Spring Burning for Wild Turkey Brood Habitat: An Evaluation

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Abstract: Increased interest in and use of growing season prescribed burning has caused concern among sportsmen and biologists as to the potential impact on ground nesting game birds. We used radio-telemetry and invertebrate sampling to evaluate early growing season (April–May) prescribed burning to provide wild turkey (*Meleagris gallopavo*) brood habitat in the Coastal Plain pine (*Pinus spp.*) forests of south Georgia from 1988 to 1990. None of the 14 hen-poult groups monitored were ever located in spring burns. Additionally, there was no significant difference in invertebrate abundance during the brood season between late winter (February–March) and spring burns. Our evaluation of spring burns for wild turkey brood habitat indicates that there are no benefits over traditional winter burning, and spring burning poses a threat to wild turkey nests. Alternative management strategies are discussed.

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Prescribed burning has long been recommended as a wild turkey (*Meleagris gallopavo*) management tool in Coastal Plain pine (*Pinus spp.*) forests (Stoddard 1963, Hurst 1981). Traditionally, burning has been conducted in late winter (February–March) at intervals ranging from 1 to 5 years.

Recently, there has been an increased interest in using growing-season burning for ecological and forestry purposes. Adoption of policies that emphasize growing-season burning by both state and federal agencies has caused concern among sportsmen and managers interested in ground-nesting game birds. A significant lack of data concerning this issue exists (Robbins and Myers 1992).

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Stoddard (1935) felt that nothing could be more destructive to upland game birds than summer fires, and recommended withholding fire after April 1 because wild turkeys were nesting (Stoddard 1936). However, several authors have recently suggested that, in some habitats, spring burns may be beneficial to upland game birds by providing quality brood habitat (McGlincy 1985, Landers and Mueller 1986, Exum 1988). As part of a larger study on wild turkey management in fire-type pine forests, we evaluated spring burns (April–May) to provide wild turkey brood habitat in Coastal Plain pine forests.

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Methods

Study Area

We conducted the study on 5,000 ha centered around Pebble Hill Plantation in Thomas and Grady counties, Georgia, from January 1988 through September 1990. This portion of the Atlantic Coastal Plain, commonly known as the Tallahassee Red Hills region (Brueckheimer 1979), is relatively fertile and gently-rolling red clay hills. Hunting plantation properties composed 90% of the study area, with the remaining acreage consisting of paper company land and a large dairy farm. The major land use was for sport hunting, primarily for northern bobwhite (*Colinus virginianus*).

Uplands consisted of old-field loblolly (*P. taeda*) and shortleaf pine (*P. echinata*), as well as remnant stands of longleaf pine (*P. palustris*) and wiregrass (*Aristida stricta*). There is a long history of late winter prescribed burning in the area. Most uplands are burned annually during late winter for quail management and to facilitate hunting. These pine uplands are interspersed with beech-magnolia (*Fagus grandifolia-Magnolia grandiflora*) hammocks and cypress (*Taxodium spp.*) and/or gum (*Nyssa spp.*) bays, primarily in low-lying areas where fire rarely penetrates. Small scattered fields are normally planted to annual grain crops or cool-season forages for winter greenery.

Burn Treatments

Eight spring-burn plots ($\bar{x}$ = 2.5 ha, range = 1.3–3.6) were strategically located throughout the core of the study area. All plots were located in open pine woodlands with a long history of prescribed burning and that had been burned in late winter the previous year. Each of these plots was encircled by a 30-m wide unburned buffer strip to provide nesting cover and soft mast produc-

tion during the study. Plots were burned between mid-April and early May. The remaining fire-type pinelands of the study area were burned each year in late winter following the traditional procedures.

Radio-telemetry

Wild turkey hens (N = 27) were captured in late winter with alpha-chloralose treated corn (Williams 1966). Captured wild turkey hens were leg banded, outfitted with solar-powered radio transmitters equipped with motion switches (Everett et al. 1978), and released at or near the capture site. Hens were monitored year-round from February 1988 to September 1990. Upon onset of incubation, nests were remotely marked (Everett et al. 1980) and monitored daily to determine their fate. Hens successfully hatching broods were located 3 times daily until poults were 2 weeks old, and then monitored daily. Radio-telemetry locations were obtained using a directional, hand-held yagi antenna and compass. Locations were accepted if 2 azimuths met at an angle of 90° ± 30° and were both less than 1.6 km from the bird. Otherwise, more readings were taken from closer vantage points to insure accurate locations. Radio-telemetry locations were plotted in the field as they were obtained, and were ground-checked if any uncertainty existed in triangulation. To eliminate error associated with long-range telemetry readings, most locations were obtained from as close a range as possible without disturbing the brood (Sisson et al. 1991).

