), and a large reduction in open habitat (17% to 4%) (Fig. 1). Similar trends were recorded in both the eastern (Elizabethtown and Vienna districts) and western portions (Murphysboro and Jonesboro districts) of the SNF. In the eastern region, open areas declined from 22% to 5% with much of the reduction apparently resulting from establishment of pine in former oldfields. In the more heavily-wooded western region, open areas declined from 12 to 4%. Based on our sampling, the amount of non-agricultural open habitat in the SNF declined from >17,000 ha in the late 1950's to <4,500 in the mid 1980's. Wildlife openings, which contributed insignificantly to the early total, now constitute an estimated 18% of the current open habitat in the SNF; the remainder represents recent clearcuts, young pine or tulip (*Liriodendron tulipifera*) plantations, and small scattered oldfields.

DISCUSSION

A program to develop and maintain wildlife openings in the SNF was initiated in 1956 by the U.S. Forest Service and the Illinois Department of Conservation. A relatively large (>1,500) number of openings currently exist although the total area involved is small (<1.0% of the Forest). In the 30-year period during which openings were being developed (ca 1956-1986), the SNF has become more heavily forested and less open due to establishment of pines in former oldfields, natural succession and maturation, wildfire suppression, and acquisition of private lands. It is anticipated that open habitat will continue to decline as the practice of clearcutting is reduced or eliminated, young plantations mature, and burning is discouraged. Maintained wildlife openings should, therefore, contribute increasingly to the total amount of grass/forb habitat that does remain and to those species that benefit from it. Also, it should not be overlooked that as fire suppression on Forest Service and private lands hastens the disappearance of remnant presettlement prairie or "barrens" plant communities (Hutchison and Johnson 1981), those maintained openings that exhibit such characteristics will become increasingly important ecologically.

It was not the purpose of this paper to evaluate management of maintained openings or their effect on wildlife in the SNF. We believe, however, that continued maintenance of 1200-1500 openings could enhance habitat for a variety of game and non-game species, and in some cases help maintain distinctive remnant plant communities while not necessarily impacting area-sensitive forest-interior avian species.

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Table 1. Land use composition[a] in the vicinity of wildlife openings in the Shawnee National Forest, ca 1956 vs 1986.

Category	1956	1986	Change (%)	*P*
Deciduous	63.7	70.8	+7.1	<0.0001
Coniferous	3.6	12.5	+8.9	<0.0001
Cropland	3.9	2.6	-1.3	<0.01
Pasture/hay	12.3	9.0	-3.3	<0.001
Open	16.5	4.2	-12.3	<0.0001
Water	<0.1	0.9	+0.9	<0.05

[a]Mean percent composition within 1.0 km radius of 80 openings (total area sampled = 25,120 ha).

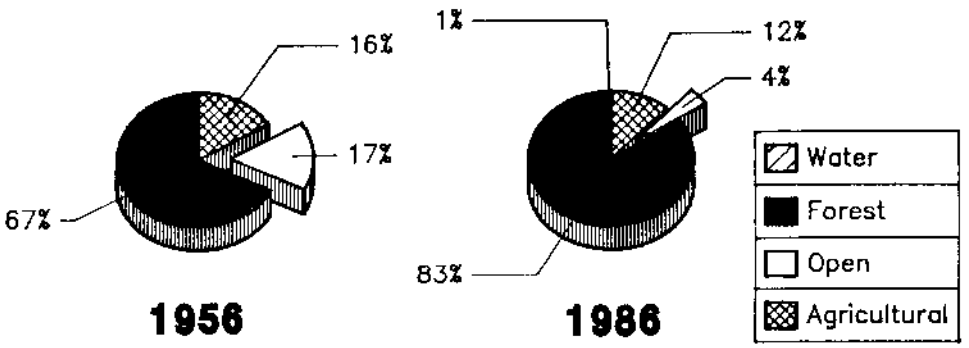

Figure 1. Land use changes in the vicinity of wildlife openings in the Shawnee National Forest, ca 1956 vs 1986.