

EVALUATING POPULATION-HABITAT RELATIONSHIPS OF FOREST BREEDING BIRDS AT MULTIPLE SCALES USING FOREST INVENTORY AND ANALYSIS DATA

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ABSTRACT

Multiple studies have documented declines of forest breeding birds in the eastern United States, but the temporal and spatial scales of most studies limit inference regarding large scale bird-habitat trends. A potential solution to this challenge is integrating existing long-term datasets such as the U.S. Forest Service Forest Inventory and Analysis (FIA) program and U.S. Geological Survey Breeding Bird Survey (BBS) that span large geographic regions. The purposes of this study were to determine if FIA metrics can be related to BBS population indices and to develop predictive models from these relationships that identify forest conditions favorable to forest songbirds. We accumulated route-level BBS data for four species guilds (canopy nesting, ground and shrub nesting, cavity nesting, early successional), each containing a minimum of five species, and developed 41 metrics describing forest structure at the county level using FIA data from for the 2000 inventory cycle within five physiographic regions. We buffered each BBS route with a 100m, 1km, and 10km buffer, intersected these buffers with the county boundaries, and developed a weighted average for each FIA metric within each buffer, with the weight being a function of % of area each county had within a given buffer. We also calculated 28 landscape metrics from NLCD imagery using Fragstats for each of the buffer sizes. We developed predictive models relating bird presence/absence and abundance across space to changes in forest and landscape structure using classification and regression trees (CART). Many CART models accounted for >50% of the variation in bird presence/absence and abundance on the BBS routes across our study area. For example, the models developed for the ovenbird (*Seiurus aurocapillus*), a ground nester in mature forests, explained 80% of its presence/absence and 70% of its abundance across the routes in our study area. Models for the yellow-breasted chat (*Icteria virens*), an early successional species, accounted for 72% of its presence/absence and 52% of its abundance. These results suggest that FIA forest metrics can explain variations in abundance of songbird species with a variety of habitat requirements across large spatial scales not previously studied, and use of such metrics also provide the ability to simultaneously model the effects of multiple spatial scales on habitat selection.

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