

JFSP Research Needs Worksheet Prescribed Fire and Climate Change

Topic: Prescribed fire is a key management tool for natural resource management, wildfire mitigation, and agriculture in the South (Hiers et al. 2020). Limited research suggests that prescribed fire can also be used as a tool to reduce potential carbon emissions (Wiedinmyer and Hurteau 2010) and increase soil carbon in pine ecosystems (Godwin et al. 2017). Restoration of overgrown forests to grasslands, savannas, and woodlands using prescribed fire is expected to result in higher water yield to aquifers and water bodies and thereby offset climate change (McNulty et al. 2013). Prescribed fire maintains many perennial herb-dominated communities thought to be most resistant to drought (Tucker et al. 2011). Prescribed fire may become even more essential in the future as a tool for managing hazardous fuel accumulations, facilitating carbon storage and sequestration, increasing ecosystem resilience, and managing exotic invasive species.

Science Maturity: There is existing research on effects of prescribed fire on ecosystem components and processes that relate to climate change resilience, such as species composition, drought tolerance, hydrological processes, carbon emissions, carbon sequestration, and soil microbial processes, although the connections between these effects and climate change have not always been explicitly made.

Research Needs/Questions:

- What is the role of prescribed fire in mitigating the effects of climate change? Specific identified information needs include:
 - Carbon sequestration / retention
 - Wildfire risk management
 - Ecosystem resilience
 - Wildlife habitat
 - Water quality protection / watershed sustainability
 - Exotic species control

Audiences and Products: Agency land managers, research scientists, policy makers, private landowners. New information for the research community to build on the current understanding of climate change and the impacts on ecosystem management practices. New models, tools and guidance for land managers and prescribed burners to inform practice. New information for decisionmakers and state / national leaders to inform climate change impact mitigation funding.

References:

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Tucker, S.S., J.M. Craine, and J.B. Nippert. 2011. Physiological drought tolerance and the structuring of tallgrass prairie assemblages. *Ecosphere* 2(4) Article 48.

Wiedinmyer, C., and Hurteau, M. D. 2010. Prescribed fire as a means of reducing forest carbon emissions in the western United States. *Environmental science & technology*, 44(6), 1926-1932. <https://doi.org/10.1021/es902455e>

Originator: This topic was identified by the Southern Fire Exchange Leadership Team based on quantitative and qualitative feedback recorded in the 2017 and 2019 Southern Fire Exchange regional end-user surveys and evaluations. Qualitative feedback was also provided by members of the Southern Fire Exchange Advisory Board, collaborators