

Part IV. Plant Assessment Form

For use with "Criteria for Categorizing Invasive Non-Native Plants that Threaten Wildlands"
by the California Exotic Pest Plant Council and the Southwest Vegetation Management Association

Electronic version, February 28, 2003

Table 1. Species and Evaluator Information

Species name (Latin binomial):	Tamarix parviflora DC.
Synonyms:	Tamarix cretica Bge., Tamarix lucronensis Sennen & Elias, Tamarix petteri Presl ex Bge., Tamarix rubella Batt., Tamarix tetranda auct. non Pall., others. Plants are sometimes sold in California as Tamarix africana Poir, which is a different species.
Common names:	Smallflower tamarisk
Evaluation date (mm/dd/yy):	01/11/06
Evaluator #1 Name/Title:	Joe DiTomaso
Affiliation:	University of California, Davis
Phone numbers:	530-754-8715
Email address:	jmditomaso@ucdavis.edu
Address:	Dept Plant Sci, Mail Stop 4, One Shields Ave, Davis CA 95616
Evaluator #2 Name/Title:	enter text here
Affiliation:	enter text here
Phone numbers:	enter text here
Email address:	enter text here
Address:	enter text here
Section below for list committee use—please leave blank	
List committee members:	Joe DiTomaso, Jake Sigg, Peter Warner, Cynthia Roye
Committee review date:	January 24, 2006
List date:	enter text here
Re-evaluation date(s):	enter text here

General comments on this assessment:

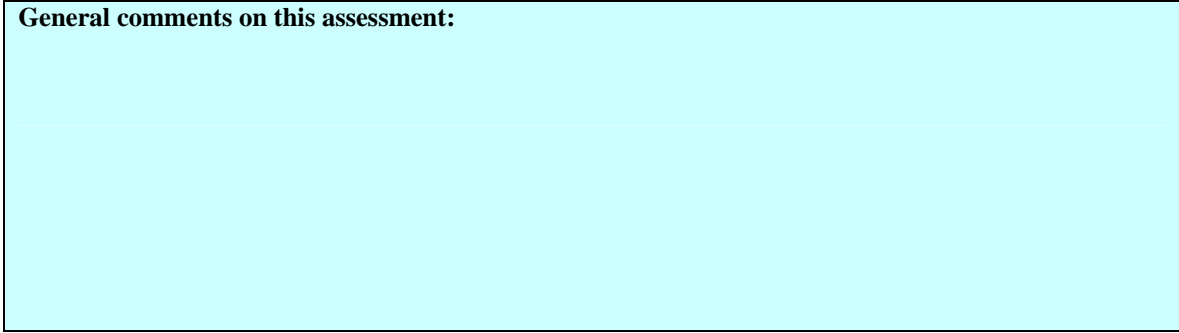


Table 2. Criteria, Section, and Overall Scores

1.1	Impact on abiotic ecosystem processes	A	Other Pub. Mat'l
1.2	Impact on plant community	A	Other Pub. Mat'l
1.3	Impact on higher trophic levels	A	Other Pub. Mat'l
1.4	Impact on genetic integrity	D	Rev'd, Sci. Pub'n

Impact

Enter four characters from Q1.1-1.4 below:

AAAD

Using matrix, determine score and enter below:

A

2.1	Role of anthropogenic and natural disturbance	3 pts	Other Pub. Mat'l
2.2	Local rate of spread with no management	3 pts	Other Pub. Mat'l
2.3	Recent trend in total area infested within state	3 pts	Other Pub. Mat'l
2.4	Innate reproductive potential Wksht A	3 pts	Other Pub. Mat'l
2.5	Potential for human-caused dispersal	1 pt	Other Pub. Mat'l
2.6	Potential for natural long-distance dispersal	3 pts	Other Pub. Mat'l
2.7	Other regions invaded	1 pt	Other Pub. Mat'l

Invasiveness

Enter the sum total of all points for Q2.1-2.7 below:

17

Use matrix to determine score and enter below:

A

Plant Score

Using matrix, determine Overall Score and Alert Status from the three section scores and enter below:

**High
No Alert**

3.1	Ecological amplitude/Range	A	Other Pub. Mat'l
3.2	Distribution/Peak frequency Wksht C	C	Other Pub. Mat'l

Distribution

Using matrix, determine score and enter below:

