

# Long-term Fire Ecology of a Longleaf-slash Pine/Wiregrass Forest, Alapaha, Georgia

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Following purchase in 1941, the Forest Service SEFES initiated cooperative research with the Georgia Agricultural Experiment Station and Agricultural Research Service on the Alapaha Experimental Range, in Berrien County. The area was periodically burned prior to 1934, completely protected from fire from 1934 to 1941 and partially burned by an accidental wildfire during the winter of 1941-42. In 1942, a randomized complete block design, of four treatments replicated twice, was established on a 160 ha unit, divided into eight 20 ha plots. Two plots were prescribed burned triennially, two plots burned biennially, two plots burned annually and two plots were completely protected from fire as controls. Vegetation responses to treatment were measured on six randomly located 0.1 ha fenced and unfenced subplots in each plot. Photographic stations, established in 1942, provide a 50 year visual record of vegetation changes on the site.

Although early studies focused on forest grazing, substantial ecological data on overstory and understory plants was collected, including species lists and successional trends. Cover of grasses and forbs increased on burned plots while decreasing on controls. Shrub cover increased slightly on burned plots and substantially on controls. Successional studies indicated that "fire followers" such as *Andropogon* and *Panicum* decreased in abundance with time since last burning, while principal grasses such as *Aristida stricta* and *Sporobolus curtissi* increased. Analysis of the relationship between grass biomass and tree canopy and shrub density showed an order of magnitude decline in grass growth as tree cover reached 50 percent and shrub cover 15 percent.

Recent studies of forest floor, soils and overstory and understory vegetation to evaluate long-term (39 years) responses of treatments indicate that past light grazing had no significant impact on the sites when compared with the major effects of fire at varying frequencies. Overstory trees on all plots appear quite similar, with the exception of much greater basal area measured on the controls. The controls are also characterized by a very well developed shrub layer with individuals of large size. The forest floor of the controls is very thick and estimated at 68 Mg/ha, as contrasted with 6 Mg/ha on the burned plots. Nitrogen, calcium, magnesium, potassium and phosphorus levels in forest floor of control plots exceed levels measured on burned plots. The primary effects of burning appear to be a relative decline in shrub cover with translocation of major nutrients into the upper 15 cm of mineral soil.

As one of the oldest (50 years) operational-scale controlled experiments currently in existence in the longleaf pine/wiregrass ecosystem, the Alapaha site is among the most ecologically important areas in the Coastal Plain. Continued study represents a major opportunity to further develop information that will augment findings from other sites as the basis for a holistic approach to ecosystem management. Restoration and maintenance of the longleaf pine/wiregrass ecosystem will provide a number of multiple-use benefits and enhance ecological diversity in the Southern Region.

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