ECOLOGY AND MANAGEMENT OF TAMARISK IN THE SOUTHWEST AND ON THE UPPER VERDE RIVER, ARIZONA

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A Thesis

Submitted in Partial Fulfillment

of the Requirements for the Degree of

Master of Science

in Forestry

Northern Arizona University

December 2008

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ABSTRACT

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Many arid-land riparian areas around the world have been invaded by tamarisk (*Tamarix* (L.) spp.). Tamarisk invasion into riparian areas of the southwestern United States has spurred many research projects with the intention of understanding the mechanisms of invasion and causes of environmental degradation associated with that invasion. My review of the literature views the invasion of tamarisk through a newly introduced framework which helps decipher cause and effect with regard to exotic plant invasion and associated environmental degradation. One view of environmental degradation associated with exotic plant invasion is that the invasion caused the degradation (the "driver"); another view is that degradation preceded and set the stage for the invasion (the "passenger"). Viewed in this light, tamarisk invasion and environmental degradation can be seen primarily as a consequence of human alteration of natural processes of riparian systems, and secondarily as a function of its inherent adaptations for degraded sites. The upper Verde River in central Arizona is a largely free-flowing river that is not yet completely invaded by tamarisk. Rather, tamarisk is a minor ecosystem component, accounting for 8% of woody plant stems found within five meters of the active channel from 1997-2007. To understand the influence of vegetative characteristics on establishment of tamarisk on the upper Verde River, herbaceous and woody riparian plant

communities were compared between areas where tamarisk had invaded and areas where it had not. The results of these analyses were surprising in that areas with tamarisk had a healthier overall riparian vegetative community, characterized by greater abundances of hydrophytic native understory plants as well as greater stem densities of native riparian trees, than sites without tamarisk, which were characterized by more mesic and upland plant communities and a high abundance of exotic plants. These results suggest that in the early stages of invasion into free-flowing riparian ecosystems tamarisk establishes most readily on the same microsites that support many native riparian plants. The passenger/driver model of tamarisk invasion suggests that riparian areas with a natural flow regime should be the most resistant to tamarisk invasion. I found support for this idea on the upper Verde River, where a quasi-natural flood regime is associated with low tamarisk density as well as an overall healthy riparian community. The management of tamarisk in riparian areas of the southwestern United States should focus on creating or, in the case of the upper Verde River, maintaining a natural flow regime.