Family: *Tamaricaceae*

Taxon: *Tamarix parviflora*

Synonym: *Tamarix tetrandra auct. non Pallas* *Common Name* salt cedar
small flower tamarisk

Questionaire : current 20090513 **Assessor:** Chuck Chimera **Designation:** H(HPWRA)
Status: Assessor Approved **Data Entry Person:** Chuck Chimera **WRA Score** 8

101	**Is the species highly domesticated?**	**y=-3, n=0**	**n**
102	**Has the species become naturalized where grown?**	**y=1, n=-1**	
103	**Does the species have weedy races?**	**y=1, n=-1**	
201	**Species suited to tropical or subtropical climate(s) - If island is primarily wet habitat, then substitute "wet tropical" for "tropical or subtropical"**	**(0-low; 1-intermediate; 2-high) (See Appendix 2)**	**Low**
202	**Quality of climate match data**	**(0-low; 1-intermediate; 2-high) (See Appendix 2)**	**High**
203	**Broad climate suitability (environmental versatility)**	**y=1, n=0**	**y**
204	**Native or naturalized in regions with tropical or subtropical climates**	**y=1, n=0**	**n**
205	**Does the species have a history of repeated introductions outside its natural range?**	**y=-2, ?=-1, n=0**	**y**
301	**Naturalized beyond native range**	**y = 1*multiplier (see Appendix 2), n= question 205**	**y**
302	**Garden/amenity/disturbance weed**	**n=0, y = 1*multiplier (see Appendix 2)**	
303	**Agricultural/forestry/horticultural weed**	**n=0, y = 2*multiplier (see Appendix 2)**	**n**
304	**Environmental weed**	**n=0, y = 2*multiplier (see Appendix 2)**	**y**
305	**Congeneric weed**	**n=0, y = 1*multiplier (see Appendix 2)**	**y**
401	**Produces spines, thorns or burrs**	**y=1, n=0**	**n**
402	**Allelopathic**	**y=1, n=0**	**n**
403	**Parasitic**	**y=1, n=0**	**n**
404	**Unpalatable to grazing animals**	**y=1, n=-1**	**n**
405	**Toxic to animals**	**y=1, n=0**	**n**
406	**Host for recognized pests and pathogens**	**y=1, n=0**	**n**
407	**Causes allergies or is otherwise toxic to humans**	**y=1, n=0**	**n**
408	**Creates a fire hazard in natural ecosystems**	**y=1, n=0**	
409	**Is a shade tolerant plant at some stage of its life cycle**	**y=1, n=0**	**n**
410	**Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)**	**y=1, n=0**	**y**
411	**Climbing or smothering growth habit**	**y=1, n=0**	**n**

412	**Forms dense thickets**	**y=1, n=0**	**y**
501	**Aquatic**	**y=5, n=0**	**n**
502	**Grass**	**y=1, n=0**	**n**
503	**Nitrogen fixing woody plant**	**y=1, n=0**	**n**
504	**Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)**	**y=1, n=0**	**n**
601	**Evidence of substantial reproductive failure in native habitat**	**y=1, n=0**	**n**
602	**Produces viable seed**	**y=1, n=-1**	**y**
603	**Hybridizes naturally**	**y=1, n=-1**	**y**
604	**Self-compatible or apomictic**	**y=1, n=-1**	
605	**Requires specialist pollinators**	**y=-1, n=0**	**n**
606	**Reproduction by vegetative fragmentation**	**y=1, n=-1**	**y**
607	**Minimum generative time (years)**	**1 year = 1, 2 or 3 years = 0, 4+ years = -1**	**1**
701	**Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)**	**y=1, n=-1**	
702	**Propagules dispersed intentionally by people**	**y=1, n=-1**	**y**
703	**Propagules likely to disperse as a produce contaminant**	**y=1, n=-1**	**n**
704	**Propagules adapted to wind dispersal**	**y=1, n=-1**	**y**
705	**Propagules water dispersed**	**y=1, n=-1**	**y**
706	**Propagules bird dispersed**	**y=1, n=-1**	**n**
707	**Propagules dispersed by other animals (externally)**	**y=1, n=-1**	**n**
708	**Propagules survive passage through the gut**	**y=1, n=-1**	
801	**Prolific seed production (>1000/m2)**	**y=1, n=-1**	**y**
802	**Evidence that a persistent propagule bank is formed (>1 yr)**	**y=1, n=-1**	**n**
803	**Well controlled by herbicides**	**y=-1, n=1**	**y**
804	**Tolerates, or benefits from, mutilation, cultivation, or fire**	**y=1, n=-1**	**y**
805	**Effective natural enemies present locally (e.g. introduced biocontrol agents)**	**y=-1, n=1**	

Designation: H(HPWRA) **WRA Score** **8**

Supporting Data:

