AVIAN RESPONSE TO SHRUBLAND RESTORATION IN THE FORESTED LANDSCAPE OF STERLING FOREST STATE PARK, NY.

John Confer
Biology Department, Ithaca College, Ithaca, NY 14850
confer@ithaca.edu

During the last half-century, shrublands and many of the bird species inhabiting them have declined in northeastern North America. Among these species, the Golden-winged Warbler (*Vermivora chrysoptera*) (GWWA) is notable because it has actually disappeared from much of its global breeding range, especially parts of the Appalachians, New York, New Jersey, and New England (see Sauer *et al*. 2008 and *The Second Atlas of Breeding Birds in New York* 2008). In contrast, the area in and around Sterling Forest State Park (SFSP), Orange County, New York, has supported a population of GWWA for over a century (Confer and Tupper 2000). Even here, however, shrubland habitat is now declining as it matures into forest. At the restoration site in SFSP, the subject of this report, the number of pairs of nesting GWWA declined from 2001 to 2005 (3, 3, 2, 2, 0 pairs, respectively), most likely due to an increase in tree cover.

To help sustain the GWWA, a small portion of SFSP was managed in 2006 to restore shrubland habitat. This report compares changes in avian abundance and diversity at a 36 ha survey area centered around the 2 ha restoration site, and at a 36 ha control site, before and after management activities in late winter of 2006. Changes in abundance (number of territories) were compared for two categories of area-sensitive species, those favoring the forest-interior and those favoring forest-edges.

STUDY SITES AND METHODS

The survey area is located in the Indian Hill portion of SFSP and is part of an extensive forest generally dominated by maple and oak and includes several small wetlands. A control site supported similar flora and fauna, including nesting GWWA and Blue-winged Warbler (*V. pinus)* (BWWA). In late winter 2006, woody stems were removed from four adjacent patches, each of ~0.5 ha, near the center of the experimental area. The specific sites managed in this way were in an earlier stage of succession than the surrounding forest and were dominated by red maple and white birch saplings.

We conducted pre-treatment surveys of nesting territories in 2004 and 2005, followed by post-treatment surveys in 2007 and 2008, after management activities. Results at both sites were likely influenced about equally by annual fluctuations in bird abundance and annual differences in observer skills. By

adjusting values at the restoration area for changes at the control area, it is possible to detect population shifts that are likely due to restoration of the shrubland habitat.

We created a forest survey area by erecting 36 metal posts at 100-m intervals to form a square grid of 25 ha with the 2 ha of restored shrubland in the center. A similar grid was created at the control area. Post locations were determined with laser transects, and back-sighting showed an error of <1 m in 1 km. To determine the number of nesting pairs of birds, we walked from post to post in both the experimental and control areas once a week for 7-8 weeks in late May through early July. We recorded all birds within the grid plus those within 50 m outside the grid area, creating a total survey area of 36 ha. Surveys began at 0600 hrs and were completed before 1000 hrs. We marked all birds detected during these surveys on a map that included topographic lines, paths and post locations. In addition, we mapped observations of breeding behavior by all species that were noted during our studies of GWWA and BWWA. We transcribed all bird observations to a map for each species and then used a cluster of observations as indicative of a territory. The classification of species as preferring forest-interior or forest-edge follows Freeman and Collins (1992).

RESULTS

In the survey area, the post-treatment average of the total number of territories for all species increased by 73 or 36% (205 to 278) in comparison to the pre-treatment average. In the control area, the post-treatment average of the total number of territories increased by a smaller number, 64, but a higher percentage, 43%. The contrary trends in these comparisons suggest there was no over-riding effect of shrubland restoration on the total number of nesting territories.

In the survey area, the post-treatment average number of nesting species increased by 9 or 22% (41 to 50) in comparison to the pre-treatment average. In the control area, the post-treatment average number of nesting species increased by 8 or 26% (30.5 to 38.5) in comparison to the pre-treatment average. Two of the new species at the control area, Mallard and Eastern Kingbird, clearly were attracted by a beaver pond built in the fall of 2007. The addition of Eastern Phoebe may also have been due to the new wetland habitat. We eliminated consideration of the species attracted by the beaver pond and then adjusted the values in the survey area for the remaining change in number of species at the control area. The adjusted results show a small increase of three or four nesting species at the 36 ha survey area, probably due to creation of small patches of successional habitat in a forested landscape. Several species that were present in the pre-treatment surveys increased in abundance in the altered habitat, notably the American Woodcock, which increased from one or two displaying males to at least seven displaying at once in early spring of 2006.

