

## **JFSP Research Needs Worksheet Spatial Scale of Prescribed Burning**

**Topic:** Prescribed fire is a key management tool for natural resource managers, wildfire mitigation and agricultural operations in the South (Hiers et al. 2020). Across the U.S., prescribed fire is frequently applied at spatial scales ranging from less than an acre to several thousand acres at a time. Public land management agencies typically conduct the largest burns, often involving aerial ignition of units covering 1,000 to 4,000 acres. There is increasing evidence that the scale of fire on the landscape, including the proximity to unburned units or patches, has implications for plant and animal response (Brown and Smith, 2000; McLauchlan et al. 2020), wildlife habitat (Palmer et al. 2017), and native pine regeneration and persistence (Robertson et al. 2019). However, questions remain regarding tradeoffs between conducting fewer, large scale burns or a larger number of small-scale burns, in terms of resources, total acres burned, economics of burning, impacts of adding new firebreaks, and improvement in natural resource management. Also, little is known about how to predict patchiness of burns under specific conditions, and what is the longer-term fate of unburned patches under a frequent prescribed fire regime. With public, private, and NGO efforts to increase the amount of prescribed fire applied on public and private lands to meet regional land management goals, new fire ecology research is needed to address these questions of scale to inform prescribed fire decision-making on public and private lands.

**Science Maturity:** Some fire history work has attempted to reconstruct the extent and spatial pattern of historical fires based on synchronous fire scars. Individual species level work on game species such as the northern bobwhite quail and the eastern wild turkey have led to some recommendations that prescribed fire burn units be managed at 100 acres or less in some cases, although this recommendation presents challenges to burning of large properties. Other work has identified the importance of within burn unit fire heterogeneity in shaping subsequent ecosystem structure (Robertson et al. 2019).

**Research Needs/Questions:** New research is needed to understand the implications of prescribed burning scale and within burn unit heterogeneity on:

- Ecosystem structure, function and composition
- Hydrology and water quality
- Listed, threatened and highly valued plant and animal populations
- Practical challenges and resource limitations

Additional research is needed to provide guidance for prescribed fire management programs that seek economic efficiencies through large burn units.

### **Audiences and Products:**

1. Models and decision support tools for prescribed burners to understand the ecologically appropriate and economically efficient scales with which to apply prescribed fire.
2. Information that can guide decision-makers seeking to assess funding levels for prescribed fire that can meet ecological and other objectives.

### **References:**

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McLauchlan, KK, Higuera, PE, Miesel, J, et al. 2020. Fire as a fundamental ecological process: Research advances and frontiers. *J Ecol.* 2020; 108: 2047– 2069. <https://doi.org/10.1111/1365-2745.13403>

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Robertson, K.M.; Platt, W.J.; Faires, C.E. Patchy Fires Promote Regeneration of Longleaf Pine (*Pinus palustris* Mill.) in Pine Savannas. *Forests* 2019, 10, 367. <https://doi.org/10.3390/f10050367>.

**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 and partnering organizations.