101	1998. Di Tomaso, J.M.. Impact, Biology, and Ecology of Saltcedar (Tamarix spp.) in the Southwestern United States. Weed Technology. 12(2): 326-336.	No evidence
102	2011. WRA Specialist. Personal Communication.	NA
103	2011. WRA Specialist. Personal Communication.	NA
201	2011. USDA, ARS, National Genetic Resources Program. Tamarix parviflora - - Germplasm Resources Information Network - (GRIN) [Online Database]. National Germplasm Resources Laboratory, Beltsville, Maryland. http://www.ars-grin.gov/cgi-bin/npgs/html/taxon.	"Native: Asia-Temperate, Western Asia: Israel; Turkey; Europe, Southeastern Europe: Albania; Croatia; Greece [incl. Crete]; Macedonia; Slovenia"
202	2011. USDA, ARS, National Genetic Resources Program. Tamarix parviflora - - Germplasm Resources Information Network - (GRIN) [Online Database]. National Germplasm Resources Laboratory, Beltsville, Maryland. http://www.ars-grin.gov/cgi-bin/npgs/html/taxon.	"Native: Asia-Temperate, Western Asia: Israel; Turkey; Europe, Southeastern Europe: Albania; Croatia; Greece [incl. Crete]; Macedonia; Slovenia"
203	1998. Di Tomaso, J.M.. Impact, Biology, and Ecology of Saltcedar (Tamarix spp.) in the Southwestern United States. Weed Technology. 12(2): 326-336.	"Saltcedar grows at elevations no greater than 2,100 m and prefers very saline soils." [elevation range >1000 m; environmental versatility]
203	2003. Zouhar, K.. Tamarix spp. Fire Effects Information System, [Online] U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory. http://www.fs.fed.us/database/feis/	"Elevation: Tamarisk can grow from below sea level to more than 6,600 feet (2,000 m) elevation [115,235,239]. In Death Valley National Monument saltcedar is a potential invader of all streams, ponds, marshes and wet ground below 5,200 feet (1,585 m) [153]. In New Mexico saltcedar is found along water courses 3,000-6,500 feet (915-1,980 m) [160]. In Arizona, tamarisk is abundant along streams in most of the state below 5,000 feet (1,525 m) [139], and, while it grows in the Southwest at elevation up to 11,000 feet (3350 m), it does not spread rapidly above 4,000 feet (1220 m) [226]. In California, small-flowered tamarisk is common in washes, slopes, sand dunes and roadsides <2,600 feet (<800 m) [111], and in Utah, small-flowered tamarisk is found along seeps and streams at 2,800 to 5,600 feet (850-1,710 m) [259]."
204	2003. Zouhar, K.. Tamarix spp. Fire Effects Information System, [Online] U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory. http://www.fs.fed.us/database/feis/	No evidence
205	2003. Zouhar, K.. Tamarix spp. Fire Effects Information System, [Online] U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory. http://www.fs.fed.us/database/feis/	"Small-flowered tamarisk originates in southern Europe and Asia Minor from Yugoslavia to Turkey [21,171]. Small-flowered tamarisk is now common in California and Arizona, and occurs sporadically in Nevada, Utah, Colorado, Missouri, North Carolina, British Columbia, Ontario, and Nova Scotia [20]. Small-flowered tamarisk is rarely encountered in New Mexico. It is of limited occurrence in the Albuquerque and Las Cruces areas, mostly in ornamental situations, and while it may escape, it is hardly invasive [3,20]. Small-flowered tamarisk is found on beaches in Florida, but it is rare [263]. It is also found in Massachusetts, Connecticut [202], and Oregon [112,138]. In the Great Plains, small-flowered tamarisk sometimes escapes from cultivation to waste places and along river flood plains. It is widely scattered in Texas, Oklahoma and Kansas [20,103]. Gleason and Cronquist [96] recognize small-flowered tamarisk in the northeastern U.S. where it occasionally escapes cultivation, although it is uncommon in this area."
301	2001. Stuart, J.D./Sawyer, J.O.. Trees and shrubs of California. University of California Press, Berkeley & Los Angeles, CA	"Smallflower tamarisk was introduced from southeastern Europe as an ornamental and for use as a windbreak. It has since become naturalized, and it invades disturbed areas such as roadsides and newly exposed soils, as well as riparian zones."
302	2001. Stuart, J.D./Sawyer, J.O.. Trees and shrubs of California. University of California Press, Berkeley & Los Angeles, CA	"…invades disturbed areas such as roadsides and newly exposed soils, as well as riparian zones." [a disturbance adapted weed with environmental impacts. See 3.04]