Many bird species nest in higher densities in large, contiguous forests than in small, forest fragments (e.g., Freeman and Collins 1989, Boulinier *et al*. 2001). Forest fragmentation and creation of forest-field edges in agricultural

landscapes is particularly harmful for these forest-interior species (Faaborg *et al*. 1992). However, in contrast to the edge of a fragmented forest surrounded by agriculture, our management created an edge between shrublands and a large, surrounding forest. To test the effect of our restoration on forest-nesting birds, we surveyed for the number of nesting pairs of area-sensitive, forest-interior species (Freeman and Collins 1989). In the 34 ha of forest surrounding the 2 ha of shrubland restoration, and in the 36 ha control area, the average number of territories for these species increased by 36 and 32.5 nesting pairs, respectively (Fig. 1, upper). The difference suggests that the number of nesting pairs of area-sensitive, forest-interior birds increased by 3.5 or 4% in the survey area around the experimental area. The increase is so small that it is most likely not statistically significant, but the trend is upward and contrary to the negative impacts associated with forest-field edges in agricultural landscapes.

We expected the number of nesting territories for area-sensitive, forest-edge species to increase. Results do show an increase in the experimental area compared to the control area by ten pairs or 66% (Fig. 1, lower). The large size of this increase suggests it is real. Both GWWA and BWWA are considered to be forest edge species, and the numbers of both these species increased within the footprint of the restoration. Other species in this guild that showed a positive response include American Woodcock, American Crow, Yellow Warbler, and Eastern Towhee.

The post-treatment surveys in 2007 and 2008 revealed four to five GWWA nests in and around the restoration site, suggesting a modest success for the restoration effort. At the same time, there were one to five BWWA nests in and around the restoration site, which raises concerns about the effect of hybridization and competition on the long-term survival of GWWA at this site.

SUMMARY

SFSP is part of the NYS Park Preserve System, and is dedicated to the conservation of all rare and declining wildlife. The decision, and its assessment, to help sustain the GWWA and other forest edge and shrubland species in this Park Preserve was balanced by consideration of possible impacts on declining forest species. In the end, our restoration showed no clear effect on the total number of nesting birds and a small increase in the number of nesting species. There was a strong increase in forest-edge species and no decline in number of territories of area-sensitive, forest-interior species around the restoration area. GWWA were reestablished at the site, even though they are declining in nearby areas. However, the restoration also attracted BWWA and the final outcome of interactions between these species is not known. Overall, creation of small shrublands in a landscape of extensive and nearly unbroken forest seems to have had a favorable effect on the avian community.

