Managing Landscape Linkages to Conserve Desert Wildlife During an Era of Climate Change

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Maintaining landscape linkages has become a principle tool for mitigating the adverse effects of habitat fragmentation on biodiversity, and connectivity conservation is increasingly being cited as a means for mitigating effects of climate change on wildlife. However, while the benefits of habitat linkages for facilitating range shifts or other forms of ecological migration may seem obvious, huge uncertainties remain about just how climate change will affect ecological processes and species, what our biological priorities ought to be in an era of climate change, and how desert landscapes can best be managed to accommodate these priorities. Landscape connectivity will be a necessary but not sufficient condition for conserving biological diversity and wildlife populations during climate change. Ecological migration will occur at different rates, and in different patterns, for different organisms, so we should anticipate managing for different mixes of species over time, with unknown consequences. Accommodating the greatest array of ecological shifts will require maintaining the widest possible range of ecological gradients--including elevational, latitudinal, hydrological, and geological gradients--within large, contiguous wildlands having minimal impediments to species' movement. The highly collaborative, multi-species modeling approach to linkage planning pioneered by South Coast Wildlands in California is one useful approach for identifying priority areas for linkage conservation and determining how to manage them for various species. However, setting management priorities for desert ecosystems during climate change will require application of additional methods, including landscape change modeling, population modeling, genetic analyses, life-history research, proactive monitoring, and of course adaptive management. There is a large and growing management toolbox to assist with the effort--from building highway crossing structures to translocating populations to controlling invasive exotic species. However, determining which tools will be both ecologically effective and cost effective will require a careful examination of our conservation priorities, predictive modeling, and cost-benefit analyses for different courses of action. We cannot anticipate or counter all changes likely to occur during this great experiment, and we need to pick our battles.

Dr. Spencer is a wildlife conservation biologist with the nonprofit Conservation Biology Institute and serves as a science adviser for the South Coast Wildlands Missing Linkages project. He specializes in the pragmatic application of science to improve ecosystem health, design and manage nature reserves, and recover endangered species. He has helped create regional conservation plans throughout California and performs recovery research for rare mammal species, including various forest carnivores and desert rodents.