Chi-square analysis of preference and Bonferroni confidence intervals of 95% were computed to determine whether habitats were used differently from their availability (Neu et al. 1974, Byers et al. 1984). These limits were compared with expected values based on habitat availability. Statistical significance was $P \leq 0.05$. Habitat availability was defined as the area within the outermost telemetry locations of all hens.

Invertebrates

Invertebrates were sampled using a sweep net with a 40-cm hoop diameter. Each site sampled was subjected to 2 simultaneous, non-overlapping samples of 250 sweeps (N = 500 sweeps/site) collected systematically along parallel lines and uniformly distributed (Sisson et al. 1991). Each sweep was made as close to the ground as possible for as long as possible. All sweeping was done by the same 2 individuals to insure consistency. All sampling was standardized by sampling on dry days in early June between 1000 and 1600 hours (Hurst 1972). Invertebrates were killed in the field by emersion into 70% isopropyl, and then taken to the lab where they were hand-sorted by species and measured volumetrically.

Each year 3 of the spring-burn plots that burned the most uniformly were chosen for invertebrate sampling. For each of these, a corresponding winter burn was sampled for comparison. These were located as close to the spring-burn plots as possible to negate any site influences on invertebrate abundance.

Each year, the 3 most heavily used brood areas (as determined by radio-telemetry) also were sampled for invertebrate abundance.

Comparisons of invertebrate abundance were based on ml of water displacement in a 100-ml graduated cylinder. An analysis of variance (ANOVA) was used to compare volume of insects among spring burn plots, winter burns, and heavily used brood areas. Duncan's New Multiple Range Test (DNMRT) was used to distinguish means that were significantly different.

Results

Radio-telemetry

We obtained habitat-use data from 14 hen-poult groups during the 3 reproductive seasons. Observed habitat use differed ($P < 0.05$) from expected use for all 3 years. Hen-poult groups showed a preference for oldfields and grazed woodlands (Sisson et al. 1991). No brood locations were recorded in any of the spring-burn plots during the study. Because Bonferroni confidence intervals cannot be calculated using 0.0 as the proportion of usage, we were unable to perform this analysis for this habitat type. Although many incidental sightings of hen-poult groups were made during the study, none were seen in spring-burn plots.

Invertebrates

We obtained 15,000 sweeps from 60 samples. Significant differences ($P \leq 0.05$) existed among years for individual treatments, therefore each year was analyzed separately. Data from winter burns and high-use brood areas has been previously reported in Sisson et al. (1991) and is presented here for comparative purposes. No significant differences in invertebrate abundance occurred between spring-burn plots and winter burns for any of the 3 years, but high-use brood areas contained significantly more invertebrates than either spring-burn plots or winter burns for all 3 years (Table 1).

Table 1. Mean invertebrate abundance (ml/250 sweeps) for sweep net samples from prescribed burned treatments and high use wild turkey brood areas in Thomas and Grady counties, Georgia, 1988–1990.

Year	Spring burns	Winter[a] burns	High use brood areas[a]
1988	2.5 A[b]	4.83 A	41.63 B
1989	15.8 A	13.8 A	37.5 B
1990	7.3 A	5.83 A	18.63 B

[a]Data previously reported in Sisson et al. (1991) and provided here for comparative purposes.

[b]Means in each row not followed by the same capital letter are different ($P < 0.05$).

Discussion

Our evaluation of spring burns indicates that it does not provide wild turkey brood habitat in Coastal Plain pine forests. Burning in this season as opposed to winter burning does not produce significantly more invertebrates during the brood season, and poses a threat to turkey nests, especially if practiced on a wide scale. Cover left unburned after March was highly desirable for nesting on the study area (Sisson et al. 1990), and we documented 7 nests that were destroyed from late burning or mowing in these areas. At least 5 other nests were located in the buffer strips encircling the spring-burn plots. None of the radio-tagged hens took their broods to spring-burned plots, selecting instead oldfields and grazed woodlands. Additional research is needed on population-level effects on ground-nesting birds from spring burning. In certain cases, there may be trade-offs between long-term habitat improvement and short-term nest destruction. However, these same benefits may be derived from burning later in the growing-season after the wild turkey nesting season is completed.

Our evaluation of spring burning specifically for wild turkey brood habitat indicate that it is not an effective management practice. On areas where wild turkey management is important, any warm-season burning for brush control or other reasons should be postponed until after the wild turkey nesting season.

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