

WILDLIFE AND SHORTLEAF PINE MANAGEMENT

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ABSTRACT

Shortleaf pine forests (Pinus echinata) are used for multiple purposes. This paper discusses the effects that timber management, livestock grazing, and recreational uses of the shortleaf forest may have on its wildlife resources.

The shortleaf pine (Pinus echinata) forest, whether in its pure state or mixed with hardwoods or other pines, is of immense value to wildlife and to people. Because its range is larger than that of any other pine in the southeastern United States (Lawson 1986), management of shortleaf forests potentially affects our environment more than management of most other pine species. This management is a matter of concern among the human residents of the shortleaf range who are keenly interested in the wildlife resources that inhabit the forest. Many of the residents of the southeastern United States actively participate in wildlife-related recreation. For example, 12% of citizens older than 16 years of age in the Southeast participated in hunting during 1980 and 46% made some nonconsumptive use of the wildlife resource (U. S. Dept. of Interior 1982). Recent studies in Mississippi (Nabi et al. 1983) and Arkansas (Owen et al. 1985) indicate that wildlife-related goals are the second most important reason that many landowners own forestland. Therefore, it is only natural that concerns should arise over management of shortleaf and the effects that such management might have on wildlife communities.

There have been a number of compendiums prepared that describe the effects of southern pine management on wildlife communities (Dickson 1982, Buckner 1982, Owen 1984). This author will not attempt to duplicate these efforts. Rather, a brief summary of these results will be provided along with a discussion of how other uses of the shortleaf forest affect wildlife resources. This paper will also emphasize wildlife communities rather than game species. At least 90% of vertebrate species in the continental United States are found in forest ecosystems (Shaw 1981). Although many of these species are not considered "game" and are present only seasonally, their needs must also be met and should be of concern to resource managers (Robbins 1984).

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SHORTLEAF MANAGEMENT AND WILDLIFE RELATIONSHIPS

There are a number of forest characteristics that influence the density and composition of wildlife communities. Habitat diversity is one of the most important of these characteristics because most wildlife species require more than one habitat or forest type to fulfill their life requisites. For example, eastern wild turkeys (Meleagris gallopavo silvestris) need a number of plant communities for such functions as hiding, escaping, roosting, brood rearing, resting, nesting, and breeding (Hurst 1981). Forest types used by turkeys include most seral stages from openings to climax. The need by wildlife species for among-stand diversity can be met in the shortleaf forest by providing stands of different ages and species composition, including sufficient numbers of natural stands (Harris and Marion 1982).

In addition to among-stand diversity, within-stand diversity is important to wildlife species. Within-stand diversity includes such characteristics as the number of horizontal strata, "patchiness" or spacing of trees, and species composition. Each of these influence the diversity and density of wildlife species present within a forest. For example, the number of horizontal strata is positively correlated with bird species diversity (Myers and Johnson 1978) but negatively correlated with development of the ground-level vegetation that benefits browsers, grazers, and breeding birds (Blair and Feduccia 1977). Irregular spacing of trees within a stand exposes open areas to full sunlight permitting increased growth of ground-level and understory vegetation. Roth (1976) suggested that uniformity in tree spacing reduces bird species diversity.

Although the hardwood component is often an economically undesirable component of the shortleaf forest, it does contribute to the welfare of numerous wildlife species. These trees produce seeds that are eaten by both birds and mammals, their bark harbors invertebrates that are also a food resource, and they provide cavities for nesting and roosting. Shortleaf pine is most valuable for birds when mixed with hardwoods (Myers and Johnson 1978, Briggs et al. 1982). Perhaps this is fortunate considering the difficulty of eradicating hardwoods from the shortleaf forest. Cain and Yaussy (1984) concluded that short of soil sterilization, complete eradication of hardwoods is unachievable.

EVENAGED MANAGEMENT OF SHORTLEAF

Evenaged management of pine forests has probably caused more furor among the public and profession than any other silvicultural option. In particular, clearcutting operations followed by intensive site preparation have received close attention. The rapid and highly visible change from existing forest communities to the first seral stages has probably been

most responsible for this reaction. Wildlife-oriented organizations located in areas where shortleaf is intensively managed have felt so strongly about clearcutting that they have brought stockholder pressure on timber companies to change management practices.