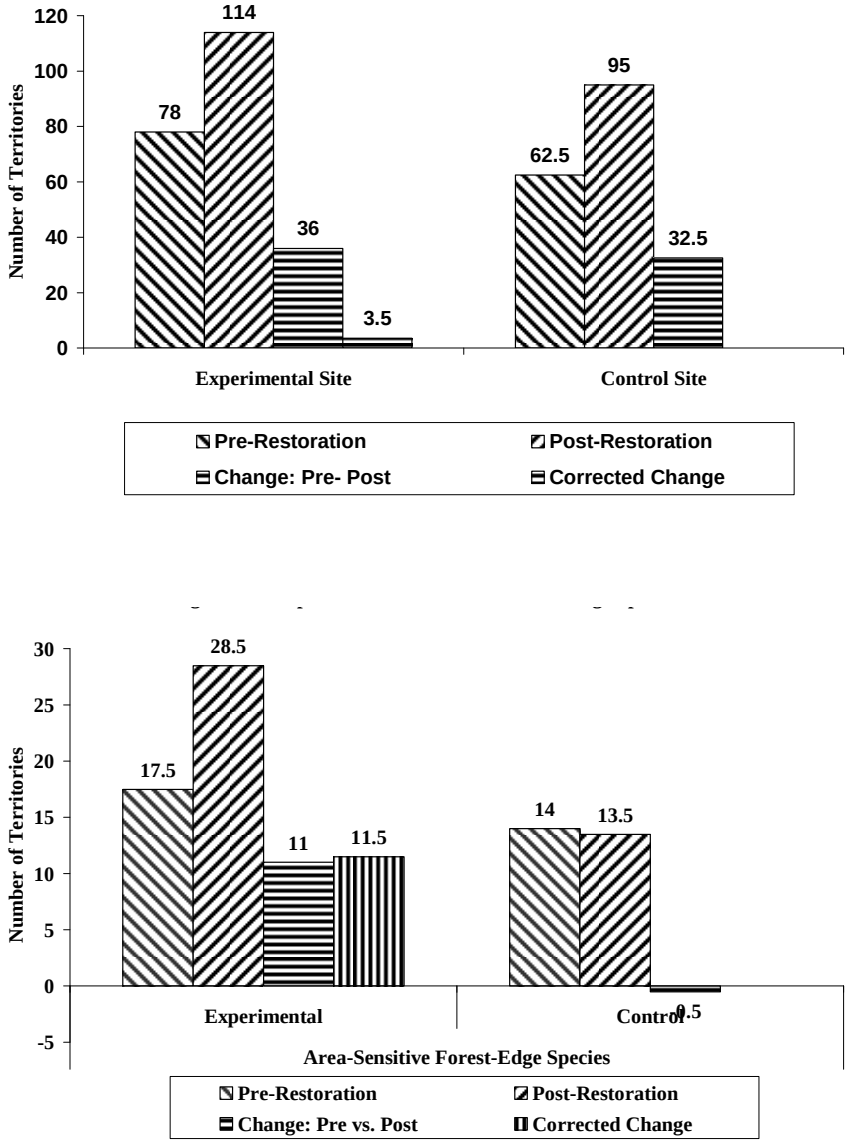

Figure 1. Responses of area-sensitive forest-interior (top) and area-sensitive forest-edge (bottom) bird species to shrubland restoration. The fourth bar for the experimental area shows the change in the experimental area corrected by subtracting the change observed in the control area.

ACKNOWLEDGMENTS

This work was directed by John Confer in collaboration with and support from the New York State Office of Parks, Recreation and Historic Preservation, the Non-game Unit of the New York State Department of Environmental Conservation, the New York State Biodiversity Research Institute, and the New York State Wildlife Grant program. T. Lyons, R. Perry and J. Gell and J. Hutchinson of the New York State Office of Parks, Recreation and Historic Preservation provided considerable assistance. Dr. Michael Rogers from Ithaca College supervised the installation of the posts and grid. More than 30 students, principally from Ithaca College, made this study possible, including especially K. Barnes, J. Cramer, M. Hager, E. Lahr, M. Podolsky, J. Quant, and R. Serrell.

LITERATURE CITED

Boulinier, T., Nichols, J. D., Hines, J. E., Sauer, J. R., Flather, C. H. and Pollock, K. H. 2001. Forest fragmentation and bird community dynamics: inference at regional scales. Ecology 82:1159-1169.

Confer, J. L. and S. K. Tupper. 2000. A reassessment of the status of Golden-winged and Blue-winged Warblers in the Hudson Highlands of southern New York. Wilson Bulletin 112:544-546.

Faaborg, J., M. Brittingham, T. Donovan, and J. Blake. 1993. Habitat fragmentation in the Temperate Zone: A Perspective for Managers. Pages 331-338 *in* Status and Management of Neotropical Birds. (D. M. Finch and P. W. Stangel, Eds.). U.S. Department of Agriculture, Forest Service, General Technical Report RM-299.

Freeman, K, B. Collins, B. 1992. Landscape ecology of birds breeding in temperate forest fragments. Pages 443-454 *in* Conservation and ecology of Neotropical migrant landbirds. (J. M. Hagen III and D. W. Johnston, Eds.). Smithsonian Institution Press, Washington and London.

Sauer, J. R., J. E. Hines, and J. Fallon. 2008. *The North American Breeding Bird Survey, Results and Analysis 1966 - 2007. Version 5.15.2008.* USGS Patuxent Wildlife Research Center, Laurel, MD. Accessed 4 Feb 2009 at: *http://www.mbr-pwrc.usgs.gov/bbs/*