

DEMOGRAPHY OF SONORAN DESERT TORTOISES

Erin R. Zylstra , Steven P. Campbell, Catherine R. Darst, Roy C. Averill-Murray, and Robert J. Steidl 

Study Description

Demographic processes that govern dynamics of animal populations often vary spatially, but few population viability analyses account explicitly for that variation. To address this issue, we developed a model that produces spatially explicit estimates of demographic rates and population viability by incorporating spatial autocorrelation into analyses of local demographic information. We applied the model to demographic data collected across the geographic range of the Sonoran desert tortoise (*Gopherus morafkai*) in Arizona. Estimated rates of population change, λ , were near one, but varied regionally because of variation in adult and juvenile survival and the rate at which juveniles transitioned to adults.



Photo 1. Sonoran desert scrub in southern Arizona. Tortoises inhabit a range of environments in this region, but are most common on steep, rocky hillsides with abundant cactus, shrubs, and small trees. Note the tortoise perched on the rock ledge to the middle left of the photograph's center. Photo credit: Erin R. Zylstra.



Photo 2. Adult Sonoran desert tortoise. This long-lived species faces an array of threats, including habitat loss, introductions of nonnative species, and climate change. Photo credit: Erin R. Zylstra.



Photo 3. Sonoran desert tortoise under rocks. Our analyses of 22 years (1987–2008) of capture–recapture data to estimate survival and transition rates accounted for imperfect detection because tortoises, like other cryptic species, are easily overlooked during surveys, even by experienced observers. Photo credit: Erin R. Zylstra.



Photo 4. Juvenile Sonoran desert tortoise. Although important to population viability, data available to characterize reproductive rates and other early life stages were sparse. Photo credit: Erin R. Zylstra.

These photographs illustrate the article “A spatially explicit hierarchical model to characterize population viability” by S. P. Campbell, E. R. Zylstra, C. R. Darst, R. C. Averill-Murray, and R. J. Steidl, published in *Ecological Applications*. <https://doi.org/10.1002/eap.1794>