

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):	Salsola tragus L.
Synonyms:	Salsola australis, S. iberica, S. kali var. tenuifolia, S. kali ssp. ruthenica, S. kali ssp. tenuifolia, S. kali ssp. tragus, S. pestifera, S. ruthenica.
Common names:	Russian thistle, common saltwort, prickly Russian thistle, Russian tumbleweed, tumbleweed, tumbling weed, windwitch, witchweed, prickly glasswort
Evaluation date (mm/dd/yy):	08/10/2004
Evaluator #1 Name/Title:	Brianna Richardson, Project Manager
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Evaluator #2 Name/Title:	Gina Skurka/Agricultural Technician I/Intern
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Section below for list committee use—please leave blank

List committee members:	Joe DiTomaso, Jake Sigg, Cynthia Roye, Peter Warner
Committee review date:	8/15/05
List date:	enter text here
Re-evaluation date(s):	enter text here

General comments on this assessment:

There are two types of *Salsola tragus*, Type A and Type B. This assessment does not distinguish between the two types.

Table 2. Criteria, Section, and Overall Scores

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

<p>Impact</p> <p><i>Enter four characters from Q1.1-1.4 below:</i></p> <p>DCDD</p> <p><i>Using matrix, determine score and enter below:</i></p> <p>C</p>

2.1	Role of anthropogenic and natural disturbance	3 (2 pts)	Other Pub. Mat'l
2.2	Local rate of spread with no management	0 (0 pts)	No Information
2.3	Recent trend in total area infested within state	1 (1 pt)	Other Pub. Mat'l
2.4	Innate reproductive potential Wksht A	3 (3 pts)	Rev'd, Sci. Pub'n
2.5	Potential for human-caused dispersal	1 (1 pt)	Anecdotal
2.6	Potential for natural long-distance dispersal	3 (3 pts)	Rev'd, Sci. Pub'n
2.7	Other regions invaded	1 (1 pt)	Other Pub. Mat'l

<p>Invasiveness</p> <p><i>Enter the sum total of all points for Q2.1-2.7 below:</i></p> <p>11</p> <p><i>Use matrix to determine score and enter below:</i></p> <p>B</p>
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<p>Plant Score</p> <p><i>Using matrix, determine Overall Score and Alert Status from the three section scores and enter below:</i></p> <p>Low</p> <p>No Alert</p>
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3.1	Ecological amplitude/Range	A	Other Pub. Mat'l
3.2	Distribution/Peak frequency Wksht C	C	Observational

<p>Distribution</p> <p><i>Using matrix, determine score and enter below:</i></p> <p>B</p>

Table 3. Documentation

<p>Question 1.1 Impact on abiotic ecosystem processes</p>	<p>B Other Pub. Mat'l back</p>
<p>Identify ecosystem processes impacted: Plants may add oxalate leachate to soil, making phosphorous more available and facilitating colonization. Can increase fire hazard, especially along tree rows and fences when dead plants build up. Can obstruct stream channels. Possess a taproot up to 1.5 m deep with lateral roots spreading up to 1.8 m and can extract deep soil moisture.</p>	
<p>Rationale: No additional sources cited these as effects of <i>Salsola tragus</i> invasion. Some alterations (increased P availability) may be beneficial to native plants. Increases fire hazard (though may be a hazard primarily to human landscapes).</p>	
<p>Sources of information: DiTomaso, J., E. Healy. Weeds of California and Other Western States. Not yet published.</p> <p>Haubensak, K. 1999. <i>Salsola tragus</i>, Chenopodiaceae, Russian thistle, tumbleweed. Source unknown.</p> <p>Anonymous. Unwanted Poster. The Habitat Restoration Group. date unknown.</p> <p>Mojave Weed Management Area website. www.mojavewma.org. Accessed 8/10/2004.</p> <p>CDFa Encycloweedia. <<http://pi.cdfa.ca.gov/weedinfo.SALSOLA2.html>>.</p>	
<p>Question 1.2 Impact on plant community composition, structure, and interactions</p>	<p>C Rev'd, Sci. Pub'n back</p>
<p>Identify type of impact or alteration: An alternate host for <i>Circulifer tenellus</i>, which can carry the virus causing curly-top of some native plants. Believed to lack the ability to dominate native plant communities. May influence the abundance of later seral species. On a windy ridgetop in WY, grass density was highest where <i>Salsola</i> was most abundant, possibly due to reduced wind speeds or increased snow accumulation. On disturbed sites, invasion by <i>Salsola</i> may facilitate establishment of later seral species like <i>Nassella pulchra</i> by creating a nutrient island of phosphorous, through added oxalate leached from the <i>Salsola</i> canopy. Other compounds may be produced by <i>Salsola</i> that have other effects on the growth of native plants. Removal of <i>Salsola</i> has decreased the growth of native grasses in WY. <i>Salsola</i> can also compete with native grasses for water and nutrients. <i>Salsola</i> can have a significant effect on the dispersal of wind-borne seeds of native plants by slowing wind currents. Infestations can become dense where adult skeletons build up along a barrier (such as a fence).</p>	
<p>Rationale: Most studies refer to <i>Salsola</i> as an early seral stage plant, implying that it is easily displaced by later seral stage plants, and therefore causes a lesser impact on overall plant communities. <i>Salsola</i> can have both positive and negative effects on the growth and establishment of native plants. The net effect is yet to be determined. Might rate a "B" ranking.</p>	
<p>Sources of information: DiTomaso, J., E. Healy. Weeds of California and Other Western States. Not yet published.</p> <p>Haubensak, K. 1999. <i>Salsola tragus</i>, Chenopodiaceae, Russian thistle, tumbleweed. Source unknown.</p> <p>Cannon, JP, EB Allen, MF Allen, LM Dudley, JJ Jurinak. 1995. The effects of oxalates produced by <i>Salsola tragus</i> on the phosphorus nutrition of <i>Stipa pulchra</i>. <i>Oecologia</i> V. 102: 265-272.</p> <p>Vanier, CH., LR Walker. 1999. Impact of a non-native plant on seed dispersal of a native. <i>Madrono</i>. 46(1): 46-48.</p> <p>Mojave Weed Management Area website. www.mojavewma.org. Accessed 8/10/2004.</p> <p>CDFa Encycloweedia. www.cdfa.ca.gov. Accessed 8/10/2004.</p>	