B

Table 3. Documentation

<p>Question 1.1 Impact on abiotic ecosystem processes</p>	<p>A Other Pub. Mat'l back</p>
<p>Identify ecosystem processes impacted: Very high water use and increased deposition of salts on soil surface. The longer the community has been invaded by Tamarix the more xeric in nature are the plant species which occupy the understory. Such deposits of salt-encrusted needles can inhibit other species germination. Saltcedar has been blamed for increasing flooding by forming a partial barrier to floodflow, which can cause floodwater to disperse and inundate areas that otherwise would not be flooded. With the invasion of saltcedar there has been an apparent increase in the frequency of fire in riparian ecosystems. Tamarix species can increase flooding in riparian areas by narrowing channel width. In addition, plants are flammable and can introduce fire into wetland and riparian communities that are not adapted to periodic burning.</p>	
<p>Rationale: Evapotranspiration rates of saltcedar are among the highest of any phreatophyte evaluated in southwestern North America, including native riparian trees. Saltcedar has been reported to contain 41,000 ppm dissolved solids in the guttation sap. Smallflower tamarisk is very similar both taxonomically and ecologically and, although, it has not been studied to the degree that Tamarix ramosissima, it appears to act very similar in riparian areas.</p>	
<p>Sources of information:</p> <p>Brotherson, J.D. and D. Field. 1987. Tamarix: impacts of a successful weed. Rangelands 9:110-112;</p> <p>Busch, D.E. and S.D. Smith. 1992. Fire in a riparian shrub community: postburn water relations in the Tamarix-Salix association along the lower Colorado River. Gen. Tech. Rep. Int USDA For. Serv. Intermt. Res. Stn. 289:52-55;</p> <p>Kerpez, T. A. and N. S. Smith. 1987. Saltcedar control for wildlife habitat improvement in the southwestern United States. USDI. Fish and Wildlife Serv. Resource Publ. 169. p. 1-16.;</p> <p>DiTomaso, J.M. 1998. Impact, biology, and ecology of saltcedar (Tamarix spp.) in the southwestern United States. Weed Technology 12:236-336 for other references.</p>	
<p>Question 1.2 Impact on plant community composition, structure, and interactions</p>	<p>A Other Pub. Mat'l back</p>
<p>Identify type of impact or alteration: Trees typically develop an efficient, deep, extensive root system and have a high evapotranspiration rate in arid climates during the warm season when the roots can access deep soil moisture. Both saltcedar and smallflower tamarisk are facultative phreatophytes that can use both surface and groundwater. The presence of numerous trees along riparian corridors or around desert springs can seriously reduce underground water tables and surface water availability, drying up wetlands, and reducing flows. Roots extract salts from deep soil layers and excrete it from the leaves. Salt is deposited on the soil surface with the leaf litter. The increased salinity of the upper soil profile inhibits the growth, survival, and recruitment of desirable native vegetation.</p>	
<p>Rationale: Smallflower tamarisk can form stands considerably more dense than naturally occurring riparian vegetation.</p>	
<p>Sources of information: DiTomaso, J.M. E.A. Healy. 2003. Aquatic and Riparian Weeds of the West. UC DANR Publ. #3421.</p> <p>DiTomaso, J.M. 1998. Impact, biology, and ecology of saltcedar (Tamarix spp.) in the southwestern United States. Weed Technology 12:236-336 for review and other citations. Many sources of personal observations.</p>	

