

# Upper Arkansas River Basin High Priority Issue

## Salt Cedar and Other Non-Native Phreatophyte Control

### January 2009

#### Issue

Salt cedar (Tamarisk), Russian olive and other invasive high water consuming vegetation are choking out native riparian habitat along the upper Arkansas River and other western streams in Kansas.

#### Description

Riparian lands in Kansas have been seriously impacted by the infestation of non-native phreatophytes. Of greatest concern are the effects tamarisk and Russian olive have on our native riparian ecosystems.<sup>(4, 5)</sup> Tamarisk is a tenacious shrub/small tree that has a deep root system (up to 100 feet) and leaves a salt residue on the soil surface. Tamarisk, a native of southern Europe and central Asia, is classified as a deciduous shrub that rapidly attains a height of five to twenty feet and grows best in sandy soils along streams. Tamarisk was brought to the United States for ornamental purposes and most likely was first established in Kansas in the early 1900s when it was planted in windbreaks. It has been widely used for bank stabilization and windbreaks since it is well suited for the western United States. There are many different species of tamarisk that are referred to with different common names. These problematic and invasive tamarisk species are commonly referred to as salt cedar.

Tamarisk can adapt to poor subsurface water quality. Tamarisk utilizes salt to increase the osmotic potential of its deep, extensive root system, which allows it to draw water from greater depths than the native vegetation. Therefore, tamarisk tends to out-compete native obligate phreatophytes during drought periods. The salt is excreted by the leaves and is concentrated in the leaf litter, thus impeding the growth of native species where tamarisk has gained a foothold. Tamarisk uses significant quantities of water. Actual water use by tamarisk depends on several factors, water availability, climate, water quality, population density, stresses, etc. However, it has been found that tamarisk will consume more water than some native vegetation in the same setting.<sup>(1, 2)</sup>

Russian olive, a different type of invasive phreatophyte shrub or small tree, was introduced in Kansas for windbreaks and wildlife plantings. The Russian olive, with its tendency to spread quickly, is a menace to riparian woodlands, threatening hardy native Kansas species like cottonwood and willow trees. Russian olive outcompetes native vegetation, interferes with natural plant succession and nutrient cycling, and chokes irrigation canals in Kansas.



Tamarisk flowers. Photo courtesy Kansas Water Office

The resulting invasive thickets of tamarisk and Russian olive provide poor habitat for livestock and wildlife, increase fire hazards, decrease water quality and generally use more water than native vegetation. The vegetation does, however, provide shelter protection for livestock. Infestations of phreatophytes in Kansas are roughly estimated to occupy greater than 50,000 acres.

Scientists with the U.S. Department of Agriculture (USDA) have stated that, "*tamarisk infestation has reached epidemic proportions and is one of the greatest disasters to ever befall native riparian areas in western United State*."<sup>(3)</sup> The National Invasive Species Council has identified tamarisk as one of its primary targets for control.

Tamarisk affects the water supply in both quantity and quality. The decrease in alluvial ground water levels due to tamarisk increases the transit loss of water delivered from John Martin Reservoir in the Arkansas River. Tamarisk affects water quality by reducing in-stream flows and the concentration of naturally occurring salts in tamarisk stands.

Thick tamarisk stands promote narrowing of river and stream channels. The U. S. Army Corps of Engineers have studied the Upper Arkansas River channel capacity and documented that tamarisk is occupying space within the channel and flood zone, thus increasing the potential risk of flood damage.<sup>(7, 8)</sup> Since tamarisk replaces native species, there is a loss of biodiversity in the infested areas. Wildfires are more intense in tamarisk infested areas, however, due to the nature of the tamarisk root crown, it recovers from fires quicker than native vegetation. Thus, fires tend to promote additional

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infestation. Tamarisk infestation is problematic in Kansas because it negatively impacts water quantity and quality, results in the loss of land utilization options and value, as well as a loss of wildlife habitat.

