

Knick, S.T., D.S. Dobkin, J.T. Rotenberry, M.A. Schroeder, W.M. Vander Haegen, and C. van Riper. 2003. Teetering on the edge or too late? Conservation and research issues for avifauna of sagebrush habitats. *Condor* 105:611-634.

Degradation, fragmentation, and loss of native sagebrush (*Artemisia* spp.) landscapes have imperiled these habitats and their associated avifauna. Historically, this vast piece of the Western landscape has been undervalued: even though more than 70% of all remaining sagebrush habitat in the United States is publicly owned, 3% of it is protected as federal reserves or national parks. We review the threats facing birds in sagebrush habitats to emphasize the urgency for conservation and research actions, and synthesize existing information that forms the foundation for recommended research directions. Management and conservation of birds in sagebrush habitats will require more research into four major topics: (1) identification of primary land-use practices and their influence on sagebrush habitats and birds, (2) better understanding of bird responses to habitat components and disturbance processes of sagebrush ecosystems, (3) improved hierarchical designs for surveying and monitoring programs, and (4) linking bird movements and population changes during migration and wintering periods to dynamics on the sagebrush breeding grounds. This research is essential because we already have seen that sagebrush habitats can be altered by land use, spread of invasive plants, and disrupted disturbance regimes beyond a threshold at which natural recovery is unlikely. Research on these issues should be instituted on lands managed by state or federal agencies because most lands still dominated by sagebrush are owned publicly. In addition to the challenge of understanding shrub steppe bird-habitat dynamics, conservation of sagebrush landscapes depends on our ability to recognize and communicate their intrinsic value and on our resolve to conserve them.