Question 1.3 Impact on higher trophic levels	A Other Pub. Mat'l back
<p>Identify type of impact or alteration: The majority of birds do not use saltcedar in high proportions compared with native plant communities. Frugivores and insectivores, abundant in native riparian vegetation, almost completely avoid saltcedar. Studies showed that several species had a higher affinity for the cottonwood-willow association, including common flicker, yellow-bellied sapsucker, porcupine and beaver. With the exception of desert woodrat and desert cottontail, no native mammal species are known to feed upon saltcedar. When consumed by wildlife, only young growth is utilized. Although some animals will seek cover or nest in Tamarix thickets, most wildlife does not consume Tamarix foliage, fruits, or seeds. Tamarix species can increase flooding in riparian areas by narrowing channel width. In addition, plants are flammable and can introduce fire into wetland and riparian communities that are not adapted to periodic burning. There is no reason to believe that smallflower tamarisk is used any more than saltcedar by animals.</p>	
<p>Rationale: Although certain wildlife species may find saltcedar beneficial to their survival, the encroachment of saltcedar has most certainly altered the native habitat that was apparently of great benefit to wildlife. Although the southwestern willow flycatcher can nest in saltcedar, infestations have a negative impact on most other birds that would normally use the native vegetation</p>	
<p>Sources of information: Numerous papers on the impact of insects, birds, and mammals. Most deal with Tamarix ramosissima. For reviews see:</p> <p>Lovich, J. Tamarix ramosissima. In, Invasive Plants of California's Wildlands. Eds., C. Bossard, J. Randall, and M. Hoshovsky. UC Press, Berkeley</p> <p>DiTomaso, J.M. 1998. Impact, biology, and ecology of saltcedar (Tamarix spp.) in the southwestern United States. Weed Technology 12:236-336 for review and peer-reviewed reference citations.</p>	
Question 1.4 Impact on genetic integrity	D Rev'd, Sci. Pub'n back
<p>Identify impacts: none, but does hybridize with other Tamarix. No native members of the family in north America.</p>	
<p>Rationale: Less extensively, hybrids between saltcedar and Chinese tamarisk with smallflower tamarisk (T. parviflora), Canary Island tamarisk (T. canariensis) and French tamarisk (T. gallica) also occur. The abundance of invasive hybrids may explain the confusion associated with the identification of Tamarix species in the western states.</p>	
<p>Sources of information: Gaskin, J.F. and P.B. Shafroth. Hybridization of invasive saltcedars (Tamarix ramosissima, T. chinensis) and athel (T. aphylla) in the southwestern USA, determined from morphology and NA sequence data. Madroño (in review).</p>	
Question 2.1 Role of anthropogenic and natural disturbance in establishment	A Other Pub. Mat'l back
<p>Describe role of disturbance: The development of water management programs that severely impact natural river flows has greatly contributed to spread of saltcedar and smallflower tamarisk. These alterations include reservoir and dam construction, river diversions, flow regulations, and irrigation projects. Historically, the flow of these rivers peaked in the late spring and early summer from snowmelt. These changes in channel geometry and streamflow created conditions unfavorable for the regeneration and survival of native perennial riparian species. As a result, rapid colonization and expansion of saltcedar occurred throughout the western river systems. In addition to altering streamflow, clearing and plowing of floodplains and associated agricultural activity also aided saltcedar colonization during the 1800s.</p>	

Rationale: Establishment can occur on disturbed and undisturbed sites, but disturbance can increase the rate of establishment.	
Sources of information: See both Lovich, J. Tamarix ramosissima. In, Invasive Plants of California's Wildlands. Eds., C. Bossard, J. Randall, and M. Hoshovsky. UC Press, Berkeley DiTomaso, J.M. E.A. Healy. 2003. Aquatic and Riparian Weeds of the West. UC DANR Publ. #3421. DiTomaso, J.M. 1998. Impact, biology, and ecology of saltcedar (Tamarix spp.) in the southwestern United States. Weed Technology 12:236-336 for review and peer-reviewed reference citations.	
Question 2.2 Local rate of spread with no management	A Other Pub. Mat'l back
Describe rate of spread: Much of the riparian area in the southwestern US has been occupied by saltcedar and the rate of increase there has slowed down. However, T. parviflora is still vigorously expanding its range. Smallflower tamarisk is not as widely distributed but on Cache Creek it has more than doubled its population in the past 10 years.	
Rationale:	
Sources of information: Brotherson, J.D. and D. Field. 1987. Tamarix: impacts of a successful weed. Rangelands 9:110-112; DiTomaso, J.M. 1998. Impact, biology, and ecology of saltcedar (Tamarix spp.) in the southwestern United States. Weed Technology 12:236-336 for review and peer-reviewed reference citations. DiTomaso, pers. observation.	
Question 2.3 Recent trend in total area infested within state	A Other Pub. Mat'l back
Describe trend: Recent efforts have begun to target the populations of smallflower tamarisk in much of the Cache Creek watershed in Yolo, Colusa, and Lake counties. This effort is hoped to slow the spread of the species. Currently, however, it has continued to spread rapidly.	
Rationale:	
Sources of information: Brotherson, J.D. and D. Field. 1987. Tamarix: impacts of a successful weed. Rangelands 9:110-112; DiTomaso, J.M. 1998. Impact, biology, and ecology of saltcedar (Tamarix spp.) in the southwestern United States. Weed Technology 12:236-336 for review and peer-reviewed reference citations. DiTomaso, pers. observation.	
Question 2.4 Innate reproductive potential	A Other Pub. Mat'l back
Describe key reproductive characteristics: Reproduce by seed and sometimes vegetatively from root sprouts and stem fragments. Seeds disperse primarily with wind and water. Germination occurs shortly after seed dispersal in spring through summer. Seeds lack a dormancy period, and most germinate within 24 hours after imbibing water. Salinity does not inhibit germination. Seeds typically survive for about 5 weeks. One mature plant can	

produce about 500,000 seeds per year. Robust seedlings may flower at the end of the first year's growth. However, seedling survival is typically low. Seedling roots develop slowly and cannot tolerate dry conditions for even one day, water currents can wash seedlings away, and seedlings do not tolerate burying. However, seedlings often survive being submerged in still water for a short time, perhaps a couple of weeks. Plants that are burned or cut down usually develop new shoots from adventitious buds on the lateral roots. Stem fragments can take root when buried in a moist substrate, such as might occur with a flooding event. Individual trees can live about 75 to 100 years or more.

