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Ryan Foote, District Ranger
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Re: FY21 Chattooga River Prescribed Fire Project

Dear Ryan and Amy,

We appreciate the opportunity to comment on the Chattooga River Ranger District's Fiscal Year 21 prescribed fire plans. Thank you for taking the time to respond to our questions about using streams as fire lines. Your response helped us better understand that part of the plans and ease our concerns. We hope our comments provide constructive feedback; we look forward to further discussing this project with you and your staff.

Site selection

We support the use of prescribed fire at the proposed sites. The species present at all five proposed sites indicate that fire could be beneficial to the sites and that many of project goals are appropriate.

Good indicator species of historically open conditions are those that both *require* open conditions and that do not readily disperse to disturbed areas. Many common species that require open conditions, such as many grasses and members of the aster family, readily spread to disturbed sites, and thus are not good indicators of historically open conditions. In contrast, smooth purple coneflower needs very specific soil conditions in addition to an open canopy, so its presence at these sites is a reliable indicator of historical conditions. Blackjack oak and post oak are also good indicator species and they are widespread on upper south- and west-facing slopes at these sites. There are clear indicators that these sites were historically more open, likely due to disturbance by fire.

We also support the District prioritizing these sites for the use of limited prescribed fire resources. Most of sites on the District do not have as rare and fire-dependent of communities as these sites. We are not aware of rare mesic-site species in these units, so risks of adverse effects are lower than at some other units. At the same time, initial results from burning these units and burning similar sites like Farmers Mountain indicate the chances of having the desired effects are high.

Fire regime

Even where fire is a needed component of the disturbance regime, fire is not simply an on-off process. Whether fire is beneficial or detrimental will depend on the whole pattern of fire, the fire regime. In addition to factors determined by the burn unit itself, the regime includes frequency, intensity, and seasonality.

The effects of suppressing all lightning fires have accumulated for decades. Those changes will require restoration, and conditions will be different after that restoration. That process means there needs to be a long-term plan for fire on these units. The fire regime appropriate for restoration will be different than the fire regime needed for ecosystem maintenance. *We encourage the district to develop measurable benchmarks to determine when to shift from restoration burns to maintenance burns, and to develop plans for the maintenance burns.*

Frequency

For the restoration phase, fire frequency will need to be elevated to reduce the accumulated duff. We suggest using duff depth as one benchmark. After many burns, the Buffalo Range Burn on the Conasauga Ranger District appears to have stabilized with duff depth of about one inch. We support the proposed 3- to 5-year return interval *for the restoration phase.*

Three- to five-year return intervals are too frequent for maintenance fire on these sites. This frequency is common in prescribed fire plans, but it is based on biased fire history reconstructions. Basing prescribed fire regimes directly on fire history reconstructions is problematic for two reasons: 1) the vast majority of fires recorded in tree-ring based fire history reconstructions are human set rather than natural; 2) fire history reconstructions are biased because the sites they sample are not representative.

The location of a fire scar *within* a tree ring can provide information about what time of year the fire occurred. In a systematic review of tree-ring fire reconstructions in the Southern Appalachians, all studies recorded at least two thirds of the fires during the dormant season, and many studies recorded over 90% of the fires in the dormant season. Lightning fires occur primarily during the growing season and people set fires primarily during the dormant season. Since human populations were high in the southeast for only a few thousand years and it is far from clear that people set fires across the landscape rather than just near settlements, lightning fires are what species are adapted to. A history of human set fires provides little information about the fire regime plants and animals need.

To understand the importance of representative sampling and why fire history reconstructions are biased, it is helpful to look at a more familiar example of sampling bias. Consider a political website that puts up an opinion poll and the reports the results as the general beliefs of Americans or voters. People with certain beliefs are much more likely to visit the website than other people. The population of people who see the poll and the population of people the poll claims to represent are not the same, so the poll results are biased. The poll results would not be an accurate depiction of the group of interest because the sample is not representative of the group of interest.

The same thing happens with fire history reconstructions. In order to reconstruct fire history, there has to be a lot of evidence of past fires. For instance, if a researcher goes to a site and there are zero or three fire-scarred trees, the researcher will not use that site. They cannot reconstruct the fire history from so few examples. Yet the fire history of that site is just as valid as the fire history of a site with lots of fire scars. That fire history reconstructions report frequent fire does not mean all dry sites had frequent fire. Frequent fire is the only result fire history constructions can report. Fire history

reconstructions will report frequent fire regardless of the mix of fire frequencies present on the landscape.