Estimates of the number of acres infested in the United States are between one and two million acres. Tamarisk has been identified in nearly every county in Kansas, but is concentrated along streams and lakes in the western portion of the state. Tamarisk is prevalent along the mainstem and tributaries to the Arkansas and Cimarron rivers, as well as the shorelines of several of the state's federal reservoirs.

Helicopter surveys of the Upper Arkansas River were conducted in 2004 and 2005 by the Kansas Department of Agriculture. Estimates from these surveys indicate that more than 15,000 acres of the riparian corridor from the Colorado-Kansas state line east to the Rice County line along the Arkansas River are infested with tamarisk (Table 1). According to a statewide county survey, more than 50,000 acres of the land surveyed in Kansas are infested with tamarisk.

**Table 1**

<b>County</b>	<b>Total Acres Tamarisk</b>
Hamilton	5,606
Kearny	3,644
Finney	2,078
Gray	960
Ford	1,798
Edwards	989
Pawnee	492
Barton	58

#### **Recommended Actions**

1. Continue to work with agencies and groups on the water issue strategic plan and 10-Year Strategic Plan to coordinate and implement the variety of programs, research and educational efforts that are occurring or recommended.
2. Cooperate with stakeholders in Colorado to implement tamarisk control projects that cross state lines.

#### **Recommended Actions Continued**

3. Promote education on invasive plants and seek local input through the Basin Advisory Committees.
4. Continue an evaluation of the most effective and cost-efficient control measures for the Upper Arkansas River basin, and provide cost share on tamarisk control and shelter belt replacement.
5. As an effective control measure is identified for the basin, implement a wide-scale, watershed-based control effort, and combine with plans for successful beneficial vegetation that helps stabilize the soil, has potential for windbreaks and other benefits.
6. Research and evaluate biological control of tamarisk using leaf beetles and/or other suitable organisms, but pilot it with extreme caution to avoid unintended consequences.
7. Deliver educational materials and technical information to legislators, property owners and the public within the basin related to non-native phreatophyte research and control through Kansas State University Agricultural Experiment Station and Cooperative Extension Service.
8. Quantify the actual non-beneficial use of water by tamarisk in the basin's different ecological settings. Existing research should be used and augmented with on-the-ground measurements of changes to both streamflow and ground water before and after tamarisk control activities. This research will help to establish the difference in water consumption in Kansas between non-native phreatophytes and typical riparian plant communities.
9. Evaluate the recovery benefits after tamarisk control to provide valuable information on the specie's true impact to water quality, wildlife habitat, water quantity, grazing land, reduction of risk from flood damage and other features that impact the basin's ecology and economy.
10. Determine the potential value of tamarisk biomass for various value-added products such as ethanol, bedding, fiberboard, and fuel pellets, or if not suitable for alternative uses, determine how to dispose of dead plant materials.

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## **Resources**

1. Butler, Jim, Kluitenberg, Gerard, and Whittemore, Don, 2008. *Ground water Assessment in Association with Salt Cedar Control –Report on Phase Two Activities*, Kansas Geological Survey, Open File Report 2008-13.
2. Butler, Jim, Kluitenberg, Gerard, and Whittemore, Don. 2005. *Ground Water Assessment in Association with Salt Cedar Control – Report on Year One Activities*, Kansas Geological Survey Open File Report 2005-19.
3. Colorado Department of Natural Resources. 2004. *10-Year Strategic Plan on the Comprehensive Removal of Tamarisk and the Coordinated Restoration of Colorado's Native Riparian Ecosystem*.
4. Kansas Water Office. 2003. *Kansas Water Plan*, Upper Arkansas Basin Section.
5. Kansas Water Office. 2005. *10-Year Strategic Plan for the Comprehensive Control of Tamarisk and Other Non-Native Phreatophytes*.
6. Tamarisk Coalition. 2005. *Options for Non-Native Phreatophyte Control*.
7. U.S. Army Corps of Engineers. 2000. *Arkansas River Channel Capacity Study, Phase I, Colorado-Kansas Stateline to Great Bend*.
8. U.S. Army Corps of Engineers. 2002. *Arkansas River Channel Capacity Study, Phase II, Colorado-Kansas Stateline to Dodge City*.