The Effects of Wildfire Intensity on the Regeneration of Pinus rigida Mill on the Shawangunk Ridge

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Acres burned by U.S wildfires have increased since the 1980s, due to warmer temperatures. Over 7 million acres have burned per year in the past 20 years (NOAA). Wildfire plays an integral role in the regeneration of the Pitch Pine (Pinus rigida Mill.) ecological community of the United States. Pitch Pine's cones only open in extreme heat, allowing seed dispersal. Recently, a 2016 high burn intensity wildfire on the Shawangunk ridge, New York failed to produce enough Pitch Pine seedlings to replenish the forest. This study investigated a nearby 2022 wildfire to attain an understanding of what role fire intensity played in Pitch Pine regeneration decline. Monitoring plots were established in 2023, then seedling number, seedling height and soil nutrients were collected in 2024. Seedlings were less abundant in high fire intensities but grew taller. Seedlings in moderate burn severities were more numerous ($p<.01$), but shorter than both their high and low intensity counterparts ($p<.01$). Greater moderate seedling counts were likely from increased nitrogen and phosphorus in soil following moderate burns. These results indicate that Pitch Pine has a moderate intensity “sweet spot” and the high intensity of the 2016 fire caused the lowered seedling counts following the fire. Decreased pine regeneration will become a large problem as fires become more intense, potentially destroying this ecological community and driving the already critically endangered Dwarf Pitch Pine subspecies to extinction. These findings will contribute to future conservation efforts of Pitch Pine, protecting the species through moderate intensity prescribed burns.

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