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December 4, 2009	John Wiens	(707) 781-2555 x319	jwiens@prbo.org

www.prbo.org

A 20-year retrospective on habitat relations of shrubsteppe birds

The belief that species' distributions are closely linked with habitat underlies bird conservation and management. It follows that statistical models relating habitat features to the occurrence of species can be used to frame habitat management practices. The underlying assumption is that such models can accurately predict the occurrence or abundance of a species. This assumption has rarely been tested.

From 1977 to 1983, we conducted studies of breeding birds in the sagebrush shrubsteppe of the northern Great Basin. We recorded the abundance of 14 species at 13 sites. We used statistical models to relate the distribution and abundance of each species to some 30 habitat variables. By conventional statistical criteria, the models for all 14 species were quite good; the habitat variables explained 45% to more than 95% of the among-site and among-year variation in species abundance. Habitat management practices have been adopted based on much poorer models.

In a paper published in *The Condor* in 2009, we report the results of resurveying birds and habitats at these same sites in 1997, 20 years after the initial surveys. The same observers (now 20 years older!) conducted the surveys, using the same methods at the same sites. Although shrub and grass coverage had increased slightly, most habitat features did not differ between the study periods. Only one of the bird species exhibited a significant regional change in abundance.

When we used the bird-habitat models derived from the 1977-1983 surveys to predict bird abundances at the study sites based on the 1997 habitat conditions, we found that the models performed poorly. Despite their earlier success, the same habitat models only explained a significant amount of variation in distribution and abundance for 1 or 2 of the 14 bird species.

The failure of such "good" models to make accurate predictions is disturbing, for it challenges how well we really understand bird-habitat relationships and, more importantly, the wisdom of basing habitat-management practices on such models. This is not simply an academic issue. Next to grassland birds, shrubsteppe birds have undergone the greatest reductions in distribution and abundance nationally over the past several decades. Climate change may only add to these changes. Conserving these species requires an understanding of what makes good habitat. Our retrospective analysis suggests that our understanding may not be as good as we think.

Main Points

- Models using information on habitat from 13 sites over 6 years explained much of the variation in abundance of 14 shrubsteppe breeding bird species.
- Although the habitat in these sites changed only slightly over the following 15-20 years, the models failed to predict abundances of the species at the later time.
- These results raise concerns about the use of untested bird-habitat models in implementing habitat management for conservation.

Paper citation
Rotenberry, J.T., and J.A. Wiens. 2009. Habitat relations of shrubsteppe birds: A 20-year retrospective. Condor 111: 401-413.