

WILDFIRE HAZARD MITIGATION TREATMENTS APPLIED ABOVE GROUND IMPACT SOIL ECOLOGICAL PROPERTIES IN OAK FOREST ECOSYSTEMS

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Manipulations designed to reduce wildfire hazard in forests in which wildfire has been suppressed for many decades typically entails manipulating fuels with prescribed fire and mechanical treatment. Although the ecosystem properties being manipulated are above ground, these activities also may affect below-ground components of ecosystems. We evaluated soil organic matter and microbial activity in mixed-oak (*Quercus* spp.) forests of southern Ohio that were subjected to alternative wildfire hazard modalities (prescribed fire, thinning from below, and the combination of thinning and burning) and untreated controls over a 4-year period. During the first growing season after treatment, soil organic C quantity was significantly lower in soil from the thin+burn plots than from the other three treatments, but there was no significant difference in organic matter quality (C:N ratio) among treatments. By the fourth year after treatment, the soils from the thinned plots had significantly greater organic matter quantity and lower organic matter quality than soils from the other treatments. During the first year, net N mineralization increased after thinning and decreased after fire relative to the untreated control. Plots that were both thinned and burned did not differ from the control. By the fourth year, there were no differences among treatments in N mineralization. Proportional nitrification was significantly lower in thinned plots (with or without fire) than in control or burned plots in the first year, but this pattern was reversed by the fourth year. Acid phosphatase activity (an index of microbial breakdown of labile carbon compounds) was lower in the thin+burn plots than in the other three treatments the first year, but by the fourth year, acid phosphatase activity was greater in the thinned plots than in the other treatments. Phenol oxidase activity (an index of fungal breakdown of recalcitrant organic matter) was not significantly affected by any treatment in the first or fourth year after treatment. The responses to the hazard reduction treatments differed among response parameters and years; thus, ordination approaches were used to present a more holistic view of the impact of above-ground manipulations forest-soil ecology.

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