**Habitat Use by Spring Migrating Landbirds in Northeastern Pennsylvania**

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**Introduction**

Long-term data sets reveal population declines in many landbird migrant species (Askins et al. 1990. Population declines in migratory birds in eastern North America. *Current Ornithology* Vol. 7, pp. 1-57). Declines are especially evident in shrub-nesting species – records from banding stations and bird observatories during migration demonstrate significant declines in many species of shrubland birds (Askins 1999. Restoring North America’s birds: lessons from landscape ecology). Because migrating landbirds likely reference innate information about breeding habitat when making decisions about habitat use during migration, i.e., migrants occupy habitats en route that are similar to the breeding season (Moore and Aborn 2000. Mechanisms of en route habitat selection: how do migrants make habitat decisions during stopover? *Studies in Avian Biology*, 20, 34-42), the persistence of shrub-scrub habitats may be critical for these species during passage. Unfortunately, we know little about migrant-habitat relations, especially with respect to habitat use and the consequences of that use at inland, non-forested stopover sites. If persistence of migrant populations depends on locating favorable conditions throughout the annual cycle, factors associated with en route ecology of migrants must figure prominently in any analysis of population change and in the development of a comprehensive conservation plan for migrant species.

**Objectives**

The purpose of our study was to assess the importance of forested and upland shrub/scrub habitat to spring migrating landbirds by understanding 1) spatial (forested vs. shrub/scrub) variation in flying invertebrate abundance, and 2) migrant use of forested vs. shrub/scrub habitat during stopover.

**Methods**

- We collected data simultaneously from forested and upland shrub/scrub habitats in Lackawanna State Park and private lands immediately adjacent to the park, Lackawanna County, northeastern Pennsylvania (Figure 1).
- Forested habitats were dominated by maple (Acer spp.) and beech (Fagus grandifolia) with eastern hemlock (Tsuga canadensis) present in moister areas.
- Shrub/scrub habitat was ~ 25 years post agriculture, consisting principally of tartarian honeysuckle (Lonicera tartarica), southern arrow wood viburnum (Viburnum dentatum), blueberry (Vaccinium spp.), dogwood (Cornus spp.), multifloral rose (Rosa multiflora) and hawthorn (Crataegus spp.)

**Results**

Invertebrates – We found no difference between study sites in biomass estimates derived from Malaise trap samples (Mann-Whitney Z = 0.068, Bushko n = 36; Lackawanna n = 28, P = 0.946) so we pooled invertebrate data across study sites. After controlling for year (F,1,60 = 16.156, P < 0.001) a GLM on ranks indicated that there was more invertebrate biomass (F,1,60 = 6.998, P = 0.01) trapped per 100 minutes in shrub/scrub habitat than forested habitat (Figure 3).

Avian Census – We detected more Long Distance (F,1,349 = 61.489, P < 0.001) Short Distance (F,1,349 = 165.402, P < 0.001) and Resident (F,1,349 = 14.098, P < 0.001) landbirds in shrub/scrub than forested habitat (Figure 4). Year had a significant effect in the analysis of Long Distance (F,1,349 = 35.010, P = 0.001) but not short distance (F,1,349 = 1.236, P = 0.267) nor resident (F,1,349 = 2.512, P = 0.114) counts.

**Mist-nets** - We recorded 3483 captures of 78 species. Netting results suggest many more birds were present in shrub/scrub habitat than forested during spring migration (Table 1).

**Conclusion**

Shrub habitat in northeastern Pennsylvania appears important to spring migrating landbirds. Results suggest that birds use shrub habitat more than forest habitat. This may to be a consequence of more resources available to migrants in shrub habitats.

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