

LIVING ON THE EDGE: DEVELOPMENT OF AN OAK SEEDLING BANK IN RESPONSE TO SILVICULTURALLY CREATED OPENINGS IN A PRODUCTIVE MIXED HARDWOOD FOREST IN THE SOUTHERN APPALACHIAN MOUNTAINS

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In oak forests of the Eastern United States, successful oak regeneration and recruitment is predicated on the presence of large oak seedlings and saplings capable of successfully competing with shade tolerant and intolerant species after disturbance. In contemporary oak forests, lack of disturbance has promoted the recruitment of shade-tolerant species (e.g., red maple [*Acer rubrum*], American beech [*Fagus grandifolia*]) and limited the recruitment of oak seedlings, which, though often abundant, remain small and noncompetitive. Intense and punctuated disturbances (e.g., even-aged regeneration harvests), while releasing and promoting the growth of existing oak seedlings, also stimulate the establishment and recruitment of shade-intolerant competitors (e.g., yellow-poplar [*Liriodendron tulipifera*], sweet birch [*Betula lenta*]). Although competitors thrive in canopy openings, observations suggest oak seedlings display greater growth than competitors along the gap edge, creating an environment where canopy gaps indirectly promote the growth and development of the oak seedling bank in edge environments. In 2014, we initiated a study to examine the efficacy of using a Bavarian *femelschlag* (expanding gap) system to regenerate oak in a productive temperate oak forest in western North Carolina. Six stands were selected and approximately 25 percent of each stand's area was regenerated in gaps (70 gaps, 18 randomly selected for intensive vegetation measurements). Five years postharvest, we tested the effects of gap size (range: 0.15–1.3 ha), proximity to gap edge, light, and numerous environmental variables on the height and abundance of oak seedlings (stems <1.5 cm in diameter at breast height [d.b.h.]) and major competitors. Results will form the basis for using an expanding gap *femelschlag* for regenerating oak and conserving diversity in temperate oak forests.

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