



Frequency and season of prescription fires to reduce hazardous fuel loads on the lower Piedmont of Georgia: establishing a demonstration area on a 12-year-old study

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Problem

Frequent burning of Piedmont forests by Native Americans maintained pine-dominated stands, favored oak regeneration over other hardwoods, and kept understories open. From 1950 to 1990, fire was quite infrequent in this region, which resulted in a gradual replacement of pines with hardwoods. More recently, however, prescribed burning has been used much more extensively to restore open pine stands for key species like red-cockaded woodpeckers. The silvicultural effects of burning at different frequencies and in different seasons, especially in stands that have a significant hardwood component and very little herbaceous understory, are not very well understood. Currently, education opportunities related to prescribed burning in this forest type are limited.

Approach

To determine the effects of a prescribed burning regime, i.e. season and frequency, on overstory and understory composition, a series of plots was established in 1987 on the Hitchiti Experimental Forest in central Georgia. The primary objective was to influence public opinion about the benefits of frequent low-intensity prescription fire versus fire exclusion. Another objective was to conduct bird point counts on all plots to augment the bottomland breeding season point counts and Christmas bird surveys that are conducted on the forest each year. Additionally, researchers planned to document and summarize changes in fuels after 12 years of underburning which began in 1989.

Researchers examined responses to 6 different treatments consisting of: 1) dormant season burns every two years with headfires, 2) dormant season burns every three years with headfires, 3) dormant season burns every three years with backfires, 4) growing season burns every three years with headfires, 5) growing season burns every six years with headfires, and 6) an unburned control. A series of these treatment plots was installed in a representative stand of naturally-regenerated 80+-year-old loblolly pine. The effect of these treatments on composition and structure of the plant community was tracked by periodic measurements and surveys. Because of their location along a major road and adjacent to a popular hiking trail, the plots were used to demonstrate the effects of prescribed burning to the public. In addition, interpretive signs were placed along the main road and hiking trail through the study area. A permanent display board was constructed at a parking lot adjacent to the burn plots interpreting the study and prescribed burning. Take-home brochures were also designed and available at this display. A web page was created describing the study area and results. The web page was updated as new information became available. An on-site manager conducted field trips and tours as requested by visitors or organized groups.

Project Findings

Control plots have changed very little although there has been some natural thinning of saplings. The growing season burns have reduced the density of tree saplings and increased the density of seedlings. Saplings have been nearly eliminated by the dormant season prescribed burns and seedlings were also significantly reduced. The density of small shrub stems, however, was greatly increased by the dormant season burns. The difference between growing- and dormant-season burns seems to be a combination of fire timing and fire intensity. Because the humidity is higher, winds much lighter, and fuels greener during the growing season, these burns have been of very low intensity compared to dormant-season burns. However, it appears that even low-intensity burns in the growing season cause considerable mortality of hardwood saplings.

There was no mention in the final report on the results or success of the bird point counts or if the environmental education outreach has been successful.

Application by Land Managers

Although the primary goal of this project was to establish a demonstration area for public outreach and education on prescribed burning, much of the findings in the final report focused on the vegetation data collected during the 12-year burning period. Very little information was presented in the final report or on the web page regarding the results of the public outreach and how they planned to gauge or influence public opinion on prescribed burning. Additionally, there were no results found on the bird point counts. Bird point counts would provide managers with important information on whether bird habitat use is being influenced by prescribed burning. Findings related to the red-cockaded woodpecker would be very useful as well.

Red-cockaded woodpeckers tend to prefer large, mature, overstory pine stands that are relatively devoid of thick midstory hardwood vegetation. None of the treatments used in this study reduced midstory hardwoods by any significant amount, although it appears the two-year dormant burns are keeping them in check. Thus, mechanical or chemical treatments will be necessary to reduce this component within stands being managed for red-cockaded woodpecker objectives.

Burning did not cause additional overstory pine mortality but neither did it reduce mortality. Therefore, managers would need to thin these stands to keep residual trees healthy and reduce the risk of beetle-caused pine mortality. Continued application of biennial dormant season burns has nearly eliminated hardwood saplings. Thus, this fire regime could be used to keep this component in check and eliminate recruitment into the midstory.

All burn treatments reduced understory woody cover; however, there is some recovery between fires. Because of the long return interval associated with the six-year burn cycle, woody cover was able to return to pretreatment levels prior to the next treatment. Thus, six years appears too long a frequency if the manager's desires are to maintain red-cockaded woodpecker habitat. However, a three- or four-year return interval may be acceptable for maintenance burning. Herbaceous dominated ground cover can be obtained with dormant season headfires every 2 or 3 years even without removal of the midstory hardwoods. Therefore, midstory removal is not necessary to reduce wildfire hazard or improve health of the understory.

Burning every 3 or 4 years is sufficient to keep fuel loads down and reduce wildfire hazard. Thus it is the only treatment needed to maintain stands with overstory pines, midstory hardwoods,

and herbaceous dominated understory. If managers want to create red-cockaded woodpecker habitat then they need to thin overstory, remove midstory, and burn on a regular basis. Both growing season and dormant season burns can be used in this forest ecosystem. Growing season burns, however, need to be in the early growing season as fuel moisture and humidity is generally too high to get quality burns after the first of June.

Deliverables and Technology Transfer

The project website, [Prescription Fires to Reduce Hazardous Fuel Loads on the Lower Piedmont of Georgia](#), is easy to follow and contains good and useful information. The introduction to the study gives a good description of the historical fire regime of the Lower Piedmont region and the concern managers have for the reduction of hazardous fuels. The graphs under the results section are small and difficult to read; therefore, concise conclusions cannot be obtained just from the graphs. However, the photographs tell the story as they illustrate dramatic changes in the landscape. The fact that many pictures are taken from the same location and one can see the same trees or identify the same items on the landscape helps with orientation and description of the results. These pictures have potential to improve public opinion of prescribed burning as an essential tool in the prevention of hazardous fuel loading.

Pre- and post-burn fuel and vegetation data was collected and summarized. Data was used for a presentation and was consequently published as:

Outcalt, K.W. 2006. [Managing composition of piedmont forests with prescribed fire. In: Proceedings 13th Biennial Southern Silvicultural Research Conference](#), February 28 to March 4, 2005, Memphis, TN. Gen. Tech. Rep. GTR-SRS-92. Asheville, NC: U.S. Department of Agriculture, Forest Service, Southern Research Station. 640 p.

Tours / Environmental Education

- March 2003 – conducted 1-day tour (no mention of who the tour was for in the final report)
- On-site manager at Hitchiti Experimental Forest provides an average of 5 tours per month for various groups including foreign scientists, students, state and federal employees, garden clubs, etc.
- Signs placed on all plots including those along road and hiking trail that goes through study area
- Permanent interpretative board constructed at trailhead adjacent to burn plots
- Study brochure (take-home sheet) available to visitors at interpretive display
- The study brochure and a poster is available on CD from JFSP

Other publications

Outcalt, Kenneth W. 2006. [Frequency and Season of Prescription Fires to Reduce Hazardous Fuel Loads on the Lower Piedmont of Georgia: Establishing a demonstration area on a 12 year old study. JFSP final report.](#) USDA, Forest Service, Southern Research Station, Athens GA 30602