

This file was created by scanning the printed publication.
Errors identified by the software have been corrected;
however, some errors may remain.

Links Between Scale and Neotropical Migratory Bird Populations

Linking Local, Regional, and Continental Population Trends in Neotropical Migrant Birds. A symposium organized by M.-A. Villard and B. Maurer. ESA Annual Meeting, Madison, Wisconsin, August 1993.

Recent concerns about the future for migratory birds, particularly those that migrate to the Tropics, have led to the development of a variety of new research and education initiatives addressing avian population ecology and conservation. Research that focuses on the relationships between migrant population trends, geographical patterns, and spatial and temporal scales is central to solving conservation problems for migrants. Understanding how and why avian populations are declining

is difficult because population trends vary in relation to numerous factors, including species, habitat, location, land use, reproductive success, and observational scale. Populations of some species are declining in some locations or in some habitats, while increasing in others. Because of the complexity and widespread nature of the problem, scientists and conservationists have not been fully successful in explaining population changes of neotropical migrants in a clear-cut way. This limits our ability, then, to adequately develop a comprehensive conservation strategy for migrant populations. Even so, a national program called Partners in Flight has been set in motion for this purpose.

To effectively conserve populations that are affected by varying conditions across several countries, it is necessary to bolster our interpretations of population trends by evaluating trends at a variety of spatial and temporal scales. In particular, studies of population trends at regional and continental scales, and over multiple years, are sorely needed because widespread, long-term patterns can be detected at these scales. This symposium comes at a time when conservationists are searching for methods to conserve migratory birds without having complete information about where and what to conserve. While the symposium did not deliver ready solutions to conservationists, it did highlight the overwhelming need to carefully evaluate whether the local, short-term scales we traditionally use to study bird populations are the best scales to base our conservation plans on. The results of this symposium suggest that large-scale studies may be necessary to fully determine whether bird populations are indeed in serious trouble, and if so, whether our concerns should focus primarily on migratory birds and forested habitats in the eastern U.S., or whether a broader array of bird species, vegetation types, and localities are at risk.

In their lead-off paper, Marc-André Villard and Brian A. Maurer, the organizers of the symposium, drew attention to how high geographic and temporal variability in

population trends observed at the continental scale complicates efforts to link declines to specific causes. Using Breeding Bird Survey (BBS) data for two species of wood warblers (Emberizidae, Parulinae), they analyzed spatial and temporal variations in abundances by averaging over 5-year periods and using universal kriging to calculate spatial patterns of abundance. They found that areas of declines occurred as series of relatively small, disjunct patches concentrated in the areas of highest abundance. While the abundance of one species decreased more or less continuously from 1966 to 1989, populations of the other species fluctuated widely. Trends in populations differed from those reported by other researchers who used the same set of BBS data. They concluded that spatial patterns of population change challenge direct interpretations based on habitat alterations on the breeding grounds, and that changes in BBS methodology influence trend direction.

Also using BBS data, Fran James presented results of analyses for 15 common species of wood warblers in eastern and central North America. Again, like the first presentation, methods for analyzing these data differed from those in earlier studies reporting declining populations. According to a nonlinear nonparametric route regression model developed by James and colleagues, most species were increasing in number, and such species, regardless of whether its overall population trend was up or down, showed substantial geographic variation in population trend. While James argued that nonlinear trends are not artifacts of observer variability, a broader conclusion can be drawn—that changes in methodology affect trend results and their interpretation, even when data sets remain the same.

Exploring three factors that potentially limit populations of neotropical migratory birds, i.e., insufficient breeding habitat, poor reproductive success, or insufficient migration or wintering habitat, Margaret Brittingham and Stanley

Temple concluded that some migratory bird species were historically limited by extensive losses of breeding habitat and low reproductive output, and life history factors must be integrated into our interpretations of population changes. Zeroing in on factors limiting populations on the breeding grounds, Jeffrey Brawn and Scott Robinson made an effort to link reproductive success to short-term trends in local abundances in forested tracts of Illinois. Population changes varied substantially between two regions, despite high levels of predation and cowbird parasitism in both areas, indicating that variation in local abundances and success can be highly uncoupled. In contrast, Thomas Sherry and Richard Holmes discussed how ecological conditions on the wintering grounds in Jamaica limit populations of American Redstarts (*Setophaga ruticilla*). They found that redstarts compete intraspecifically for preferred habitat via a social dominance mechanism, and that there may be fitness consequences linked to this behavior. They concluded that regional populations are limited and potentially regulated by density-dependent habitat-use patterns. This kind of information is needed to fully assess whether habitats and conditions on the wintering grounds are more or less important in limiting migrant populations than are those on the breeding grounds. If environmental conditions limit populations in one of these areas, say, breeding grounds, then conservation focused on the other area may not result in population increases.

One of the more original papers, presented by Curt Flathers, dealt with regional-scale relationships among landscape structure, avian abundance, and life history categories. Landscape structure based on digital land use and land cover data was quantified within circular scenes centered on avian survey routes in the eastern United States. Results showed that permanent residents, temperate migrants, and cavity nesters were relatively insensitive to landscape structure, while neotropical migrants and open-cup nesters

were most sensitive to forest patch characteristics. Thus, conservation strategies will need to account for inherent life history variation among land use patterns and landscapes. In a paper that focused on fragmentation patterns at the continental scale, Maurer and Villard pointed out that different measures of range fragmentation can affect interpretations of BBS results.

The Proceedings of this symposium should help to develop clearer approaches to the research and conservation of neotropical migratory birds by drawing attention to current problems of interpretation, methodology, scale, limiting factors, and time of year. Hopefully, we can all learn from the essence of this symposium—that ecological interpretations are not easy to make when the

problems are complex and numerous, and that tolerance for a broad variety of research viewpoints and studies is needed to make progress on complex conservation issues.

*Deborah M. Finch
USDA Forest Service
Rocky Mountain Experiment Station
2205 Columbia, SE
Albuquerque, NM 87106*