If intensive site preparation follows the clearcutting operation, most of the ground-level plant community may be removed and mineral soil exposed. Within one year, however, about one half of the harvested area will be revegetated and vegetation will average approximately 1 m in height (Beasley and Granillo 1985). These young clearcuts are attractive to many small mammals, mourning doves (Zenaida macroura), bobwhite quail (Colinus virginianus), and meadowlarks (Sturnella magna) (Dickson 1982). In addition, the predators that often feed on these species are attracted to these sites.

For the next two to four years, production of browse, forbs, and soft mast recovers from site preparation and is much greater than in native stands (Stransky and Halls 1978, Stransky and Roese 1984). From two years after clearcutting until crown closure, sites are dominated by perennial grasses, woody shrubs, hardwood sprouts, and a number of annual and perennial forbs (Beasley and Granillo 1985). It is in this stage of stand development that white-tailed deer (Odocoileus virginianus), rabbits (Sylvilagus floridanus), Peromyscus spp. and other small mammals are most benefited. In addition, possibly 30 to 40% of breeding bird species benefit from these shrubland communities until crown closure occurs (Johnston and Odum 1956). Because shortleaf generally grows more slowly than loblolly pine (Pinus taeda) (Chapman 1942), this shrubland community can persist longer in shortleaf plantations.

As crown closure occurs, habitat characteristics and wildlife communities also change. The intense shade from the pine canopy and the developing hardwood mid-story discourages the growth of ground-level vegetation and inhibits soft mast production (Halls and Alcaniz 1968, Blair and Enghardt 1976, Blair and Feduccia 1977). This results in loss of habitat for a number of species, that flourished in earlier seral stages, until thinnings or other cultural practices open the canopy once again. Thinning greatly enhances the habitat quality in shortleaf plantations through increased forage quality and quantity (Wolters et al. 1982, Blair et al. 1983), and increased soft mast production (Campo and Hurst 1980). Increased mid-story growth as a result of thinning greatly enhances habitat for songbirds (Kroodsma 1984).

After thinnings begin, a variety of management practices may alter the quality of habitat in shortleaf stands. Prescribed burning is a management practice that has both favorable and adverse effects on wildlife communities in the shortleaf forest. The effects of prescribed burning vary with

the frequency, time of year, and intensity of fires, and with stand structure. Burning favors browsers and grazers by temporarily increasing the nutrient content of forage plants, increasing the amount of light reaching herbaceous plants, and by causing sprouting of woody plants so the succulent growing portions are once again within reach of browsing animals (Lay 1956, Lay 1957, Dills 1956). Burning encourages patchiness in the understory that may increase the number of species and density of birds associated with ground-level vegetation (Myers and Johnson 1978). Burning can also create snags, attract large numbers of wood-dwelling insects, scarify leguminous seeds, and make available seeds previously hidden in the duff (Conner 1981, Dickson 1981). Conversely, fires can also destroy snags and temporarily lower hardwood mid-story and soft mast production, thus reducing the number of birds that are dependent on this habitat component (Dickson 1982).

The effects of evenaged management on wildlife communities can also be modified by such practices as providing streamside management zones, leaving snags wherever feasible, limiting stand size, providing a mosaic of stand ages within compartments, and shaping stands to provide a high amount of edge to area. Streamside management zones are often recommended for riparian areas that are inherently more productive for shortleaf than dryer sites. Yet, these zones are a wildlife management practice that potentially have great impact on most wildlife species in the evenaged shortleaf forest. By providing hard mast, snags, cavities, travel corridors, shade for the aquatic system, stabilization for stream banks, and an aesthetic buffer, streamside management zones can greatly diversify evenaged shortleaf pine systems. Abundant edges between stands that differ in age and structure, improves habitat quality for most species requiring more than one habitat type. For example, Strelke and Dickson (1980) found about three times the number and diversity of birds in stand edges as in stand interiors. However, predation rates may also be higher in these edges (Robbins 1984). Some large stands (> 1000 ha) are necessary for species dependent on forest interiors (Dickson 1982).

UNEVENAGED MANAGEMENT OF SHORTLEAF

Although many shortleaf forests are managed under an evenaged regime, numerous shortleaf stands are of an unevenaged structure, a management option particularly viable for private nonindustrial landowners (Reynolds et al. 1984). Yet, there are little data describing the quality of wildlife habitat in unevenaged shortleaf stands. These stands have characteristics that make them good habitat for wildlife species. Unevenaged stands of shortleaf generally carry between 45 and 75 ft²/ac basal area (Farrar 1984), which is less basal area than stands of an evenaged structure. In addition, these stands have an irregular canopy profile, a highly developed mid-story, abundant ground-level vegetation, and an irregular spacing of trees (Farrar 1984). This

diversity in habitat characteristics favors most members of the wildlife community.

