

Conserving Open Pine Wildlife Communities in Commercial Pine Stands



A managed loblolly pine stand following mid-rotation prescribed fire and herbicide applications. Photo: Dr. Raymond B. Iglay

Pine (*Pinus* spp.) forests of the southeastern Coastal Plain were historically described as open pine woodlands and savannahs with floristically rich understories that supported diverse wildlife communities (Van Lear et al. 2005, Mitchell and Duncan 2009). Widespread fire suppression following European settlement transitioned many open pine communities to hardwood-encroached, closed-canopy forests followed by subsequent declines in many species of disturbance-adapted wildlife (Mitchell and Duncan 2009).

Managed pine forests can provide open pine conditions for at least some portion of a stand's rotation, typically 25-35 years in the Southeast. Because managed pine systems occupy 15.8 million ha in the Southeast, there is huge potential for these systems to contribute to open pine conservation goals. Managed pine creates a matrix of stand conditions including early successional conditions post-harvest to closed-canopy to open stands following mid-rotation treatments (see photo, page 2). Mid-rotation management such as thinning, prescribed fire, and application of selective herbicides can reduce

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canopy closure, limit hardwood encroachment, and maintain a diverse herbaceous understory.

We evaluated the extent to which managed pine systems can maintain open structural conditions (e.g., basal area, canopy closure) and associated

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wildlife species. We conducted a comprehensive literature review and meta-analysis of biodiversity and wildlife responses to several site preparation techniques, thinning, and mid-rotation applications of prescribed fire and selective herbicide. Birds

All taxonomic groups (e.g., reptiles, amphibians, small mammals, birds) responded favorably or neutrally to commercial thinning.

responded favorably to a chemical site preparation with a one-time banded herbicide. Bird abundance and number of species generally declined with more intensive site preparation (e.g., combination of chemical and mechanical site preparation, broadcast



Northern Bobwhite, a popular game bird that uses managed pine stand habitats. Photo: Alan Schierer



Managed pine landscapes create a spatial matrix of early successional, closed canopy, and open stand conditions. Photo: NCASI

herbicide, multiple herbicide applications). All taxonomic groups (e.g., reptiles, amphibians, small mammals, birds) responded favorably or neutrally to commercial thinning. Diversity and abundance of plants, birds, and open pine specialists generally increased following mid-rotation fire and/or herbicide while amphibians slightly declined following these treatments.

A literature review of structural conditions in loblolly pine stands of various ages found that thinning is an effective first step to bringing closed canopy stands into an open pine condition. In general, thinned stands exhibited ~80% canopy closure, 20% midstory hardwood and shrub coverage, and a wide range of herbaceous understory coverage (24-97%). Stands receiving mid-rotation fire and herbicide applications had similar canopy closure but reduced midstory encroachment (6% hardwood and 12% shrub coverage) and increased herbaceous understory

coverage (83-98%) See photo on page 1. Although loblolly pine stands managed for timber products are at the upper end of acceptable basal area and canopy closure recommendations for inclusion in open pine woodlands, these stands do meet midstory and herbaceous understory criteria.



Bachman's Sparrow, a species common in commercial open pine. Photo: Andy Reago & Chrissy McClaren

A landscape analysis of commercial loblolly pine stands managed for sawtimber emphasized the importance of planting density and site quality (i.e., site index, which measures the average height of trees at base age 25) for calculating number of years spent in open pine condition. After a commercial thin, stands with lower planting densities (e.g., 350-435



The showy *Prairie Warbler* is a common species in early successional managed pine forests. Photo: Matt Tillett

trees/ac) and site indices (50-60) spent 3-4 years in open pine condition whereas stands with higher planting densities (e.g., 700 trees/ac) and site indices (e.g., 80+) had only one year in open pine condition.

Thus, for a large, commercial landscape with stands averaging 74 on site index, 12% of the landscape



Gopher Tortoise is a species of concern that can occur in commercially managed pine stands. Photo: David Syzdek

is in open pine condition during any given year if the initial planting density for each stand is 350 trees/ac. For this same landscape planted at 700 trees/ac, only 3% of the landscape is in open pine condition at any one time.

Pine stands managed for wood products spend some time in early successional condition at planting and open pine condition following commercial thinning. Less intensive site preparation treatments, thinning, and mid-rotation prescribed fire and selective herbicide applications promote suitable conditions for plants, birds, and other open pine specialists; however, there may be trade-offs with some taxa (e.g., amphibians). Thinning is a vital first step to transforming closed canopy stands to open pine condition. Although prescribed fire and selective herbicides can further enhance open pine condition, prescribed fire can be difficult to apply in some locations due to the wildland-urban interface and smoke regulations, and herbicide can be costly. Management by many large institutional forest owners has already moved towards lower planting densities, which may lengthen time spent in open pine condition. Regardless, active management across managed pine landscapes helps ensure open pine conditions will

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likely persist in a shifting mosaic over time. Integration of commercially managed pine stands into a larger regional framework for open pine conservation would further understanding of available habitat for open pine wildlife species and would serve as a platform for discussions by private and public landowners and managers about opportunities to contribute to conservation goals.

This research is applicable to loblolly pine stands in the southeastern coastal plain.

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For full report on biodiversity, please see Greene et al.'s (2016) paper in *Forest Ecology and Management*.

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