

## **JFSP Research Needs Worksheet**

### **Prescribed Fire in Wetland Ecosystems**

**Topic:** Prescribed fire is one of the most important tools for managing conservation and agricultural lands (Hiers et al. 2020). While much has been learned about the role of prescribed fire for restoring and managing a wide variety of upland ecosystems, relatively little is known about the role of prescribed fire for managing and restoring wetland ecosystems. Wetland ecosystems that can benefit from prescribed fire are found across the U.S. and can include saltwater marshes, freshwater marshes, bogs, freshwater swamps, wet flatwoods, pocosins, isolated upland wetlands, and ephemeral ponds. These habitats are home to many threatened, endangered and state listed species and are often some of the most imperiled ecosystems in the U.S. Wetland ecosystems often represent significant fire management challenges as they can variously support highly flammable evergreen vegetation that accumulates with time since fire, have organic soil that can smolder and produce copious smoke for long periods of time, exotic species that burn differently than locally historical vegetation, and present challenges to establishing firebreaks. Little is known about the longer-term outcomes of repeated burning at given intervals in most wetland ecosystems. Fire and natural resource managers need new information, models, and tools to guide the management, maintenance and restoration of wetland ecosystems in the Southeast and across the U.S.

**Science Maturity:** Conceptual models that include fire have been developed for some wetland ecosystems (Duever and Roberts, 2013; Osborne et al. 2013). Most research to date has focused on endangered species, especially in ephemeral ponds and cypress domes harboring amphibians (Gorman et al. 2013), and on the combustion properties and smoke production of organic soils (Reardon et al. 2007).

**Research Needs/Questions:** What is the role of prescribed fire in restoration, managing and maintaining wetland ecosystems? Relevant related research questions and needs include:

- What are the historical roles of fire in wetland ecosystems (including fire frequency, season, extent and severity)?
- What are the roles of prescribed fire in wetland ecosystem function?
- What is the role of prescribed fire in managing and restoring wetlands for wildlife species?
- Fuel models for wetland ecosystems
- Fire behavior models for wetland ecosystems
- Smoke and emissions models for wetland ecosystems

**Audiences and Products:**

- Basic information and knowledge to inform future studies of the roles of prescribed fire in wetland ecosystems.
- Conceptual models as well as fuel, fire behavior and smoke models for prescribed fire managers working with wetland ecosystems.

**References:**

Duever, M.J., Roberts, R.E. Successional and Transitional Models of Natural South Florida, USA, Plant Communities. *Fire Ecol* 9, 110–123 (2013).  
<https://doi.org/10.4996/fireecology.0901110>

Gorman, T.A., C.A. Haas, C.A., and J.G. Himes. 2013. Evaluating methods to restore amphibian habitat in fire-suppressed pine flatwoods wetlands. *Fire Ecology* 9: 96-109.

Hiers, J.K., O'Brien, J.J., Varner, J.M. et al. Prescribed fire science: the case for a refined research agenda. *Fire Ecol* 16, 11 (2020). <https://doi.org/10.1186/s42408-020-0070-8>

Osborne, T.Z., Kobziar, L.N. & Inglett, P.W. Fire and Water: New Perspectives on Fire's Role in Shaping Wetland Ecosystems. *Fire Ecol* 9, 1–5 (2013).  
<https://doi.org/10.4996/fireecology.0901001>

Reardon, J., R. Hungerford, and K. Ryan. 2007. Factors affecting sustained smouldering in organic soils from pocosin and pond pine woodland wetlands. *International Journal of Wildland Fire* 16:107-118.

**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.