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MAPS Data Validate Unique Approach to Delineating Bird Populations

The term “population” is widely used in ecology and is the basis for a considerable body of scientific studies and a multitude of conservation and management decisions. The concept is important because different wildlife populations may face different population or habitat pressures. Being able to distinguish distinct populations can have significant implications for how conservation is carried out in the field, and may help managers spend conservation dollars more efficiently. Yet, this term is surprisingly imprecise, perhaps especially among birds, which have more mobility than other taxa and can migrate great distances.

In a [recently published paper](#) in *The Journal of Applied Ecology*, Lead author Clark Rushing and others, including IBP scientist James Saracco, presented a novel approach for using large-scale, citizen-science monitoring data, including the [Monitoring Avian Productivity and Survivorship \(MAPS\) Program](#) and the North American Breeding Bird Survey, to identify distinct natural populations, their trend, and abundance.

The eight species studied included eastern populations of Wood Thrush, Eastern Wood-Pewee, Kentucky Warbler, and Eastern Towhee; and western populations of Hermit Warbler, Western Wood-Pewee, Chestnut-backed Chickadee, and Black-throated Gray Warbler.

Defining a population

A much-used definition of a population is a group of individuals of the same species inhabiting the same area. Yet the term “the same area” is ambiguous and presents difficulties in interpretation.

Ecologists have long recognized that the factors shaping the distribution and abundance of species operate on at least two spatial scales. At the local scale, immigration and emigration are the primary drivers of population dynamics, making local populations vulnerable to extinction or



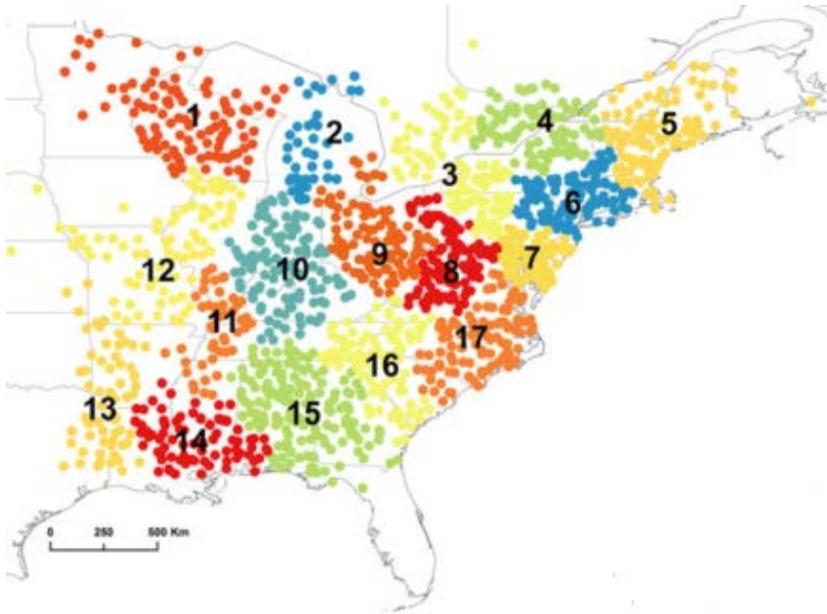
Kentucky Warbler, one of eight species analyzed in the new paper by Rushing et al.

recolonization in the short term. At larger spatial scales, however, immigration and emigration simply reshuffle individuals among local populations and do not contribute to changes in the overall number of individuals over time. The concept of “natural populations,” which are biologically based alternatives to traditional geographically defined units, has been around for decades; yet, this concept has seen little practical application by ecologists.

A unique analytical approach to defining populations

In their paper, the authors developed an approach that uses count data from the North American Breeding Bird Survey to delineate natural populations. Their approach takes route-level estimates of trend and abundance to group sites based on shared demographic attributes and geographic proximity.

To determine whether that approach identified distinct populations, the authors used data from IBP’s MAPS Program set to test whether the trend or abundance differences among populations of three species were associated with differences in adult apparent survival and/or productivity. Productivity showed distinct differences among populations and was correlated with population trends. In contrast, survival did not



Geographic structure of the 17 populations of Wood Thrush identified by clustering routes based on trend, abundance and spatial proximity. Each point shows the location of Breeding Bird Survey routes that detected this species between 2000 and 2013.

show such differences among populations, as might be expected if populations are mixing across different geographic areas during the non-breeding season.

Overall, the approach demonstrated in the paper advances the natural population concept and provides a framework for understanding large-scale population processes and for conducting more efficient and effective conservation.