302	2003. Halvorson, W.L./Guertin, P.. Factsheet for: Tamarix L. spp.. U.S. Geological Survey / Southwest Biological Science Center, Tucson, Arizona	"Tamarix grows along stream banks, lake and pond margins, canals, ditches, springs, washes, and disturbed and burned sites (Lovich 2000), although disturbance isn't a requirement for it to invade (Stromberg and Chew 2002)."
302	2003. Zouhar, K.. Tamarix spp. Fire Effects Information System, [Online] U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory. http://www.fs.fed.us/database/feis/	"Disturbance: Tamarisk communities are frequently associated with past disturbances and/or changes in historic disturbance regimes. Engineering features on most western rivers for management of water and electric power have resulted in increased evaporation and associated salinity, changes in erosion and sedimentation rates, and other physicochemical changes [135]. In the central Rio Grande Valley, changes in both physical environment and native vegetation were well underway by the time tamarisk became widespread. Tamarisk occupied land made available by agricultural and urban development and by upstream water development."
303	2011. WRA Specialist. Personal Communication.	An environmental weed. See 3.04
304	1998. Di Tomaso, J.M.. Impact, Biology, and Ecology of Saltcedar (Tamarix spp.) in the Southwestern United States. Weed Technology. 12(2): 326-336.	"Abstract: Eight species of Tamarix were first brought to North America in the 1800s from southern Europe or the eastern Mediterranean region. Many of the species escaped cultivation and by the 1920s invaded about 4,000 ha of riparian habitat in the southwestern United States. By 1987, it was estimated to have increased to at least 600,000 ha. The success of saltcedar in the southwest can be attributed to several factors related to its growth habit, reproduction, water usage, ability to tolerate highly saline conditions, and redistribution of salt from deep in the soil profile to the soil surface. The flowers produce small, numerous, and tufted seeds that can be carried long distances by wind or water. The seeds, however, have a short period of viability, and must come in contact with suitable moisture within a few weeks of dispersal. Unlike obligate phreatophytes, such as willows and cottonwoods, saltcedar is a facultative phreatophyte and is often able to survive under conditions where groundwater is inaccessible. The high evapotranspiration rates of saltcedar can lower the water table and alter the floristic composition in heavily infested areas. Mature plants are tolerant to a variety of stress conditions, including heat, cold, drought, flooding, and high salinity. Saltcedar is not an obligate halophyte but survives in areas where groundwater concentrations of dissolved solids can average 8,000 ppm or higher. In addition, the leaves of saltcedar excrete salts that are deposited on the soil surface under the plant, inhibiting germination and growth of competing species. Nomenclature: Saltcedar, Tamarix… Water Use. Evapotranspiration rates of saltcedar are among the highest of any phreatophyte evaluated in southwestern North America (Brotherson et al. 1984; van Hylckama 1974), including native riparian trees (Busch and Smith 1995; Neill 1985). Its consumption of water can be so extensive that in heavily infested areas saltcedar can desiccate springs, drain pools, and even dry up perennial streams (Johnson 1987). One large tree can absorb 760 L of water a day. Saltcedar in all the heavily infested areas of the southwest are estimated to consume almost twice as much water per year as the major cities of southern Califomia (Friederici 1995; Johnson 1987)."
304	2001. Stuart, J.D./Sawyer, J.O.. Trees and shrubs of California. University of California Press, Berkeley & Los Angeles, CA	"In riparian zones, as in other habitats, it displaces native plants and transpires prodigious quantities of water, affecting stream flows in desert regions."
304	2003. Halvorson, W.L./Guertin, P.. Factsheet for: Tamarix L. spp.. U.S. Geological Survey / Southwest Biological Science Center, Tucson, Arizona	"Tamarix is a relatively long-lived woody plant that can tolerate a wide range of environmental conditions once established (Carpenter 1998). It produces massive numbers of small seeds, along with the ability to propagate from buried or submerged stems (Carpenter 1998). It can displace native woody species especially when peak water discharge timing and amount have been changed, salinity, temperature, and substrate texture have been altered through human activity (Carpenter 1998)."
305	1998. Di Tomaso, J.M.. Impact, Biology, and Ecology of Saltcedar (Tamarix spp.) in the Southwestern United States. Weed Technology. 12(2): 326-336.	"Of these eight introduced species, five are present in the southwest (DiTomaso 1996). Most species are weedy, particularly T. parviflora DC. # TAAPA, previously known as T. tetrandra Pall., T. ramosissima Ledeb. # TAARA, previously known as T. pentandra Pallas., and T. chinensis Lour. # TAACH. Tamarix chinensis is difficult to distinguish from T. ramosissima and is occasionally thought to be the same species. Tamarix gallica is less widely distributed than other weedy Tamarix species and is also similar to T. ramosissima. One less weedy species is the large evergreen athel tree (T. aphylla)."
401	2001. Stuart, J.D./Sawyer, J.O.. Trees and shrubs of California. University of California Press, Berkeley & Los Angeles, CA	"A shrub or small, multistemmed tree that can form thickets. Plants typically range in height from 1.5 m (5 ft) to 5.5 m (18 ft)…Leaves are deciduous, alternate, simple, awl-like, yellowish green, and from 1.5 mm (0.06 in.) to 3 mm (.12 in.) long; they lack petioles. Leaf tips are sharp pointed and elongated." [no spines, thorns or burrs]