Rationale: A good deal of evidence indicates that saltcedar can reproduce very effectively both asexually and sexually.

Sources of information: Brotherson, J.D. and D. Field. 1987. Tamarix: impacts of a successful weed. Rangelands 9:110-112; Shrader, T.H. Selective management of phreatophytes for improved utilization of natural food-plain resources. Irrigation and Drainage pp. 16-44;

DiTomaso, J.M. 1998. Impact, biology, and ecology of saltcedar (*Tamarix* spp.) in the southwestern United States. Weed Technology 12:236-336 for review and peer reviewed reference citations.

DiTomaso, J.M. E.A. Healy. 2003. Aquatic and Riparian Weeds of the West. UC DANR Publ. #3421.

Question 2.5 Potential for human-caused dispersal C Other Pub. Mat'l [back](#)

Identify dispersal mechanisms: Planted as an ornamental, as a shade tree, and for erosion control. Not nearly as widely planted today as in the past. Can still be purchased via the internet.

Rationale: It was planted as an ornamental shrub or shade tree, or to create wind breaks, or to stabilize eroding stream banks.

Sources of information: DiTomaso, J.M. 1998. Impact, biology, and ecology of saltcedar (*Tamarix* spp.) in the southwestern United States. Weed Technology 12:236-336 for more details and citations.

DiTomaso, J.M. E.A. Healy. 2003. Aquatic and Riparian Weeds of the West. UC DANR Publ. #3421.

Question 2.6 Potential for natural long-distance dispersal A Other Pub. Mat'l [back](#)

Identify dispersal mechanisms: The tiny seeds have high viability and long hairs allowing for wind distribution, but may also be carried and deposited along sandbars and riverbanks by water. Stem and root fragments can also float downstream after fragmentation by mechanical damage or flooding and initiate new infestations.

Rationale: Seeds weight about 0.1 mg and can travel long distances in the wind. Flooding can move stem and root fragments very long distances

Sources of information: Brotherson, J.D. and D. Field. 1987. Tamarix: impacts of a successful weed. Rangelands 9:110-112; Neill, W.M. 1985. Tamarisk. Fremontia 12:22-23;

See both Lovich, J. *Tamarix ramosissima*. In, Invasive Plants of California's Wildlands. Eds., C. Bossard, J. Randall, and M. Hoshovsky. UC Press, Berkeley

DiTomaso, J.M. 1998. Impact, biology, and ecology of saltcedar (*Tamarix* spp.) in the southwestern United States. Weed Technology 12:236-336 for review and other citations.

DiTomaso, J.M. E.A. Healy. 2003. Aquatic and Riparian Weeds of the West. UC DANR Publ. #3421.	
Question 2.7 Other regions invaded	C Other Pub. Mat'l back
Identify other regions: Today, smallflower tamarisk infestations are common in many river systems in the Southern North Coast Ranges, southern Sierra Nevada foothills, eastern Sierra Nevada, Tehachapi Mountains, Central Valley, San Francisco Bay region, eastern South Coast Ranges, South Coast, and deserts, to 800 m. It is also found in Arizona, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, scattered in a few central states and many southern and eastern states.	
Rationale: Seems to be weedy in areas similar to those in the California and the southwestern US.	
Sources of information: See both Lovich, J. Tamarix ramosissima. In, Invasive Plants of California's Wildlands. Eds., C. Bossard, J. Randall, and M. Hoshovsky. UC Press, Berkeley	
DiTomaso, J.M. 1998. Impact, biology, and ecology of saltcedar (Tamarix spp.) in the southwestern United States. Weed Technology 12:236-336 for review and other citations.	
DiTomaso, J.M. E.A. Healy. 2003. Aquatic and Riparian Weeds of the West. UC DANR Publ. #3421.	
Question 3.1 Ecological amplitude/Range	A Other Pub. Mat'l back
Describe ecological amplitude, identifying date of source information and approximate date of introduction to the state, if known: Southern North Coast Ranges, southern Sierra Nevada foothills, eastern Sierra Nevada, Tehachapi Mountains, Central Valley, San Francisco Bay region, eastern South Coast Ranges, South Coast, and deserts, to 800 m. Arizona, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, scattered in a few central states and many southern and eastern states. First introduced from southern Europe or the eastern Mediterranean region.	
Rationale: Although saltcedar is typically found around aquatic or riparian areas, it has also been observed in scrublands, although not in dense stands.	
Sources of information: Neill, W.M. 1985. Tamarisk. Fremontia 12:22-23; See both Lovich, J. Tamarix ramosissima. In, Invasive Plants of California's Wildlands. Eds., C. Bossard, J. Randall, and M. Hoshovsky. UC Press, Berkeley	
DiTomaso, J.M. E.A. Healy. 2003. Aquatic and Riparian Weeds of the West. UC DANR Publ. #3421.	
DiTomaso, J.M. 1998. Impact, biology, and ecology of saltcedar (Tamarix spp.) in the southwestern United States. Weed Technology 12:236-336 for review and other citations. Many sources of personal observations.	
Question 3.2 Distribution/Peak frequency	C Other Pub. Mat'l back
Describe distribution: Although not as common as saltcedar, smallflower tamarisk forms dense stands in many riparian areas around the state, particularly in Northern California (Cache Creek), where it infests many riparian communities. It is also in many smaller, isolated water sources that are scattered about the desert (e.g., Red Rock Canyon in the Mojave Desert) and in the coast ranges, such as the Mendocino Headlands State Park, Tomales Bay State Park, and the upper Russian and/or Eel rivers.	
Rationale: Smallflower tamarisk is a facultative phreatophyte, which accounts for its primary infestations in	

