

Project Title: Long-Term Plant Responses to Four Fire Return Intervals in an Old-Growth Mixed Stand, Lower Piedmont GA

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Abstract: This data archival project is described in the JFS proposal and consists of a dataset containing 8 folders, 12 subfolders, 66 text files, 21 Excel workbooks, 240 worksheets and about 1000 slides (roughly 117,000KB) that document a longterm prescribed fire study on the Brender Demonstration Forest which is part of the Hitchiti Experimental Forest, Oconee Ranger District, Chattahoochee-Oconee National Forest situated on the Lower Georgia Piedmont about 20 miles North of Macon, GA. Material in this dataset includes USFS study documentation, information pertaining to fires conducted, and vegetation and fuel responses from its establishment in 1988 through 2006. This dataset is archived at the USFS data archive site accessed at <http://www.fs.usda.gov/rds/archive/>.

History of Bender (Hitchiti) long term Rx fire plots

The Brender Demonstration Forest is located about 20 miles north of Macon Georgia on the fall line that separates the Lower Piedmont from the Upper Coastal Plain that was once (20,000+ yrs ago) the Atlantic Ocean shoreline. Virtually the whole Piedmont was cleared for row crops (primarily cotton) prior to the Civil War (1861). Poor agricultural practices resulted in wholesale erosion of the A horizon resulting in land abandonment between the 1890's and 1930's. The federal government assumed control of this area in 1939. The study site is a mature (average age 85 yrs) predominantly loblolly pine/hardwood stand with some shortleaf on sandier soils.

There is no record of fire (Rx or wildfire) from 1939 when the USFS acquired the land until this study was established in 1987. That said, a low-intensity wildfire started by a careless hiker burned about ½ of plot 11(2yr winter burn) on April 4 or 5 1995.

Red cockaded woodpecker (A Threatened and Endangered species covered by federal statute) cavity trees occur on some plots (both natural and inserts).

Ice storms, summer straight line wind events (microbursts) and tornadoes have damaged overstory trees over the years and southern pine beetles (SPB) are a continuing problem typically resulting from lightning strikes which are a common during the hot humid summers. SPB has impacted most study plots and resulted in clearcutting and abandoning plots 5 and 25.

The first six roughly 2 acre plots were established in 1987 and the remainder established in 1988 for a total of 24 plots. A nested sampling scheme comprised of 0.2, 0.02 and 0.001 subplots was utilized to follow vegetation changes following application of 5 burn treatments and a control. NRCS (or its predecessor) identified soil types and collected samples prior to initiating treatments, but location of the disk with their results is apparently gone. Twenty soil cores were extracted on each plot prior to initial

treatment application and sent to the Southern Research Station soils project located in Charleston, but again the disk is apparently gone. Following initial fuel sampling and oven drying, samples from each plot were also sent to the Charleston lab. Again, my notes state the results were uploaded into the electronic database for the study, but they are also now missing and presumed gone. The Charleston lab no longer has a copy of the results either.

Except for plots 25 and 26, Initial burns were all conducted between 4/13 & 5/3 1989 with the Keetch/Byram Drought Index (KBDI) below 200 and fireline intensity below 100 btu/ft/sec. The purpose of these initial burns was to begin the process of duff reduction and it was recognized a-priori that they would not blacken the full plots. Plot 25 was burned as a proof of concept demonstration in August 1988 and used as a replacement for plot 20 which was abandoned in 1990 following unauthorized USFS understory removal for red cockaded woodpecker (RCW) habitat. Unauthorized understory removal for RCW also occurred along one edge of plot 18. Plot 26 (replacement for plot 5) was initially burned June 1992.

Fifty mature pines were randomly selected on each plot, 25 of which were raked around to remove the threat of heat damage from smoldering duff prior to initial burns. Twenty tagged pines were also raked around (10 upper slope & 10 lower slope - Lower slopes (which have deeper duff accumulations) before initial burns, but no mortality resulted from the fires in either case, so pines were not raked around prior to subsequent burns. Two pines were, however, killed by lightning strikes and 5 by SPB the first year postburn.

Southern pine beetles (SPB) have been an ongoing problem. Plot 5 was clearcut in the summer of 1991 as part of the felling effort to try to slow/stop a large southern pine beetle (SPB) attack and replaced with plot 26. Plot 5 was clearcut in an effort to stop its spread in 1991. Insect-damaged timber was harvested on a spot on plot 4; but subsequent spots on various plots were just felled and left in place to minimize surface disturbance. Pines on plot 25 were all cut in 2007 due to SPB.

The original study plan called for eight treatments replicated 3 times for a total of 24 plots, namely: annual dormant season, annual growing season, 2yr dormant season, 2yr growing season, 3yr dormant season, 3yr growing season, 6yr growing season and a control. However, when we tried to apply the annual treatments the 2nd year the results were unacceptable very patchy burns requiring multiple re-ignitions under our prescription window. Rather than burn under drier conditions (KBDI above 450) which would have likely consumed the 50+ yrs of duff in a single burn resulting in significant lower bole and root damage to overstory pines, we changed treatments on the 24 plots to: 2yr dormant season headfire, 3yr dormant season backfire, 3yr dormant season headfire, 3yr growing season burn, 6yr growing season burn and a control. Again problems arose in that wind often overrode slope or plot orientation (aspect) resulting in backfires heading and headfires backing as well as cross slope fire movement. We thus eventually combined the 3yr dormant season backfire and headfire plots. The upslope control line was typically backfired and the bottom line headfired. The two lines of fire generally merged above the permanent upslope vegetation sample plots on dormant season burns, and virtually always on growing season plots.

During the 1st few burns, particularly during summer, the fire did not always reach the bottom of the plot because of damper fuels. Additionally, complete treatment of lower slopes was also a problem during the growing season because of near-calm winds in these dense understory stands coupled with green surface fuels and shade from mid- and overstory vegetation. Repeated treatment applications over time eventually opened up the stands and this problem resolved itself. Other longterm burn studies on the Lower Coastal Plain were typically sampled and burned before the Brender plots (because green-up occurs on the coastal plain before it does on the piedmont). The Brender plots were generally ready to burn the beginning of March, but we often had to wait several weeks for the burn prescription window to materialize. In some cases this resulted in dormant season burn treatments being applied during budbreak (and about a week later in 1993).

Prior to each treatment application, at least six pairs of 1/4MA fuel sample locations were subjectively located and flagged on each treatment plot; the two samples making up a pair are adjacent to each other and visually similar - one of each pair sampled preburn and the other postburn.

With Wade's retirement in January 2003, the Oconee Ranger District, Cherokee National Forest became responsible for applying scheduled fires, but these small acreage, high cost burns were a low priority. Forester David Combs continued scheduled sampling and maintenance, but the treatment schedule has not been rigorously followed.

The USFS Southern Research Station Center for Disturbance Science in Athens, Georgia <http://www.srs.fs.usda.gov/forestdisturbance/> has just hired (2015) a certified burn boss and plans to again sample and burn this longterm study as scheduled.