402	1998. Di Tomaso, J.M.. Impact, Biology, and Ecology of Saltcedar (Tamarix spp.) in the Southwestern United States. Weed Technology. 12(2): 326-336.	"Excessive surface deposits of salt can inhibit the germination of other species (Egan et al. 1993), thus restricting competition with other under- or overstory vegetation for space and water (Brotherson and Field 1987). In some communities, saltcedar is the dominant overstory species, whereas salt tolerant grasses, such as saltgrass, dominate the understory (Brotherson and Winkel 1986).
402	2003. Zouhar, K.. Tamarix spp. Fire Effects Information System, [Online] U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory. http://www.fs.fed.us/database/feis/	No evidence
403	2001. Stuart, J.D./Sawyer, J.O.. Trees and shrubs of California. University of California Press, Berkeley & Los Angeles, CA	"A shrub or small, multistemmed tree…" [Tamaricaceae, not parasitic]
404	2003. Zouhar, K.. Tamarix spp. Fire Effects Information System, [Online] U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory. http://www.fs.fed.us/database/feis/	"Cattle may graze large amounts of saltcedar sprout growth. In one study, cattle removed 40% of saltcedar foliage. All plants outside the fence areas were grazed. Within 1 month, new growth was 4 feet (1.2 m) high in the fenced areas, and about 1 foot (0.3 m) high in grazed plots. After the 1st month, utilization was limited to the terminal ends of saltcedar stems, and 2 years later the stand was so dense that cattle would not enter the area [92]...Palatability/nutritional value: The scale like leaves of tamarisk tend to be unpalatable to grazers [218]. The nutritional value of tamarisk is not known, although it is reported to have very low crude protein content [115]."
404	2011. California Invasive Plant Council. Invasive Plants of California's Wildland - Tamarix spp.. http://www.cal-ipc.org/ip/management/ipcw/pages/detailreport.cfm@usernumber=81&surveynumber=182.php	"Grazing: Cattle have been shown to graze significant amounts of sprout growth (Gary 1960)."
405	2003. Zouhar, K.. Tamarix spp. Fire Effects Information System, [Online] U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory. http://www.fs.fed.us/database/feis/	No evidence of toxicity to animals
405	2011. California Invasive Plant Council. Invasive Plants of California's Wildland - Tamarix spp.. http://www.cal-ipc.org/ip/management/ipcw/pages/detailreport.cfm@usernumber=81&surveynumber=182.php	"Grazing: Cattle have been shown to graze significant amounts of sprout growth (Gary 1960)." [no evidence of toxicity to animals]
406	1998. Di Tomaso, J.M.. Impact, Biology, and Ecology of Saltcedar (Tamarix spp.) in the Southwestern United States. Weed Technology. 12(2): 326-336.	No evidence
406	2003. Zouhar, K.. Tamarix spp. Fire Effects Information System, [Online] U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory. http://www.fs.fed.us/database/feis/	"Watts and others [255] provide a list of insects associated with saltcedar in New Mexico. Stevens [220] reports over 200 species of invertebrate herbivores associated with tamarisk in the U.S., only 6 of which are sufficiently common in northern Arizona to qualify as pests of this plant. Insect herbivory does not appear to affect tamarisk growth. Herbivory must exceed 75% of the foliage before reduction of apical growth rate occurs [220]."
407	1998. Di Tomaso, J.M.. Impact, Biology, and Ecology of Saltcedar (Tamarix spp.) in the Southwestern United States. Weed Technology. 12(2): 326-336.	No evidence of toxicity to humans
407	2003. Zouhar, K.. Tamarix spp. Fire Effects Information System, [Online] U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory. http://www.fs.fed.us/database/feis/	No evidence of toxicity to humans
407	2011. Pollen Library. Small-Flower Tamarisk (Tamarix parviflora). SDI Health LLC, http://www.pollenlibrary.com/Specie/Tamarix+parviflora/	"Allergenicity: No allergy has been reported for Small-Flower Tamarisk (Tamarix parviflora) species."

