RESEARCH BRIEF

The influence of prescribed fire on wild turkeys in the Southeastern United States: A review and synthesis

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Forest Ecology & Management, v.455, January 2020

In this article, authors reviewed the existing scientific literature (> 90 scientific sources) on how prescribed fire effects wild turkeys (*Meleagris gallopavo*) in the pine-grassland ecosystems of the Southeastern U.S. They particularly focused on how using prescribed fire (or not) impacts important turkey life-history traits, including: habitat selection, demography, and movement. The synthesis is organized into four sections: 1) a description of fundamental fire ecology concepts related to turkey habitat management decisions, including: *fire seasonality, frequency, and spatial extent*; 2) direct fire effects on components of turkey life-history; 3) the identification of key information needs (not included in this brief); and 4) practical fire-management guidance based on these findings.

MANAGEMENT IMPLICATIONS

- Turkeys preferentially select areas burned within the previous 3 years.
- Fire managed areas should not be so large to eliminate infrequently burned areas, such as hardwood forests, from the home range of individual turkeys.
- Growing season burns pose little risk to nests or broods if fire extent and frequency concerns are properly addressed.

Fundamental turkey/fire ecology principles

Fire seasonality: Dormant season prescribed fires are most commonly used today due to manager preferences for environmental conditions which facilitate fire control, smoke dispersion, and reduced mortality of mature overstory trees. However, a key objective of most prescribed fires is to promote vegetation understories dominated by forbs and grasses. This relies on top-killing hardwood saplings, which are more susceptible to fire during the growing season. The dominant use of dormant season fires coincides with long-held assumptions that dormant-season fires would reduce risks to ground-nesting gamebirds (like turkeys), since they preceded nesting activities. Findings in the existing literature suggests that growing-season fires have a minor or insignificant effect on nesting success of turkeys. This finding is largely attributed to the small percentage of a landscape typically burned in an individual fire, and the high propensity turkeys exhibit for renesting.

Fire frequency: Fire frequency strongly affects plant community composition, and a fire-return interval of 1-3 years has been found to maintain the herbaceous ground-flora desirable in pine-grassland communities. Turkeys, however, use a variety of habitat types throughout the year, necessitating a range of vegetative conditions. For instance, during nesting stages, and during the first ~2 weeks after poults hatch, dense vegetation (typical in areas burned 2 years prior) is desired for protection from predators. But, once poults begin roosting in trees, areas not burned in 3 or mores years are likely to be utilized. Similarly, during the non-breeding season, turkeys more often use areas not typically burned, such as hardwood forests in bottomlands, drainages, and swamps. As such, the variable habitat conditions required by turkeys throughout their annual cycle require sites with fire histories ranging from frequent to not-frequent fire.

Fire extent: Very little information exists regarding the appropriate scale of prescribed fire for managing turkey habitat. Most previous research has focused on the effects of varying fire frequency and/or season. For what research has occurred related to fire-scale, there is little opportunity to compare their findings due to lack of common definitions available relating to fire-scale effects on turkey populations. Towards a solution to this, the authors suggest a hierarchical framework for fire-scale to be considered and discussed, from largest to smallest: **total management area** (burned and unburned area) in which the population of interest is studied; **fire managed area** over a defined time period; sum of **area burned annually**; and finally, the **individual burn compartment area**. In this framework, the area of each level is nested within the area of the next highest level, and 'fire rotation' (length of time needed for a particular area of interest to burn) can be calculated for any one of the levels.

Direct fire effects

Authors partitioned direct fire effects on turkeys into three categories of important life-history traits: effects which influence how turkeys interact with the landscape (habitat use), population demographic effects through fire-induced nest and brood mortality (demographic response), and movement of turkeys between burned and unburned areas.

Habitat use: Forested edges along recently burned treeless cover types were

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preferred during *pre-nesting* period, while in the *nesting period*, females preferred habitats with more shrub cover and habitats burned within two years. The brooding period is very dynamic, and there is an accordingly diverse set of habitat needs. During this period, turkeys appeared to utilize both forested (hardwood and pine) and treeless cover types, though for both of these types, they preferred sites which were burned within the previous two years. During *non-breeding periods*, hard mast is an important part of wild turkeys' diet, and as such, turkeys use hardwood forests (which often have with less frequent fire histories) more during this period. In fact, because of foraging and roosting opportunities, hardwood forests are recognized as being critical non-breeding habitat for turkeys.

Demographic response: Because adult turkeys typically can avoid direct effects of fire, potential fire effects considerations focus on nests and poults. Largely due to the fact that only small percentages of a landscape are included in individual burn compartments, the literature suggests that the risk of direct fire effects to nests is low. The authors note that valid concerns exist regarding growing season burns which coincide with peak nesting, though studies show that females preferentially select sites that were burned within the past two years, and as such do not typically choose to nest in sites scheduled to burn. Also ameliorating potential effects of exposure to fire, females exhibit a high propensity for re-nesting if a nest is destroyed.

Likewise, studies have shown that broods on a fire-managed landscape rarely suffer direct mortality from fire. Wild turkey poults are very mobile, even within 24 hours of hatching, and show a preference for selecting habitats which have recently been burned.

Movement: Recent studies have shown that females often immediately move back into an area after it burns. Certain behaviors, such as loafing, showed a positive relationship with time since fire, suggesting that conditions immediately after a fire were not conducive to loafing due to a lack of cover. Turkeys did not extensively use areas > 250 meters away from unburned areas, where escape cover was too far away, suggesting that burning smaller patches to maximize perimeter-to-area ratios as a strategy to maximize preferred turkey habitat.

A series of photographs monitoring time-since-fire influences on vegetation structure at a forest stand located at the Jones Ecological Research Center at Ichauway in Southeastern Georgia, USA. A prescribed fire occurred on 21 October 2003, and the first photograph was taken shortly there-after in November, followed by photos taken at the same time in subsequent years through 2008.

Fire management guidance

The authors suggest that growing season burns can be appropriate when managing for turkeys, particularly where managers are unable to meet objectives using dormant season fire alone, though it is not recommended to be employed at a return interval ≤ 2 years since these stands are preferred by females during nesting and brooding periods. It appears that fire-return intervals of ≥ 3 years are appropriate, particularly if distributed in a mosaic throughout a fire-managed landscape so to increase proximity of burned and unburned areas. Lastly, it is recommended to avoid fire managed areas large enough to eliminate the inclusion of areas with histories of infrequent fire, such as hardwood forests.

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This research brief was funded by The Joint Fire Science Program. www.firescience.gov

No. RB-32