The Cactus Ferruginous Pygmy-owl—
A Prime Candidate for Climate Adaptation

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Vast portions of southwestern North America are experiencing pervasive drought, but there is little known about how these events are affecting wildlife populations. A recent study published in the *Journal of Climate* predicts a 30 to 50 percent chance of a devastating "megadrought" in southeast Arizona in the coming century, which is among the highest levels of risk across Southwestern North America.[1] Megadroughts can persist for several decades and bring extreme temperatures that further desiccate already parched landscapes. This prediction is particularly troublesome because drought conditions have persisted in southern Arizona for much of the last 15 years. Lead author of the study Toby Ault of Cornell University also warns, "As we add greenhouse gases into the atmosphere—and we haven't put the brakes on stopping this—we are weighting the dice for megadrought conditions."[2]

Monitoring sensitive wildlife species across time is useful for understanding the potential impacts of changing rainfall and temperature on populations and for triggering management responses to observed declines. In the Sonoran Desert, ongoing monitoring of imperiled Cactus Ferruginous Pygmy-Owl populations in northwest Mexico provides us with just such a case study.

Since 2000, Dr. Aaron Flesch of the University of Arizona has monitored pygmy-owl populations immediately south of Arizona in Sonora, Mexico, partly supported by Tucson Audubon. Based on the first 12 years of monitoring, Flesch recently reported in the journal *Biological Conservation* that populations have declined by an estimated 19–27 percent. Moreover, results suggest recent drought and high temperatures are driving declines of pygmy-owl populations in Mexico, which has major implications for recovery of populations in Arizona that have already declined to endangered levels.[1]

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Additional research by Flesch, that will be published in the journal *PLoS ONE* later this year, suggests low rainfall drives reductions in owl prey (mainly lizards) and high temperatures drive reductions in prey activity, which have multiplicative effects on reproductive output and thus affects population dynamics.

How can managers help prevent further declines of pygmy-owl populations in the face of warming and drying conditions and thus adapt to climate change? To address these questions, Flesch[2] found that "owl abundance was higher and varied less over time in areas with more nest cavities, greater structural complexity and amount of riparian vegetation, and lower land-use intensity, which suggests these factors are important drivers of habitat quality and good targets for managers. Thus, augmenting nest cavities by erecting nest boxes or translocating saguaros, restoring mesquite woodlands in riparian areas that have already been lost or degraded across much of the Sonoran Desert, and mitigating the effects of land use on important resources should augment habitat quality and recovery prospects for owls . . . Enhancing habitat quality offers a promising potential strategy for mitigating the effects of climate change. Understanding the extent to which habitat quality can mediate weather effects is important in the wake of anticipated climate change."

Restoring and enhancing habitat for pygmy-owls is one approach to facilitate climate change adaptation. Best management practices based on the best available scientific information should guide adaptation strategies to conserve populations and reduce extinction risks for pygmy-owls and other sensitive species as they attempt to acclimate to a warming world.

1. Ault et al. 2014. See: http://journals.ametsoc.org/doi/abs/10.1175/JCLI-D-12-00282.1. Cornell University, Media Relations Office. *Southwest May Face Megadrought this Century*. Online at: http://mediarelations.cornell.edu/2014/08/27/southwest-may-face-megadrought-this-century/

2. Flesch, A. 2014. *Spatiotemporal trends and drivers of population dynamics in a declining Sonoran Desert predator*. Biological Conservation. El Sevier. Volume 175, July 2014, Pages 110–118. Online at: http://www.sciencedirect.com/science/article/pii/S0006320714001724

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