408	2003. Zouhar, K.. Tamarix spp. Fire Effects Information System, [Online] U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory. http://www.fs.fed.us/database/feis/	"Fire regimes: Changes in the nature of disturbance from fire (frequency, intensity, and severity) have been affected both by tamarisk invasion and by other changes in the invaded communities [44]. Fire frequency and fire behavior in tamarisk-invaded communities are thought to be different than in uninvaded communities [42,44,107,231,242]. Additionally, reduced flooding in riparian communities commonly results in excessive accumulations of debris, which in turn increase the frequency, intensity, and severity of fires. This has commonly been blamed on saltcedar, although saltcedar produces no more debris than cottonwood or willow. In the absence of flooding to remove debris, however, accumulation of this material increases to levels that may have a profound effect on the ecology of the system (see Fire Ecology for a discussion of the causes and consequences of fire in these systems) [9]...Fire regimes: Information on fire regimes in which tamarisk evolved is lacking. Busch and Smith [44] cite research that suggests that halophytic tamarisk species increase in abundance in burned areas previously dominated by common reed (Phragmites australis), whereas successional pathways suggested for T. dioica in southwestern Nepal indicate replacement by other taxa after fire [72]...Increases in fire size or frequency have been reported for the lower Colorado and Bill Williams [42], Gila [242], Rio Grande [230,231], and Owens [32] rivers in recent decades [244]. While tamarisk may promote more frequent and severe wildfires in these areas, the role of fire in these ecosystems is still not well understood [80,231]. Fire appears to be less common in riparian ecosystems where tamarisk has not invaded [42,44,107,242]. Increases in fire size and frequency are attributed to a number of factors including an increase in ignition sources, increased fire frequency in surrounding uplands, and increased abundance of fuels...The structure of saltcedar stands may be more conducive to repeated fire [116,185,231] than that of native vegetation. Saltcedar and Russian-olive can contribute to increased vertical canopy density, creating volatile fuel ladders, thereby increasing the likelihood and impacts of wildfire [231]. Tamarisk plants can have many stems and high rates of stem mortality, resulting in a dense accumulation of dead, dry branches. Large quantities of dead branches and leaf litter are caught in tamarisk branches above the ground surface, enhancing the crowns' flammability [43,185,244]. Authors have suggested that fire hazard peaks in tamarisk stands at 10 to 20 years of age [178,244]. Anderson and others [5] observed that 21 of 25 tamarisk stands along the lower Colorado River had burned in the prior 15 years. This implies a disturbance interval that is insufficient for full maturation of cottonwood, willow and mesquite [42], or for tamarisk to mature and senesce." [evidence suggests Tamarix spp. may or may not increase fire hazards in natural ecosystems]
409	2003. Zouhar, K.. Tamarix spp. Fire Effects Information System, [Online] U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory. http://www.fs.fed.us/database/feis/	"Preliminary results and field observations indicate that mature tamarisk is highly susceptible to shading, with shaded plants having greatly altered leaf morphology and reduced reproductive effort [121,220]."
409	2011. Floridata. Tamarix parviflor. http://www.floridata.com/ref/t/tama_par.cfm	"Light: Full sun."
410	1998. Di Tomaso, J.M.. Impact, Biology, and Ecology of Saltcedar (Tamarix spp.) in the Southwestern United States. Weed Technology. 12(2): 326-336.	"...prefers very saline soils. Typically, saltcedar occupies sites with silt loams and silt clay loams high in organic matter…able to accommodate wide variations in soil and mineral gradients, as well as environmental stress conditions (Brotherson and Field 1987). Saltcedar has a slight preference for alkaline conditions (pH 7.5) but is also commonly found in more acidic growing conditions (Brotherson and Winkel 1986)."
410	2003. Zouhar, K.. Tamarix spp. Fire Effects Information System, [Online] U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory. http://www.fs.fed.us/database/feis/	"Soils: Saltcedar is able to tolerate wide variations in soil and mineral types [36]. Saltcedar can survive in salinities exceeding 50,000 ppm [220]. Tamarisk is well adapted to the saline and alkaline soils of the Great Basin [171,249]; the saline meadows around Utah Lake [36]; and the saline soils and open salt flats in the Great Salt Plains in Oklahoma and Kansas [245]."
411	2001. Stuart, J.D./Sawyer, J.O.. Trees and shrubs of California. University of California Press, Berkeley & Los Angeles, CA	"A shrub or small, multistemmed tree…"
412	1997. Georgiadis, T./Dimopoulos, P./Dimitrellos, G.. The Flora and Vegetation of the Acheron Delta (W Greece) Aiming at Nature Conservation. Phyton. 37(1): 31-60.	"Dense bushes of Tamarix parviflora (pure stands), characterized by a poor flora in the openings." [description of a vegetation community in the Acheron Delta (W Greece)]
412	1998. Di Tomaso, J.M.. Impact, Biology, and Ecology of Saltcedar (Tamarix spp.) in the Southwestern United States. Weed Technology. 12(2): 326-336.	"In dense mature stands of saltcedar with little bare ground exposed beneath the shrub canopy, there is little opportunity for regeneration of any species (Horton 1977). In these heavily infested areas, it would be unlikely that native riparian species could reestablish without some form of human intervention."

