

Tamarisk biocontrol using tamarisk beetles: a review and potential consequences for riparian birds in the southwestern United States

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In the southwestern United States, a non-native biocontrol agent (tamarisk beetles, *Diorhabda* spp.) has been introduced to eradicate non-native tamarisk (*Tamarix* spp.), a tree species complex that has become a dominant component of southwestern riparian woodlands. Tamarisk beetles have the potential to spread widely and defoliate large expanses of tamarisk habitat, but the effect of such a widespread loss of riparian vegetation on birds remains unknown. We reviewed literature on the effects of other defoliating insects on birds to investigate the potential for tamarisk beetles to positively or negatively affect birds by changing food abundance and vegetation structure. We then combined data on the temporal patterns of tamarisk defoliation by beetles with nest productivity of a well studied riparian obligate (the Southwestern Willow Flycatcher; *Empidonax traillii extimus*) to simulate the potential demographic consequences of beetle defoliation on breeding riparian birds in both the short- and long-term. Our results highlight that the effects of tamarisk biocontrol will likely vary among bird species and populations depending upon their sensitivity to seasonal defoliation by beetles and net loss of riparian habitat due to tamarisk mortality. Species with restricted distributions that include areas dominated by tamarisk may be negatively affected both in the short- and long-term. The rate of regeneration and/or restoration of native cottonwoods (*Populus* spp.) and willows (*Salix* spp.) relative to the rate of tamarisk loss due to beetles will be critical in determining the long-term effect of this large-scale ecological experiment.