OTHER MULTIPLE USES AFFECTING WILDLIFE

The shortleaf pine forest is a multiple-use forest. Although only public lands are mandatorilly managed for multiple uses (Multiple Use-Sustained Yield Act 16 U.S.C. 528-531), most shortleaf forests serve more than one purpose. Two uses of the shortleaf forest that affect wildlife resources are livestock grazing and public recreation.

Grazing and wildlife communities

Grazing of livestock, particularly cattle, in shortleaf forests has been a practice of homesteaders and livestock producers for decades (Grelen 1978). Because of the low cost of producing forage, this practice is an especially attractive alternative to improved pasture (Pearson 1974). Yet, there have been concerns raised about the potential effects that grazing might have on the quality of wildlife habitat in the shortleaf forest.

Of particular concern has been the effects of cattle grazing on white-tailed deer populations. A number of preferred deer foods are also eaten by cattle (Thill 1984). Both deer and cattle utilize hard and soft mast, grasses, woody browse, and forbs. Recent studies in the Louisiana shortleaf-loblolly forest, however, suggest that these two interests are not necessarily mutually exclusive. Grasses and grasslike plants are preferred by cattle while deer depend heavily upon woody browse (Thill 1984, Thill and Martin 1979, Moore and Terry 1979). Thill (1984) found that woody browse provided an average of 89% of the forage eaten by white-tailed deer and an average of 32% of cattle diets. Hard and soft masts usually comprised less than 1% of deer diets except during fall when these food items made up as much as 10% of the diet. Less than 0.1% of cattle diets was composed of hard and soft masts and peak use during fall did not exceed 4%. Grasses and grasslike plants made up an average of 66% of the diet of cattle but less than 2% of deer diets. Forbs were used most heavily by deer, and greatest competition between deer and cattle occurred during spring when forb resources are abundant.

Thill (1984) also suggested that on young clearcuts deer and cattle diets are especially complementary. The abundant supply of grasses produced on young clearcuts provides excellent grazing opportunities and an inexpensive means of improving accessibility to these sites. Deer and cattle are frequently observed feeding in the same clearcut, but use patterns differ temporally and spatially. Nelson and Shalaway (1985) found that cattle preferred to feed in young clearcuts during daylight while deer used them mostly at night. McKee

(1979), however, recommended that cattle be excluded from clearcuts during at least the first growing season to improve pine survival.

The greatest period of diet overlap for deer and cattle is during winter and early spring when deer and cattle are sharing hard mast and evergreen or tardily deciduous woody plants such as water oak (Quercus nigra), red maple (Acer rubrum), yellow jessamine (Gelsemium), Japanese honeysuckle (Lonicera japonica), blackberries (Rubus spp.), and greenbriars (Smilax spp.) (Thill 1984). Apparently, little competition occurs during other seasons. Management of the grass resource seems to be the key to resolving the conflict between cattle and deer. Because grasses are so important to the diet of cattle, stocking levels should be based on production estimates of grasses (Thill 1984).

Grazing by cattle also modifies habitat quality for other wildlife species. Moore and Terry (1979) suggested that in Florida, cattle grazing actually improves habitat quality for other species by reducing the abundance of plants that are of relatively low quality. In addition, moderate trampling by cattle breaks up dense ground-level vegetation, stimulates the development of other ground-level plants, exposes seeds, prepares a seedbed, and provides access for ground-feeding wildlife.

The influence of grazing other livestock species, such as hogs (Sus scrofa), in the shortleaf pine ecosystem are less well understood. Sweeney and Sweeney (1982) have compiled a thorough review of the food habits and habitat use of wild or "released" hogs. Hogs are opportunistic feeders, eating whatever foods are available. Like cattle, hogs also seem to prefer succulent young grasses during spring (Springer 1977, Roark 1977), but do not use them so heavily during other times of the year (10% to 36% of the diet). Acorns are used heavily during fall and winter, comprising as much as 50 to 84% of the diet. Roots are used year-round. Also used are soft mast, mushrooms, carrion, invertebrates, bulbs, and pine seeds. Their preference for acorns and pine seeds have at times inhibited forest regeneration (Wahlenberg 1946, Wakely 1954, Lucas 1977). Most wildlife species do not benefit from the presence of feral hogs because of their heavy use of hard and soft masts and their destructive feeding habits. However, the degree of competition depends upon the relative abundance of mast crops, alternative food supplies, and the hog population (Sweeney and Sweeney 1982).