501	2001. Stuart, J.D./Sawyer, J.O.. Trees and shrubs of California. University of California Press, Berkeley & Los Angeles, CA	"A shrub or small, multistemmed tree…it invades disturbed areas such as roadsides and newly exposed soils, as well as riparian zones." [terrestrial tree]
502	2011. USDA, ARS, National Genetic Resources Program. Tamarix parviflora - - Germplasm Resources Information Network - (GRIN) [Online Database]. National Germplasm Resources Laboratory, Beltsville, Maryland. http://www.ars-grin.gov/cgi-bin/npgs/html/taxon.	Tamaricaceae
503	2011. USDA, ARS, National Genetic Resources Program. Tamarix parviflora - - Germplasm Resources Information Network - (GRIN) [Online Database]. National Germplasm Resources Laboratory, Beltsville, Maryland. http://www.ars-grin.gov/cgi-bin/npgs/html/taxon.	Tamaricaceae [not a nitrogen fixing woody plant]
504	2007. Venturella, G./Baum, B./Mandracchia, G.. The genus Tamarix (Tamaricaceae) in Sicily: first contribution. Flora Mediterranea. 17: 25-46.	"Low tree or shrub, 1-4 m high, with reddish-brown to light purple bark, entirely glabrous." [Tamaricaceae, not a geophyte]
601	1997. Georgiadis, T./Dimopoulos, P./Dimitrellos, G.. The Flora and Vegetation of the Acheron Delta (W Greece) Aiming at Nature Conservation. Phyton. 37(1): 31-60.	No evidence of substantial reproductive failure in native habitat
602	1998. Di Tomaso, J.M.. Impact, Biology, and Ecology of Saltcedar (Tamarix spp.) in the Southwestern United States. Weed Technology. 12(2): 326-336.	"A single large saltcedar plant can produce half a million seeds per year."
603	2002. Gaskin, J.F./Schaal, B.A.. Hybrid Tamarix widespread in U.S. invasion and undetected in native Asian range. Proceedings of the National Academy of Sciences. 19(17): 11256–11259.	"Surprisingly, we found that the most common plant in this U.S. invasion is a hybrid combination of two species specific genotypes that were geographically isolated in their native Eurasian range. Less extensive hybrids exist in the invasion, involving combinations of T. ramosissima and T. chinensis with Tamarix parviflora and Tamarix gallica. The presence of potentially novel hybrids in the U.S. illustrates how importation of exotics can alter population structures of species and contribute to invasions."
604	2002. Gaskin, J.F./Schaal, B.A.. Hybrid Tamarix widespread in U.S. invasion and undetected in native Asian range. Proceedings of the National Academy of Sciences. 19(17): 11256–11259.	"Tamarix is an Old World genus of approximately 54 shrub and tree species, found in salty, dry, or riparian habitats. The plants can outcross, self pollinate, and also propagate clonally from woody fragments (6)."
604	2003. Zouhar, K.. Tamarix spp. Fire Effects Information System, [Online] U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory. http://www.fs.fed.us/database/feis/	"Breeding system: Tamarisk flowers are bisexual [3,171]. It has been stated by some that saltcedar has a self-compatible breeding system [36,201], but preliminary tests suggest this is unlikely [220]."
605	2002. Gaskin, J.F./Schaal, B.A.. Hybrid Tamarix widespread in U.S. invasion and undetected in native Asian range. Proceedings of the National Academy of Sciences. 19(17): 11256–11259.	"The small white to pink clustered flowers are pollinated by numerous species of insects, and possibly by the wind (7), and the small seeds have hairs on one end that enable long-distance wind dispersal."
605	2003. Halvorson, W.L./Guertin, P.. Factsheet for: Tamarix L. spp.. U.S. Geological Survey / Southwest Biological Science Center, Tucson, Arizona	"Flowers produce small quantities of nectar (Stevens 1985 in Zimmerman 1997). Tamarix requires insect pollination to set seed (Hoddenbach 1989 in Tesky 1992b, Stevens 1990 in Carpenter 1998). Fruit capsules ripen and split open from April to October in Arizona (Reynolds and Alexander 1974 in Tesky 1992b)."
605	2003. Zouhar, K.. Tamarix spp. Fire Effects Information System, [Online] U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory. http://www.fs.fed.us/database/feis/	"Pollination: Brotherson and von Winkel [36] suggest that tamarisk is cross-pollinated by wind. However, experiments by Stevens [220] in which tamarisk racemes were bagged to prevent insects from reaching the flowers demonstrated conclusively that virtually no seed development occurred without insect visitation. Wind pollination and selfing are under investigation; however, preliminary tests suggest that wind-pollination is unlikely [220]."
606	1998. Di Tomaso, J.M.. Impact, Biology, and Ecology of Saltcedar (Tamarix spp.) in the Southwestern United States. Weed Technology. 12(2): 326-336.	"...expansion in saltcedar infested areas can be, to some degree, through vegetative growth, as well as seed production."
606	2011. California Invasive Plant Council. Invasive Plants of California's Wildland - Tamarix spp.. http://www.cal-ipc.org/ip/management/ipcw/pages/detailreport.cfm@usernumber=81&surveynumber=182.php	"Saltcedar can reproduce both vegetatively and by seed. Plants can regenerate from cuttings that fall on moist soil."

