Project Title: 40 years of fuel, fire & plant data from a long-term Rx fire study in southern pine located on the Francis Marion National Forest South Carolina

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Abstract: This data archival project is described in the JFS proposal and consists of a dataset containing 10 folders, 9 subfolders, 21text files, 71 Excel workbooks, and about 1000 slides (roughly 107,000KB excluding slides) that document a longterm prescribed fire study on the Francis Marion National Forest, just North of Charleston SC. Material in this dataset includes USFS study documentation, information pertaining to fires conducted, and vegetation and fuel responses from its establishment in 1958 through 2005. This dataset is archived at the USFS data archive site accessed at >http://www.fs.usda.gov/rds/archive/<.

History of the Tiger Corner long term Rx fire plots

The Tiger Corner study location is within a few miles of the former Santee fire plots that were established in 1947. USFS soil scientist Bill McKee studied those soils in depth and personally told me they closely matched the soils on the Tiger Corner fire study area. It should be noted that the Santee plots were only ¼ ac in size with no buffer between plots so tree roots often occurred in more than one plot, and because of the small plot size, fires rarely, if ever, approached quasi-steady state resulting in fire behavior that had little in common with operational burns. That study was eventually terminated and the sites clearcut.

Because of the above listed shortcomings with the Santee plots, This study (also called the Tiger Corner study) was established on the Francis Marion National Forest (near Charleston SC) by the USFS Southeastern Forest & Range Experiment Station Southern Forest Fire Laboratory in 1958 and all 2-acre plots (including controls) burned with backing fires the winter of 58-59. Prior to study establishment, the area had been burned about every 4th winter with backfires at least since World War II. The original stand was clearcut in 1920's and seeded in with longleaf on the ridges and loblolly and pond pine on wetter sites. At time of establishment the overstory averaged 30 yr in age, 8.5" dbh and 55 ft in height. The elevation difference on the 40+ ac site is less than 3 feet. There is no evidence of turpentining or thinning in this second growth stand.

The study is comprised of four replications of 5 treatments; each plot 4x5 chains (2-acres) in size: Replications A, B and C are primarily loblolly/pond pine, while D (which is across a FS woods road) is primarily longleaf. Treatments are: no burn, winter burns every 1, 2, 3, or 4 years. A 5-yr burn treatment was initially part of the study, but that treatment was abandoned in 1963 because it was visually obvious after burning the 4-yr plots with strip-heads for the 1st time that 5 years was too long a fire-free interval to keep the hazard within acceptable limits.

Significant study events include:

1) 1958 - The study was established during a severe multi-year drought, but it soon became obvious that some plots were typically too wet to fuel sample and burn eventually resulting in abandonment of plots 1B and 2A.

2) 1964 - A severe ice storm on Jan 1, took the tops out of many of the pines

3) 1970 - The Macon Fire Laboratory Project Leader (PL) in charge of the study decided its objective to determine an acceptable fire-free interval for hazard reduction had been met and ordered the study closed. Plots were burned and intensively sampled the winter of 1970-71, a final report written (see Sackett 1972 in thepublications folder) and the study officially closed. The unit scientist in charge of the study agreed with that decision, but the other two project scientists thought closing the study was ill-advised as visual vegetation changes were still taking place. This Project Leader accepted an FAO assignment in 1971 and study treatments were 'bootlegged' in his absence. Upon his return in 1973 he was immediately transferred to Tempe AZ and took the acquiescent scientist with him. The other two unit scientists also soon left Macon; one to attend grad school, and myself transferred to south Florida from where I continued the study collecting data and applying treatments as scheduled.

4) Ten dominant/codominant overstory trees near the center of each plot had been selected as permanent measurement trees and banded with paint, but the numbers eventually became unreadable due to lack of maintenance.

5) While located in South Florida I wrote a new study plan, but it was apparently never forwarded to station headquarters for required signatures. I assumed my Project Leader in Macon, Georgia had signed and sent it on, as he continued to approve my field work on the study. When I transferred back to Macon in 1979 and this oversight was discovered, I wrote a brief study plan with documenting plant community changes as the primary objective. A copy is in the study folder.

6) During this lapse in administrative documentation, the USFS constructed a road though plot 2B reducing its useable size to little more than an acre.

7) All burn plots including the 4's were occasionally burned with headfires, sometimes to accommodate piggyback studies. Depending upon weather conditions, headfires can produce fairly high fireline intensities and severe crown scorch resulting in substantial growth loss and occasional mortality.

8) During treatment applications in 1985, a contract air tanker pilot got confused and dropped a load of retardant on a study burn. No overstory breakage occurred, but the mix contained phosphorus which may have compromised a piggy back nutrient study (See Binkley papers in the publication folder).

