



Quail, Turkey, and Deer: Fire Effects and Management Recommendations

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Prescribed fire is widely practiced by agencies and private landowners in the southeastern U.S. to maintain wildlife habitat and conserve biodiversity. Prescribed fire mimics the natural occurrence of historical fires in ecosystems that range from fire-frequented, upland pine savannas and mixed pine-hardwood forests, to wet bottomland forests that occasionally experienced fire. Variation in fire timing and frequency across landscapes naturally maintains a mosaic of vegetation patches of different ages. These patches differ in vegetation structure and composition, supporting a diverse assemblage of animals with various food and cover requirements for needs such as foraging, breeding, and escaping from predators.

Hunting is one of the most economically important and recreationally prevalent activities on fire-managed lands in the southeastern U.S. People enjoy hunting a number of birds and mammals that require fire-maintained habitats. This factsheet focuses on three of the most popular, non-waterfowl game species: white-tailed deer (*Odocoileus virginianus*), bobwhite quail (*Colinus virginianus*), and eastern wild turkey (*Meleagris gallopavo*). Fire management practices strongly affect the resources and habitat structures important to these animals. The purpose of this factsheet is to summarize the most recent research on how fire management affects these species, and to highlight management recommendations that have resulted from this research.

GENERAL FIRE EFFECTS ON GAME SPECIES

Fire management mainly benefits game species by improving vegetative structure and composition, which provide both food and protection. Because frequent fires are a natural process in southeastern ecosystems, these highly mobile species have ways of escaping fires (by running, flying, or hiding underground) and rarely suffer direct mortality. They spend most of their time using resources in the groundcover and understory, where fires stimulate herbaceous growth and maintain low woody

cover for foraging and refuge. Fire effects can be beneficial, neutral, or harmful for wildlife, depending in part on the amount of area burned, whether burns are patchy or complete, and fire frequency, season, and intensity.



Managers can maintain a balance between recent burns that support foraging and denser areas that provide nesting habitat for wild turkey.

WILD TURKEY

Fire management influences wild turkey nesting and brood success. Turkeys generally choose nest sites in dense herbaceous groundcover¹⁻³. In frequently-burned pine-lands, these sites will often be in open shrub-scrub habitats, or in drainages adjacent to uplands that burn frequently and provide good foraging habitat^{1,3,4}. Alternatively, in the Central Appalachian hardwood forests, nest sites tend to be dispersed more randomly⁵. Research shows minimal direct impact of growing-season fires on turkey nests whether in pinelands or hardwood forests^{2,6}. Female turkeys also tend to re-nest after failure, mitigating the effects of any direct fire-caused mortality^{7,8}.

Turkeys use recently-burned areas for foraging, but as time-since-fire increases, these locations are mainly used for nesting. Both male and female turkeys tend to use areas

burned within the last 18 months, particularly just after the fire^{9,10}. Recently burned areas might make foraging more efficient by removing the litter. Turkeys also prefer areas burned in the early growing season as opposed to winter^{5,10} due to greater availability of preferred food and lower predation risk¹¹. After two years, however, females will select these areas for nesting but after three years they are not particularly preferred over other habitats¹².

Management recommendations: Managers can maintain a balance between recent burns that support foraging and denser areas that provide nesting habitat¹³. Ideally, burns should be patchy or fires could be conducted on a rotational basis to maintain a patch-mosaic of these habitats. Small scale (30-55 acres) and frequent fire return intervals (2-3 years) in pinelands should support this objective. In central Appalachian hardwoods, small burns or occasional dormant season burning should minimize direct impacts on turkey nests.



Growing season burns promote vegetation regrowth that recovers rapidly and provides nutritious forage for fawns and adults.

WHITE-TAILED DEER

Fires mainly affect deer through their influence on vegetation, creating a tradeoff between higher forage quality and increased predation risk in recently burned areas. Deer are attracted to recent burns because regenerating plant growth is more palatable and higher in nutrients than older tissue¹⁴. If parts of their summer home ranges are burned, male and female deer (including lactating females) will simply use larger areas^{14,15}. However, during lactation and fawning, females tend to select areas not burned within the last year^{15,16}. This is probably because fire removes dense cover that provides protection from predators. However, observational evidence has suggested low predation in burned areas¹³, potentially due to increased predator detection.

The time of year when deer give birth should be considered when timing prescribed fires. Herbaceous cover increases more rapidly after early growing season fires than after dormant season fires. Because deer generally give birth in early spring, fires conducted later, during the growing season, may promote fawn survival (by rapid vegetation recovery) and healthy deer herds¹⁷ (by rapid nutritious regrowth).

Management recommendations: Managers should consider minimizing fires that burn large contiguous areas, instead burning large adjacent blocks during different years, and varying fire-return intervals to maintain dense cover in some areas. If wildfires do burn large areas, tailor prescribed fires to create heterogeneity over space and time. Burning during the growing season after deer have given birth, should promote fawn health.

NORTHERN BOBWHITE QUAIL

Recent studies support conventional wisdom on the beneficial indirect effects of fire for northern bobwhite quail. Quail chicks forage on invertebrates that are abundant in areas with young vegetation, where it is also easier for them to move around. Kamps et al. (2017) found that as the amount of area burned within brood home ranges decreased, quail increased their home range size and chicks' growth decreased¹⁸. In addition, the survival of chicks was positively related to the amount of area burned within brood home ranges, likely due to more foraging opportunities. Quail prefer recent burns (1-3 years), with use decreasing as time since fire increases¹⁹. Quail prefer to nest in grassy areas within three months to a year since fire, and burning has minimal direct impact on nest mortality. Quail have a long nesting season which peaks around June and show a strong tendency to re-nest when nests are destroyed⁴. Rosche et al. (2017) documented that only 2 out of 14 nests were destroyed by a growing season fire²⁰. All 14 nests were located in areas that had been burned within the last two years.

Research highlights the beneficial effects of mosaic burning, which balances the need for cover from predators with increased food availability. How large should burn patches be? Wellendorf & Palmer (2009) found nest production and autumn bobwhite density tended to be higher on areas with small burn patches (<5-6 acres) than with larger burn patches (~20 acres), but the differences (which varied among years) were not large enough to strongly recommend either strategy²¹.

Management recommendations: In general, early growing-season fires (April-June) on a 2 to 3-year return interval should minimize nest mortality. Frequent burns on small spatial scales (<50 acres) should create a mosaic that

balances food and cover requirements, although common quail management practices such as supplemental food plots and fallow field management can modify fire effects¹⁹. Ensuring that fire-maintained habitats persist should be the fundamental goal for bobwhite quail management.

IN SUMMARY

Fire effects on these game species depend on life stage, spatial scale, and the habitat types being managed. Managers should consider scaling the size of burns to the home range sizes of the species for which they are managing, which will increase from quail to turkey to deer. Fire season and frequency directly affect the resources needed by each of these species. For example, the amount

and phenology of fleshy fruit and leafy forage production for deer depends on habitat type, the season of burn, and time since the fire²². Similarly, macroarthropod biomass (foods for turkey and quail) is promoted with variability in fire frequency²³. For all of these game species, relatively frequent fire (2-3 year rotations), especially during the growing season, should be used to maintain a mosaic of habitat types in different patch sizes and times since fire. Any immediate negative impacts are generally offset by the long-term benefits of fire-maintained habitat quality. Managers should tailor these recommendations to meet specific management goals for healthy wildlife populations.

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