

Impacts of the saltcedar leaf beetle on saltcedar (*Tamarix* spp.) water use in central Nevada

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Abstract:

In this study we document the impacts of the saltcedar leaf beetle (*Diorhabda elongata*) on the water use of saltcedar trees (*Tamarix* spp.) at two field sites in central western Nevada. *Diorhabda elongata* is the first approved biological control agent for saltcedar in the U.S.A. Within 3 years from release beetles defoliated most to all of the trees at each field site and had spread over 25 km.

We used stem sapflow gauges and canopy evapotranspiration towers to measure the impacts of defoliation by *D. elongata* on saltcedar water use. We document that during the first year of defoliation by *D. elongata* transpiration decreased by up to 55% over the course of a season. During the second year the reduction in transpiration was 33%. However, in locations closer to the release site where beetle activity was more intense and little canopy foliage remained, the reductions in water use was over 95%. Across a broader area the impacts of beetles on saltcedar water use are dependent on a variety of factors including the timing and intensity of beetle defoliation and the canopy coverage of trees. In this study the greatest impacts on water use occurred closer to the release site. Beetle impacted trees did not have higher rates of water use per unit leaf area therefore estimates of canopy cover provide useful insights into reductions in water use. Collectively these results indicate that *D. elongata* is effective in reducing saltcedar water use across a large area. More information is needed to understand how to effectively establish *D. elongata* in other sites throughout the western U.S.A.; and how its impacts will alter long term community dynamics and ecosystem level water use.