

# Lake States Fire Science Consortium

A JFSP KNOWLEDGE EXCHANGE CONSORTIUM



## BIRDS, MIXED-PINE & FIRE IN EASTERN UPPER MICHIGAN

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Land use in the northern Lake States region has affected fire-dependent mixed-pine forests of red pine (*Pinus resinosa*) and eastern white pine (*P. strobus*) by altering natural disturbance regimes that drive forest composition, structure, and function. Since structure is often associated with wildlife use, then altering a process that affects forest structure (fire), in theory, will impact wildlife communities. Currently, restoration of mixed-pine forests is underway on many lands, but without baseline data on wildlife communities. This study addressed three questions: 1) Do bird communities differ between reference (virgin, old-growth) sites and altered mixed-pine sites? 2) What compositional and structural attributes are associated with observed differences in bird communities and how might they be related to fire history? 3) How does heterogeneity of natural land cover affect bird communities?

Five-minute, unlimited-radius bird point counts were conducted twice between 6 June and 13 July 2009 within 54 sites (25 reference, 29 altered) at Seney National Wildlife Refuge. Vegetation was characterized at two different scales (50 acres at the patch level and 0.12 acres at the plot level). Vegetation variables were selected that represented features that can be the focus of restoration efforts. Bird species richness was determined for: 1) all bird species in all habitat classes combined, 2) for bird species in each habitat class (e.g., forest, generalist, and wetland, respectively), and 3) for the combined forest-generalist species group.

The 108 point counts resulted in 77 species: 31 forest species, 26 generalist species (57 forest-generalist species), and 20 wetland species, and no one species was found in  $\geq 40\%$  of the 54 sites. Two forest-generalist spe-



### MANAGEMENT IMPLICATIONS

- 1) Reference mixed-pine sites have a different bird community than altered sites.
- 2) Reference mixed-pine sites have greater forest bird species richness.
- 3) Reference sites had twice the indicator bird species than altered sites.
- 4) Coniferous midstory development in altered sites does not enhance bird diversity.
- 5) Fire history, in part, explains bird abundances in reference mixed-pine sites.

### Want to learn more?

Greg Corace at Seney National Wildlife Refuge ([greg\\_corace@fws.gov](mailto:greg_corace@fws.gov); 906-586-9851 x14).

Corace, R. G. III., L. M. Shartell, P. C. Goebel, D. M. Kashian, I. Drobyshev, and D.M. Hix. 2014. Bird communities of reference and altered mixed-pine forests: implications for restoring fire-dependent forest ecosystems. *Forest Ecology and Management* 318:183-193

## Research Brief for Resource Managers

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cies were found solely in reference sites (American redstart, *Setophaga ruticilla*, and chestnut-sided warbler, *Dendroica pensylvanica*), and no forest-generalist species were found solely in altered sites. The reference sites had twice the number of indicator bird species than the altered sites (Table 1). Data suggested that there were significant differences in bird assemblages between reference and altered sites (MRPP;  $P \leq 0.001$ ).

**Table 1. Bird species associated ( $P < 0.10$ ) with 25 reference and 29 altered mixed-pine stands.**

Reference	Altered
Hairy Woodpecker ( <i>Picoides villosus</i> )	American Robin ( <i>Turdus migratorius</i> )
Yellow Warbler ( <i>Setophaga petechial</i> )	Pileated Woodpecker ( <i>Dryocopus pileatus</i> )
American Redstart	Song Sparrow ( <i>Melospiza melodia</i> )
White-throated Sparrow ( <i>Zonotrichia albicollis</i> )	Ruffed Grouse ( <i>Bonasa umbellus</i> )
Least Flycatcher ( <i>Empidonax minimus</i> )	
Nashville Warbler ( <i>Oreothlypis ruficapilla</i> )	
Chestnut-sided Warbler	
Veery ( <i>Catharus fuscescens</i> )	

Wetland cover types predominated in all patches, especially within patches surrounding reference sites; patches surrounding altered sites had (on average) more area in forests than patches surrounding reference sites. There were more similarities in vegetation between reference and altered sites at the plot scale than at the patch scale. No difference in individual bird abundance was found between reference and altered sites. Greater richness of forest bird species in reference sites was documented. Additional variables that were not measured may have contributed to the greater forest bird species richness in reference sites. Although bird species responses to vegetation and fire history variables were complicated, it was clear that time since last fire, number of fires in last 50 years, and other fire variables affected bird abundances as much as structure and composition.

The findings of the study support the hypotheses that bird communities associated with reference sites differ from altered sites and that the variation in fire histories associated with reference sites were related to the abundance of eight indicator forest-generalist bird species. The results indicate that mixed-pine forest restoration could produce bird communities similar to reference sites and increased conifer dominance in the understory does not increase bird diversity. Future studies should be conducted to examine fire effects in other pine forest types in the region and document use by potential flagship species, Red Crossbill (*Loxia curvirostra*) and Black-backed Woodpecker (*Picoides arcticus*).

*Related information:*

Atwell, R.C., L.A. Schulte, and B.J. Palik. 2008. Songbird response to experimental retention harvesting in red pine (*Pinus resinosa*) forests. *Forest Ecology and Management* 255: 3621-3631.

Corace, R.G. III, P.C. Goebel, and D.L. McCormick. 2010. Kirtland's Warbler habitat management and multi-species bird conservation: considerations for planning and management across jack pine (*Pinus banksiana* Lamb.) habitat types. *Natural Areas Journal* 30:174-190.