9) Initial soils work on the study area was conducted by Louis Metz, but the results had not yet been digitized when the Southern Forest Fire Lab was closed in 1985 and the hard copy trashed along with many other files and photos pertaining to this study. Duplicates should have been retained both at Station headquarters and by the soils RWU that did the sampling, but that was not apparently the case.

10) Hurricane Hugo, a category 5 hurricane crossed directly over the study area September 22, 1989; the 140 mph winds uprooting many trees and twisting others, severing primary roots. Many of

these trees died over the next several years. We conducted an extensive damage survey (See Wade *et el.* 1993) and continued with scheduled treatments. A massive salvage operation ensued on the Forest which included this study area, but the District Ranger (DR) agreed to exclude this study site. The Governor of South Carolina issued a well-meaning, but scientifically unsupported ban on all outdoor fires for the year following Hugo. The USFS agreed to abide by this ban on their land holdings as well, although the Department of Interior did not and soon conducted a somewhat successful burn on Bull Island which is part of Cape Romain National Wildlife Refuge and is where Hugo came ashore (in contrast to the long-term study, they received very favorable press for successfully lowering the hazard on this uninhabited island even though the fire did not meet its objectives in the opinion of many including this scientist who was on hand during the burn – the USFWS had trouble getting the fire to carry because of poor burning weather). Many old timers including the local DR and his staff recognized the 1-yr burn ban was based on politics, not scientific merit and that it ignored generations of field experience. The DR thus issued me a burn permit when an acceptable window finally materialized in April (because this was a research site) and the plots scheduled for treatment were burned without incident. These burns took place during the end of spring green-up (mid April) which was not the dormant season as called for in the study plan, but in my estimation burning late was better than not burning. In retribution, the Forest Supervisor forced the DR to retire and tried to get me fired as well. When that failed, he rescinded district approval of burn plans and forbid them to allow me to be fire boss on any future USFS burns in SC. The new DR, however, also recognized the importance of this study so in spite of the extra effort and cost, the district staff worked with me and all subsequent burns were conducted as scheduled until I retired 13 years later. The major problem during that time period was that the district had annual burn acreage goals and they would much rather use a good burn day to treat several hundred acres rather than 8 to 32 acres depending on the number of study plots scheduled for treatment. The result was that study plots were often not burned until March when the Forest had met its acreage goal.

11) Study plots were sampled prior to and after all treatment applications although some data has not survived. I was in the process of digitizing data collected on this study in 1985 when the fire laboratory was closed and most records trashed. I have the only copy of the 100+ pages of raw data printouts – the problem is that the codes did not survive for this location, although they did survive for the companion study established at the same time on the Osceola NF in Florida. Using this information and comparing these printouts with other existing documentation, I have been able to figure out all column headings and most species codes except for a few of the understory species. I would be happy to donate these printouts to an acceptable depository. After Hurricane Hugo, renowned Tall Timbers fire ecologists Jeff Glitzenstein and Donna Streng conducted numerous studies and surveys on the study area for almost a decade (see the publications folder for numerous talks and related publications, but I have yet to find my copies of their detailed final reports).

12) In 1999, plots 2D and Check-D burned in a very low intensity late winter wildfire; both plots were retained.

13) With my retirement January 1, 2003, the study area began a down-hill slide. RWU forester D. Combs did his best to sample and see that scheduled burn treatments were carried out, but he

received no encouragement from his new supervisor or the RWU leader. To my knowledge, study treatments were last applied the winter of 2004-05.

14) Several Red Cockaded woodpecker (RCW) (a federally listed T&E species which excavates nests in live southern pine) cavity trees occurred on the study area and hurricane Hugo took its toll; we found both dead birds and snapped off/uprooted nest cavity trees. The study site was, however, one of the few FMNF areas not salvage clearcut (most others were swamps which do not provide acceptable bird habit) so USFS RCW recovery team members installed numerous artificial cavities in trres on the study area, which the birds utilized. Notes pertaining to RCW on the study area should be on file with the recovery team, although recent correspondence with their local field staff failed to turn up any pertinent records – although they may on file at the at the USFWS Recovery Team headquarters or with the USFS representative to that team

15) Because the RCW is protected by federal statute, its habitat must be maintained which leads me to believe that study annual and biennial treatment plots have likely been burned pretty much as scheduled.

16) A forester attached to USFS Southern Research Station Center for Forest Disturbance Science Research Work Unit 4156 in Athens, GA is now USFS prescribed burn certified and plans are to reinstate the burn schedule , perhaps as early as the winter of 2015-16. Contact Team Leader Mac Callaham at http://www.srs.fs.usda.gov/forestdisturbance/ for current information on this study.

Dale Wade 12/30/2015