

Lake States Fire Science Consortium

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Unburned forest 'stringers' influence postfire forest communities

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High intensity, stand-replacing fires in jack pine (*Pinus banksiana*) dominated ecosystems often leave unburned strips of forest ("stringers"). These living remnants of pre-fire forests are thought to result from fire-created weather, as they form independent of topographic conditions and vegetation. Stringers can have ecologically important legacy effects on postfire forest structure, namely by acting as a seed source for adjacent burned areas. However, extensive fire suppression and fire exclusion throughout Michigan, coupled with widespread establishment of jack pine plantations, has resulted in changes to forest structure and composition, relative to historic conditions.

For example, the absence of fire has allowed jack pine forests to age, and stringers in these forests will also disappear with age. Stringers provide heterogeneity in structure on the post-fire landscape that is not mimicked well with management – especially in plantations. Tucker and Kashian (2018) investigated how stringers influence jack pine regeneration and plant community composition in adjacent burned areas.

Vegetation structure and composition were analyzed at four study sites in northern Lower Michigan spanning a gradient of time-since-fire (last burned in 1966, 1980, 2000, and 2006). Stringers comprised 5 % to 8 % of the burned area within each site, and one to six stringers were sampled per site. At each stringer, three replicate transects were established for tree density surveys. Each transect included nine 100 m² plots; one plot was established at the stringer center, with four additional plots in each perpendicular direction at four distances (0.5, 1, 2, and 3 times average tree height) to capture effective dis-



Photo credit: D. Kashian

MANAGEMENT IMPLICATIONS

1. Mature trees present in jack pine stringers provide a prolonged seed source for adjacent unburned areas.
2. Stringers provide structural diversity on the landscape, and promote structural diversity in regenerating jack pine stands. This heterogeneity may positively impact Kirtland's warbler conservation efforts.
3. Stringers also influence ground plant community composition which may have lasting ecological effects by impacting successional trajectories.
4. Forest managers can support the important ecological value provided stringers provide by retaining natural stringers created by high-intensity fire, and/or by creating stringers with variable-retention harvesting.

Want to learn more?

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persal area for a given stringer. Understory plant community composition was estimated by identifying all plants to the species level within three 1 m² quadrats near the centerpoint of each 100 m² plot.

Study plots within and immediately adjacent to stringers had different ground cover plant communities than plots farthest from stringers, and this difference was most pronounced at more recently burned sites. Plant community differences were likely explained by the differences in microclimate closest to the stringers, which differed in temperature and light availability compared to plots within the stringers and furthest from the stringers. The density of jack pine stems was highly variable outside of stringers with no consistent patterns, but sapling age distributions were consistently broader at locations nearby stringers compared to locations far from stringers. Long-term seed rain from the live trees within the stringers in more recent burns appeared to provide continuous regeneration within the surrounding burned forest. Stringers provide variation in stand structure and age, while also acting as a prolonged seed source for burned areas adjacent to stringers. The heterogeneity in overall forest composition resulting from stringers can provide wildlife habitat and improve ecosystem resiliency to disturbance.

Reference

Tucker, M.M., Kashian, D.M., 2018. Pre-fire forest remnants affect post-fire plant community structure and composition. For. Ecol. Manage. 408, 103–111. <https://doi.org/10.1016/j.foreco.2017.10.038>