607	1998. Di Tomaso, J.M.. Impact, Biology, and Ecology of Saltcedar (Tamarix spp.) in the Southwestern United States. Weed Technology. 12(2): 326-336.	"Reproduction. Seedlings mature rapidly and produce small white or pinkish flowers, often by the end of the first year of growth (Neill 1985)."
701	2003. Zouhar, K.. Tamarix spp. Fire Effects Information System, [Online] U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory. http://www.fs.fed.us/database/feis/	"In California, small-flowered tamarisk is common in washes, slopes, sand dunes and roadsides <2,600 feet (<800 m) [111]" [may be inadvertently dispersed by traffic along roadsides, or may be adapted to frequent roadside disturbance]
702	2001. Stuart, J.D./Sawyer, J.O.. Trees and shrubs of California. University of California Press, Berkeley & Los Angeles, CA	"Smallflower tamarisk was introduced from southeastern Europe as an ornamental and for use as a windbreak."
702	2011. Floridata. Tamarix parviflor. http://www.floridata.com/ref/t/tama_par.cfm	"Usage Tamarisks have bright feathery foliage that is very attractive in summer. They make excellent hedges and windbreaks along the seacoast since they are highly tolerant of salt spray and salty soils. They are also useful along sidewalks and roads that get salted frequently to control winter ice. Small flowered tamarisk is a useful hedge inland, too, especially on poor, sandy soils. Use in a mixed shrub border for its interesting texture that is fine in summer and coarser in winter when the leaves have dropped."
703	2003. Zouhar, K.. Tamarix spp. Fire Effects Information System, [Online] U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory. http://www.fs.fed.us/database/feis/	"Seed dispersal: Saltcedar seeds have small hairs on the apex of the seed coat and are readily dispersed by wind (mean fall rate in still air = 0.187 m/sec), and can also be dispersed by water" [no evidence that trees are grown with crops, or that seeds contaminate produce]
704	1998. Di Tomaso, J.M.. Impact, Biology, and Ecology of Saltcedar (Tamarix spp.) in the Southwestern United States. Weed Technology. 12(2): 326-336.	"Seeds are quite small and light (0.1 mg) (Sisneros 1991), and have a tuft of hair on the end to aid in wind dispersal or can be carried and deposited along sandbars and riverbanks by water (Brotherson and Field 1987)."
705	1998. Di Tomaso, J.M.. Impact, Biology, and Ecology of Saltcedar (Tamarix spp.) in the Southwestern United States. Weed Technology. 12(2): 326-336.	"Seeds are quite small and light (0.1 mg) (Sisneros 1991), and have a tuft of hair on the end to aid in wind dispersal or can be carried and deposited along sandbars and riverbanks by water (Brotherson and Field 1987)."
705	2001. Stuart, J.D./Sawyer, J.O.. Trees and shrubs of California. University of California Press, Berkeley & Los Angeles, CA	"In riparian zones, as in other habitats, it displaces native plants and transpires prodigious quantities of water, affecting stream flows in desert regions."
706	1998. Di Tomaso, J.M.. Impact, Biology, and Ecology of Saltcedar (Tamarix spp.) in the Southwestern United States. Weed Technology. 12(2): 326-336.	"Seeds are quite small and light (0.1 mg) (Sisneros 1991), and have a tuft of hair on the end to aid in wind dispersal or can be carried and deposited along sandbars and riverbanks by water (Brotherson and Field 1987)."
707	2003. Zouhar, K.. Tamarix spp. Fire Effects Information System, [Online] U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory. http://www.fs.fed.us/database/feis/	"Seed dispersal: Saltcedar seeds have small hairs on the apex of the seed coat and are readily dispersed by wind (mean fall rate in still air = 0.187 m/sec), and can also be dispersed by water [165,220]." [no evidence of external dispersal by animals]
708	2003. Zouhar, K.. Tamarix spp. Fire Effects Information System, [Online] U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory. http://www.fs.fed.us/database/feis/	"Seed dispersal: Saltcedar seeds have small hairs on the apex of the seed coat and are readily dispersed by wind (mean fall rate in still air = 0.187 m/sec), and can also be dispersed by water [165,220]. " [unknown if seeds survive passage through gut, but unlikely to be consumed]
801	1998. Di Tomaso, J.M.. Impact, Biology, and Ecology of Saltcedar (Tamarix spp.) in the Southwestern United States. Weed Technology. 12(2): 326-336.	"A single large saltcedar plant can produce half a million seeds per year."
801	2011. California Invasive Plant Council. Invasive Plants of California's Wildland - Tamarix spp.. http://www.cal-ipc.org/ip/management/ipcw/pages/detailreport.cfm@usernumber=81&surveynumber=182.php	"Saltcedar can reproduce both vegetatively and by seed. Plants can regenerate from cuttings that fall on moist soil. Plants can flower by the end of the first year of growth (DiTomaso 1996). Studies in Arizona demonstrated that dense saltcedar stands can generate 100 seeds per square inch. Seed production occurs over a 5.5-month period, with one major and one minor peak (Warren and Turner 1975)."

