



North Carolina Forest Service

To protect, manage, and promote forest resources for the citizens of North Carolina

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Fire Effects on Wildlife In the Mountains

Recommendations and interest in the use of fire to manage hardwoods and hardwood pine forests in the mountains and foothills of North Carolina is increasing. Like our southern pine forests fire is also important in oak and oak-pine forests, however the effects are considerably different as fuel characteristics, understory vegetation, fire intensity, overstory tolerance are dissimilar to pine ecosystems and are not as well studied.

A group of wildlife biologists and foresters from five universities (University of Tennessee, Virginia Tech, Mississippi State University, NC State University, University of Missouri) authored a publication that reviews fire effects on wildlife and their habitat in the Central Hardwood and Southern Appalachian regions. Published in the *Fire Ecology Journal* -Volume 12 (2016) the paper summarizes current research of fire effects, discusses the use of silviculture with fire to create, enhance or maintain habitat, and provides recommendation for prescriptions for various wildlife or species guilds.

A few of the many points in the paper are:

- In hardwoods it is important to distinguish what species and habitat condition you want, as fire regime for one species may conflict with another.
- For multiple species land management objectives follow recommendations for fire frequency over those for fire intensity or seasonality.
- Many hardwoods are vulnerable to fire. The authors suggest low intensity fire in hardwoods to avoid injury or mortality to overstory trees.
- Silvicultural practices such as thinning and mid-story removal can be used to increase light to the forest floor and increase the effect of fire in hardwoods to create, enhance, or maintain habitat.
- Snags produced by moderate burns, as opposed to girdling or herbicides, persist longer and produce softer interiors (from heart rot) favored by cavity nesters.
- Research is limited on fire seasonality effects in upland hardwoods. Bud break in the mountains may occur several weeks later and burning in July or August may be comparable to a June burn in longleaf forests of the deep south.
- Dendrochronology indicates dormant season fire was historically more frequent than growing season fire in the Southern Appalachians.

Abstract: *Fire is being prescribed and used increasingly to promote ecosystem restoration (e.g., oak woodlands and savannas) and to manage wildlife habitat in the Central Hardwoods*

*and Appalachian regions, USA. However, questions persist as to how fire affects hardwood forest communities and associated wildlife, and how fire should be used to achieve management goals. We provide an up-to-date review of fire effects on various wildlife species and their habitat in the Central Hardwoods and Appalachians. Documented direct effects (i.e., mortality) on wildlife are rare. Indirect effects (i.e. changes in habitat quality) are influenced greatly by light availability, fire frequency, and fire intensity. Unless fire intensity is great enough to kill a portion of the overstory, burning in closed-canopy forests has provided little benefit for most wildlife species in the region because it doesn't result in enough sunlight penetration to elicit understory response. Canopy reduction through silvicultural treatment has enabled managers to use fire more effectively. Fire intensity must be kept low in hardwoods to limit damage to many species of overstory trees. However, wounding or killing trees with fire benefits many wildlife species by allowing increased sunlight to stimulate understory response, snag and subsequent cavity creation, and additions of large coarse woody debris. In general, a fire-return interval of 2 yr to 7 yr benefits a wide variety of wildlife species by providing a diverse structure in the understory, increasing browse, forage, and soft mast, and creating snags and cavities. Historically, dormant-season fire was most prevalent in these regions, and it still is when most prescribed fire is implemented in hardwood systems as burn-days are relatively few in the growing season of May through August because of shading from leaf cover and high fuel moisture. Late growing-season burning increases the window for burning, and better control on woody composition is possible. Early growing-season fire may pose increased risk for some species, especially herpetofauna recently emerged from winter hibernacula (April) or forest songbirds that nest in the understory (May to June). However, negative population-level effects are unlikely unless the burned area is relatively large and early growing-season fire is used continually. We did not find evidence that fire is leading to population declines for any species, including Endangered Species Act (ESA)-listed species (e.g., Indiana bat [*Myotis sodalis* Mill. Allen] or northern long-eared bat [*M. septentrionalis* Trouess.]). Instead, data indicate that fire can enhance habitat for bats by increasing suitability of foraging and day-roost sites. Similarly, concern over burning and displacement of woodland salamanders (Plethodontidae), another taxa of heightened conservation concern, is alleviated when fire is prescribed along ecologically appropriate aspect and slope gradients and not forced into mesic, high site index environments where salamanders are most common. Because topography across the Central Hardwoods and Appalachians is diverse, we contend that applying fire on positions best suited for burning is an effective approach to increase regional landscape heterogeneity and biological diversity. Herein, we offer prescriptive concepts for burning for various wildlife species and guilds in the Central Hardwoods and Appalachians.*

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