Often, owners of forestlands are not in complete control of grazing practices on their lands. This is particularly true of large industrial or federal forestland owners and landowners in that portion of the shortleaf range where the "common lands" attitude remains prevalent. These landowners

are sometimes trapped between those interests that demand access for grazing and those interests that demand regulations on grazing (Rochelle and Melchior 1985). Improved relations between these user-groups may be achieved by fostering more ethical behavior and an awareness of fiscal responsibility among livestock owners, and by informing sportsmen and conservationists of the positive aspects of regulated grazing practices.

Public use of shortleaf forests

Recreational use of the shortleaf forest is another factor that affects both timber and wildlife resources. Many forestland owners have management objectives that are adversely affected by public use. In turn, recreational users of forestland may perceive the management practices of the landowner as detrimental to their recreational pursuits. These problems are particularly acute on privately owned forestland.

Hunting is the most important recreational use of privately owned forestlands in the southeastern United States (Kluender 1978, Owen et al. 1985). Use of forestland by hunters, however, can lead to problems such as litter, road damage, timber damage, trespass, and interference with landowner activities (Owen et al. 1985). Unregulated access for hunting can also result in undesirable impacts on wildlife populations. Careful regulation of game harvests cannot be achieved without access control. In addition, landowners are less likely to encourage wildlife populations if these populations only attract problems. Liability of landowners for recreationists is also a disincentive to wildlife management. Often used programs for achieving access control are posting, road closings, and leasing. Quite often, however, landowners simply ignore the problem (Owen et al. 1985).

Other important public uses of the shortleaf forest include trash dumping, firewood gathering, fishing, three and four wheel vehicle use, sightseeing, and trapping (Owen et al. 1985). Many of these uses, if unregulated, can also lead to serious problems for both timber and wildlife resources. For example, illegal trash dumps are often the source of wild fires that can occur during any time of year. In addition, the individual, corporation, or agency on whose land the dump is located can be held legally responsible for adverse consequences of the dump. Landowners are often fined for a dump that they did not start, that they have vigorously discouraged, and that they have even attempted to clean up. Illegal firewood cutting is also a major problem for timber and wildlife resources. In the shortleaf forest, this cutting often occurs in streamside management zones or other areas left specifically for the benefit of wildlife populations and results in a reduction of habitat quality.

As the human population increases in the southeastern United States, demand for recreational access in the shortleaf forest will increase. Ways must be found to promote harmony among user-groups and between users and landowners. Programs designed to raise the level of ethics among recreationists are one means of addressing this problem. Recognizing that the forestland owner is the producer of our wildlife resource and properly compensating him or her for this effort would also be beneficial (Leopold et al. 1930, Lewis 1983).

CONCLUSIONS

Timber management in shortleaf stands should be modified to accommodate the needs of as many wildlife species as possible. In particular, we should be aware that our forests are home to numerous neotropical migratory species that depend heavily upon shortleaf forests for their life requisites. Use and awareness of this nongame resource is increasing. For example, 28.8 million Americans took trips during 1980 primarily to participate in "nonconsumptive" wildlife-related activities (U. S. Dept. Interior 1982). An additional 9.4 million citizens enjoyed wildlife "nonconsumptively" during that year while on trips for other purposes. During 1980, 10% of Americans over 16 years old were hunters but 55% of Americans made nonconsumptive use of wildlife resources. These citizens are also rapidly learning how to encourage public agencies and privately owned corporations to manage for wildlife species they enjoy.

Management practices that should be encouraged include routine prescribed burning, leaving snags, and retaining hardwoods in areas such as streamside management zones. Regulating other uses of the shortleaf forest such as recreational use and grazing will also be beneficial to wildlife communities. The implementation of these practices on private lands have costs that the public often expects the landowner to bear. However, the public must learn that conservation of our forest and wildlife resources is a matter of concern for all citizens. The private landowner should be reimbursed for implementing management practices that are favorable to wildlife resources that belong to all Americans. Users of timber, wildlife, and grazing resources on public and private lands must also understand that resource use carries with it fiscal and ethical responsibility. Collectively, these steps can benefit landowners, timber resources, wildlife resources, and all users of the shortleaf forest.

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