802	1998. Di Tomaso, J.M.. Impact, Biology, and Ecology of Saltcedar (Tamarix spp.) in the Southwestern United States. Weed Technology. 12(2): 326-336.	"Germination. The tiny seeds of saltcedar have high initial viability (Neill 1985). However, seeds remain viable for only about 5 wks under normal conditions (Everitt 1980). Because of their short-lived viability, saltcedar seeds must come in contact with suitable moisture within a few weeks of dispersal. Consequently, for germination to occur following water dispersal, it is important that the availability of seed coincide with the time of peak annual discharge, so that seeds will settle and germinate in a suitable location at highwater marks (Everitt 1980)."
802	2003. Halvorson, W.L./Guertin, P.. Factsheet for: Tamarix L. spp.. U.S. Geological Survey / Southwest Biological Science Center, Tucson, Arizona	"A persistent seed bank doesn't seem to form even with the few seeds that seemingly survive over the winter under cooler conditions (Stevens 1990 in Carpenter 1998). Seeds produced during winter months may stay viable for up to 3 times longer than those produced in the summer months (Zimmerman 1997)."
802	2003. Zouhar, K.. Tamarix spp. Fire Effects Information System, [Online] U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory. http://www.fs.fed.us/database/feis/	"Seed banking: Tamarisk seeds are short lived and do not form a persistent seed bank [219]. Saltcedar seeds produced during the summer remain viable for up to 45 days under ideal field conditions (ambient humidity and full shade), or for as few as 24 days when exposed to full sunlight and dry conditions. Winter field longevity under ideal conditions is approximately 130 days. Seed mortality is generally due to desiccation [220]. If seeds are not germinated during the summer that they are dispersed, almost none germinate the following spring [107]. "
803	1998. Di Tomaso, J.M.. Impact, Biology, and Ecology of Saltcedar (Tamarix spp.) in the Southwestern United States. Weed Technology. 12(2): 326-336.	"They can resprout vegetatively after fire, severe flood, or treatment with herbicides and are able to accommodate wide variations in soil and mineral gradients, as well as environmental stress conditions (Brotherson and Field 1987)."
803	2011. California Invasive Plant Council. Invasive Plants of California's Wildland - Tamarix spp.. http://www.cal-ipc.org/ip/management/ipcw/pages/detailreport.cfm@usernumber=81&surveynumber=182.php	"Chemical control: Heavy infestations may require stand thinning through controlled burns or mechanical removal with heavy equipment prior to treatment with herbicides. Six herbicides are commonly used to combat saltcedar, including; imazapyr, triclopyr, and glyphosate (Jackson 1996). Several proven methods exist for removing tamarisk. Perhaps the best method is to apply an imazapyr marketed as Arsenal® to the foliage. This technique is especially effective when a tank mix is used with a glyphosate herbicide such as Rodeo® or Roundup Pro®. The most frequently used method in California is to cut the shrub off near the ground and apply triclopyr, either as Garlon 4Â® or Garlon 3AÂ®. This technique usually results in better than a 90 percent kill rate. Triclopyr (as Pathfinder IIÂ®) can even be applied directly to the basal bark of stems less than about four inches in diameter without cutting the stem (the bark must be wetted completely around the base of each stem). Garlon 4Â®or Pathfinder IIÂ® have no timing restrictions, but Garlon 3AÂ® should be applied during the growing season. Resprouts can be treated with foliar applications of herbicide. Foliar applications of glyphosate or imazapyr achieve best results when applied in late spring to early fall during good growing conditions. Triclopyr can be diluted with diesel or natural oils, a dilution of 3 parts water to 1 part of Garlon 4Â® has proven effective (Barrows 1993, Lovich et al. 1994). Application rates for these herbicides are reviewed in Jackson (1996). Only Rodeo® has an aquatic registration, making it a legal choice for application over or around water."
804	1998. Di Tomaso, J.M.. Impact, Biology, and Ecology of Saltcedar (Tamarix spp.) in the Southwestern United States. Weed Technology. 12(2): 326-336.	"Once mature, saltcedar is remarkably tolerant to mechanical injury caused by cutting, grazing, and burning, as well as a variety of environmental stress conditions, including, heat, cold, drought, water inundation, and high concentrations of dissolved solids (Brotherson and Field 1987; Everitt 1980; Frasier and Johnsen 1991). After burning or cutting, saltcedar shrubs redevelop rapidly (Horton 1977). Cutting has been shown to stimulate growth. Goldsmith and Smart (1982) measured stem growth rate at 75 cm/yr after cutting. This compared with 30 cm/yr for an uncut bush growing in the same area. In another study, Gary (1960) reported that after cattle removed approximately 50% of the saltcedar foliage, the shrubs recovered vigorously. By the second year the stand became so dense that cattle would not reenter the area...Plants can resprout vigorously from roots if the top growth is damaged or removed (Frasier and Johnsen 1991). In addition, adventitious roots easily develop from submerged or buried saltcedar stems (Everitt 1980; Kerpez and Smith 1987)."
804	2003. Halvorson, W.L./Guertin, P.. Factsheet for: Tamarix L. spp.. U.S. Geological Survey / Southwest Biological Science Center, Tucson, Arizona	"Tamarix is fire-adapted; it has a high foliar water and salt content making it difficult to burn (Kunzmann et al. 1990 in Tesky 1992b). When fire does occur, Tamarix resprouts vigorously from its root crown and rhizomes (Rodman 1990 in Tesky 1992b, 16 Tesky 1992b). Also, it increases flowering and seed production after fires (Hoddenbach 1989 in Tesky 1992b)."

804	2011. California Invasive Plant Council. Invasive Plants of California's Wildland - Tamarix spp.. http://www.cal-ipc.org/ip/management/ipcw/pages/detailreport.cfm@usernumber=81&surveynumber=182.php	"Manual/mechanical methods: Saltcedar is difficult to kill with mechanical methods, as it is able to resprout vigorously following cutting or burning. Root plowing and cutting are effective ways of clearing heavy infestations initially, but these methods are successful only when combined with follow up treatment with herbicide. Seedlings and small plants can be uprooted by hand. Prescribed burning: Fire does not kill saltcedar roots, and plants return quickly after fire if untreated by other methods. Fire is valuable primarily for thinning heavy infestations prior to follow-up application of herbicide. The consequences of fire for native plants and soil chemistry must be recognized. Flooding: Flooding thickets for one to two years can kill most saltcedar plants in a thicket."
805	2011. California Invasive Plant Council. Invasive Plants of California's Wildland - Tamarix spp.. http://www.cal-ipc.org/ip/management/ipcw/pages/detailreport.cfm@usernumber=81&surveynumber=182.php	"Insects and fungi: The USDA is currently using an international team of researchers to test thirteen species of natural enemies to control saltcedar. Of these, two have been recommended for field release in the United States, including a mealybug (Trabutina mannipara) from Israel and a leaf beetle (Diorhabda elongata) from China. Two other species are being tested in quarantine, including a psyllid (Colposcenia aliena) and a gelechiid leaf tier (Ornativalva grisea) from China. A gall midge (Psectorsema) from France has been approved for quarantine testing. Overseas testing has been completed for a foliage-feeding weevil (Coniatus tamarisci) from France, and for a pterophorid moth (Agdistis tamaricis), and a foliage feeding weevil (Cryptocephalus sinaita subsp. moricei) from Israel (DeLoach 1997)."