A next reasonable question is, 'what's the harm in burning too frequently?' The problem is that since fire is a natural part of the landscape, we would not expect the negative effects of over-burning to show up after just one or two prescribed fires. Just as many of the benefits of prescribed fires will take repeated burns to manifest, such as increased oak regeneration, any harm will also take repeated burns to become apparent.

Prescribed fires remove essential nutrients from ecosystems, particularly nitrogen. Ecosystems adapted for frequent fires often have many nitrogen fixing plants, but we have not observed an abundance of nitrogen fixers on burned sites on the Chattahoochee National Forest. Burning too frequently could disrupt nutrient cycling and gradually degrade ecosystem productivity and functioning.

As repeated burns consume the duff layer, mineral soil may be exposed to erosion. At the frequently burned Buffalo Range Burn on the Conasauga Ranger District, we observed bare patches of soil on the ridgetops and soil movement. Erosion is especially concerning given the steep slopes present in most of these units.

Once these sites have been restored, the District should reduce the fire frequency. The exact frequency is difficult to tell, but we suggest the district start with 10- to 20-year return intervals. These are low productivity sites, so they will need less fire to maintain open conditions and maintain low fuel loads relative to many other sites.

Intensity

While wildfires typically have only a single ignition point, prescribed fires typically have many ignition points. Multiple ignition points lead to local areas of more intense fire where flame fronts meet each other and greater rates of spread. We are concerned that those processes will give wildlife less time to find refuges and push fire farther downslope and farther into mesic areas. We ask the district to use as few ignition points as possible. Given the small size of some of these units, it should still be easy to burn them in a day with few ignition points.

Seasonality

As mentioned above, most lightning fires in the region occur during the growing season. However, many plant roots reside in the duff that has built up over the course of fire suppression. To give plants time to move their root system deeper and adjust to the shock of reintroducing fire, we suggest that initial burns be completed in the dormant season and almost all later burns be done in the growing season. That transition from dormant season to growing season burns may not match the transition from restoration burns to maintenance burns as some restoration goals will likely require growing season burning.

Fire lines

Fire lines are potential sources of erosion and sedimentation, and we noticed that several of the planned dozer lines include stretches of steep slope. We ask that dozers not be used in any place where they have not been previously used, especially the south end of the southern Lee Mountain unit. We also noticed that the dozer line at south end of the northern Lee Mountain unit is deeply entrenched, and suggest that water diversion structures upslope of the entrenched section be kept on that line at all times.

We also observed that the existing fire lines have not been blocked, and we saw tire tracks on the line along the crest of Lee Mountain. Since off-roading is much easier to stop before it starts, the entrances to all dozer lines should be blocked in-between burns.

Invasive species

Just as fire can create opportunities for native species, it can create opportunities for invasive species. Most notably, the conditions needed for yellow pine regeneration are the same as those needed for paulownia regeneration. Massive paulownia invasions have followed wildfires at Linville Gorge and in the Cohuttas. Paulownia and other invasives will likely become bigger problems as successive fires thin the duff layer and open the canopy. Controlling invasives prior to spread costs a fraction of what it does after they spread, and in some cases control after they spread is impossible.

We observed the following invasive species:

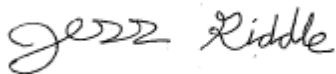
- Paulownia, a small fruiting tree at N34.64478 W83.31672
- Autumn olive, a lone bush at N34.64710 W83.31577
- Autumn olive, several bushes along 100 yards of road at N34.65113 W83.31630
- Mimosa, a large tree just downslope of a large blackjack oak at N34.63867 W83.31375
- Several invasives, including kudzu, Chinese privet, and mimosa at N34.61190 W83.34307

Conclusions

We believe prescribed fire can be a valuable management tool for these sites. The plans appear appropriate for the restoration phase, but a longer-term plan with less-frequent fire is needed to keep the ecosystems healthy.

We appreciate the District putting effort into managing rare species, and look forward to seeing these sites as they are restored. Please do not hesitate to ask if you have any questions about our comments and please keep us informed of any changes to the project.

Sincerely



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