riparian and aquatic regions, but occasional occurrence in drier regions.

Sources of information: Peter Warner, pers. observation

John Randall, pers. observation

DiTomaso, J.M. E.A. Healy. 2003. Aquatic and Riparian Weeds of the West. UC DANR Publ. #3421.

DiTomaso, J.M. 1998. Impact, biology, and ecology of saltcedar (*Tamarix* spp.) in the southwestern United States. *Weed Technology* 12:236-336 for review and other citations. Many sources of personal observations.

Worksheet A[back](#)

Reaches reproductive maturity in 2 years or less	No: 0 pt
Dense infestations produce >1,000 viable seed per square meter	Yes: 2 pts
Populations of this species produce seeds every year.	Yes: 1 pt
Seed production sustained over 3 or more months within a population annually	Yes: 1 pt
Seeds remain viable in soil for three or more years	No: 0 pts
Viable seed produced with <i>both</i> self-pollination and cross-pollination	Yes: 1 pt
Has quickly spreading vegetative structures (rhizomes, roots, etc.) that may root at nodes	Yes: 1 pt
Fragments easily and fragments can become established elsewhere	Yes: 2 pts
Resprouts readily when cut, grazed, or burned	Yes: 1 pt
	9 pts Total Unknowns
	A (6+ pts)
Note any related traits: documented to form hybrids with a more invasive congener, tolerates physiologically stressful conditions such as extreme drought and high salinity soils	

Worksheet C - California Ecological Types

[back](#)

(*sensu* Holland 1986)

Major Ecological Types	Minor Ecological Types	Code*
Marine Systems	marine systems	score
Freshwater and Estuarine Aquatic Systems	lakes, ponds, reservoirs	D. present
	rivers, streams, canals	C. 5-20%
	estuaries	score
Dunes	coastal	score
	desert	score
	interior	score
Scrub and Chaparral	coastal bluff scrub	score
	coastal scrub	D. present
	Sonoran desert scrub	score
	Mojavean desert scrub (incl. Joshua tree woodland)	D. present
	Great Basin scrub	score
	chenopod scrub	score
	montane dwarf scrub	score
	Upper Sonoran subshrub scrub	score
	chaparral	score
Grasslands, Vernal Pools, Meadows, and other Herb Communities	coastal prairie	score
	valley and foothill grassland	score
	Great Basin grassland	score
	vernal pool	score
	meadow and seep	D. present
	alkali playa	score
	pebble plain	score
Bog and Marsh	bog and fen	score
	marsh and swamp	score
Riparian and Bottomland	riparian forest	D. present
	riparian woodland	C. 5-20%
	riparian scrub (incl. desert washes)	D. present
Woodland	cismontane woodland	score
	piñon and juniper woodland	score
	Sonoran thorn woodland	score
Forest	broadleaved upland forest	score
	North Coast coniferous forest	score
	closed cone coniferous forest	score
	lower montane coniferous forest	score
	upper montane coniferous forest	score
	subalpine coniferous forest	score
Alpine Habitats	alpine boulder and rock field	score
	alpine dwarf scrub	score

* A. means >50% of type occurrences are invaded; B means >20% to 50%; C. means >5% to 20%; D. means present but ≤5%; U. means unknown (unable to estimate percentage of occurrences invaded).