



Effects of Buffelgrass on Sonoran Desert Tortoises

Introduction

Invasions by nonnative species threaten biodiversity worldwide and can alter the structure and process of sensitive ecosystems. Buffelgrass (*Pennisetum ciliare*), a perennial bunchgrass native to northern Africa and Asia, was introduced to the southwestern U.S. in the 1930s and has invaded southwestern deserts. It creates a dense grass layer where the ground cover was historically sparse. Buffelgrass can exclude native plants and eliminate species that provide food and cover for native herbivores (animals that eat only plants). In addition, areas invaded by buffelgrass have much higher biomass than native deserts, which increases the frequency and intensity of fires.

Sonoran desert tortoises (*Gopherus morafkai*) occur throughout southern Arizona and northern Mexico, a region where the distribution of buffelgrass has increased markedly in recent years. The changes in vegetation in areas invaded by buffelgrass have the potential to affect tortoises because buffelgrass reduces the distribution and abundance of their native plant food and increases mortality rates by supporting fires.

Study Methods

University of Arizona researchers studied the effects of buffelgrass on tortoises in both districts of Saguaro National Park in 2010 and 2011. They surveyed tortoises and vegetation on 50 plots established in areas with varying degrees of buffelgrass cover (0-25%). They surveyed tortoises on each plot four times between early July and October, estimated density of tortoises on each plot, and measured the physical condition of each tortoise.

Results

Researchers detected tortoises on 45 of 50 plots (90%) and one or more tortoises during 114 of 200 surveys (57%). They detected an average of 3.6 tortoises per



Sonoran desert tortoise browsing a small buffelgrass plant.

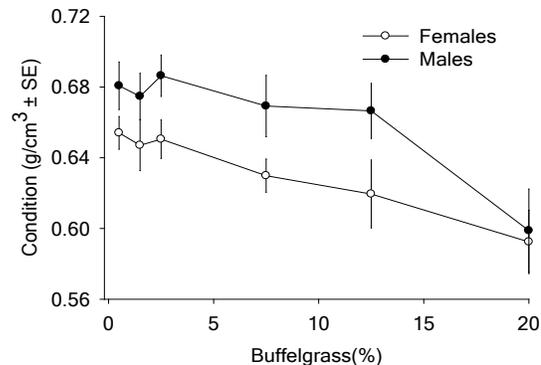


Figure 1. Average condition of adult tortoises across a gradient of buffelgrass cover

plot, with a range of 0-12 tortoises per plot. In total, they located 155 individual tortoises, of which 131 were adults (62 females, 69 males) and 24 were juveniles.

The density of tortoises averaged 0.33 tortoises per hectare (1 hectare = 2.47 acres) and did not vary with the amount of buffelgrass cover. The physical condition of tortoises, however, decreased as the cover of buffelgrass increased (Fig. 1). Their condition averaged 10% lower in areas with >15% cover of buffelgrass compared to areas with no buffelgrass. Decreases in body condition could be a result of reductions in the quantity of plants that are available for tortoises' consumption, which were found to be reduced in areas invaded by buffelgrass. Continued declines in condition of tortoises could compromise their immune systems, lower reproduction, lower growth rates, and ultimately increase mortality. Because tortoises are long-lived and tend to stay in the same area for most of their lives, changes in plant community composition in response to buffelgrass invasion are unlikely to cause mortality or to cause them to move, which could explain why density of tortoises did not vary across the gradient of buffelgrass cover.

Conclusion

If tortoises persist in areas invaded by buffelgrass, they likely will be exposed to more frequent wildfires causing high mortality. Up to 11% of a tortoise population was thought to have perished from the 1994 Mother's Day fire. Wildfires will also enhance the spread of buffelgrass, as it thrives in post-fire conditions whereas native Sonoran Desert vegetation does not.

More Information

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