

RESEARCH ARTICLE

Canopy thinning, not agricultural history, determines early responses of wild bees to longleaf pine savanna restoration

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Longleaf pine savannas are highly threatened, fire-maintained ecosystems unique to the southeastern United States. Fire suppression and conversion to agriculture have strongly affected this ecosystem, altering overstory canopies, understory plant communities, and animal populations. Tree thinning to reinstate open canopies can benefit understory plant diversity, but effects on animal communities are less well understood. Moreover, agricultural land-use legacies can have long-lasting impacts on plant communities, but their effects on animal communities either alone or through interactions with restoration are unclear. Resolving these impacts is important due to the conservation potential of fire-suppressed and post-agricultural longleaf savannas. We evaluated how historical agricultural land use and canopy thinning affect the diversity and abundance of wild bees in longleaf pine savannas. We employed a replicated, large-scale factorial block experiment in South Carolina, where canopy thinning was applied to longleaf pine savannas that were either post-agricultural or remnant (no agricultural history). Bees were sampled using elevated bee bowls. In the second growing season after restoration, thinned plots supported a greater bee abundance and bee community richness. Additionally, restored plots had altered wild bee community composition when compared to unthinned plots, indicating that reduction of canopy cover by the thinning treatment best predicted wild bee diversity and composition. Conversely, we found little evidence for differences between sites with or without historical agricultural land use. Some abundant *Lasioglossum* species were the most sensitive to habitat changes. Our results highlight how restoration practices that reduce canopy cover in fire-suppressed savannas can have rapid benefits for wild bee communities.

Key words: agricultural legacy, Halictidae, land use, *Pinus palustris*, pollinators, restoration ecology

Implications for Practice

- Canopy tree thinning to restore longleaf pine savannas rapidly increases wild bee diversity.
- Agricultural history does not affect wild bee communities or alter the effects of canopy tree thinning on wild bee communities.

less well understood. Given their relative mobility, animals may show similar or dampened responses to agricultural legacies, in comparison to plants, and therefore the response of animals is dependent on the influence of legacies on habitat structure.

Agricultural abandonment also presents opportunities for biodiversity conservation, although these opportunities are accompanied by challenges. First, active restoration may be