<p><<http://pi.cdfa.ca.gov/weedinfo.SALSOLA2.html>>.</p> <p>Haubensak, K and A. Smyth, University of California at Berkeley, for Channel Islands National Park. 11-99.</p>	
<p>Question 1.3 Impact on higher trophic levels</p>	<p>D Rev'd, Sci. Pub'n back</p>
<p>Identify type of impact or alteration: It is spiny. Can accumulate oxalates to levels toxic to sheep; however, immature plants in moderation can provide an extra source of nutritious forage for livestock on arid rangeland. Birds feed on the seeds in the canopy in winter (when plants remain intact). In one study, adult <i>Uta inornata</i> (the threatened Coachella Valley fringe-toed lizard) were associated with spring <i>Salsola</i>, but hatchling <i>U. inornata</i> were negatively associated with living <i>Salsola</i> in summer months (due to predation by adult lizards utilizing the <i>Salsola</i>). The lizards use <i>Salsola</i> for shade, and occasionally glean insects from the plant leaves. A recent study by Barrows indicates that <i>S. tragus</i> is a positive component of the habitat of the threatened Coachella Valley fringe-toed lizard (<i>Uta inornata</i>). The data presented show that <i>S. tragus</i> is similar in appearance and microhabitat distribution as native species used by <i>U. inornata</i> for shading, though <i>S. tragus</i> does not provide a food source for the lizards, as native species do.</p>	
<p>Rationale: Most documented effects of <i>Salsola</i> on higher trophic levels are positive. No serious negative effects were identified.</p>	
<p>Sources of information: Barrows, CW. 1997. Habitat relationships of the Coachella Valley fringe-toed lizard (<i>Uma inornata</i>). <i>The Southwestern Naturalist</i> 42(2): 218-223.</p> <p>Evans, RA., JA. Young. 1982. Russian thistle and barbwire Russian thistle seed and seedbed ecology. USDA-ARS. ARR-W-25: October.</p> <p>DiTomaso, J., E. Healy. Weeds of California and Other Western States. Not yet published.</p> <p>Haubensak, K. 1999. <i>Salsola tragus</i>, Chenopodiaceae, Russian thistle, tumbleweed. Source unknown.</p> <p>CDFA Encycloweededia. <<http://pi.cdfa.ca.gov/weedinfo.SALSOLA2.html>>.</p> <p>Haubensak, K and A. Smyth, University of California at Berkeley, for Channel Islands National Park. 11-99.</p>	
<p>Question 1.4 Impact on genetic integrity</p>	<p>D Other Pub. Mat'l back</p>
<p>Identify impacts: No related CA natives. Russianthistle consists of 2 variants in CA. Both types hybridize with barbwire Russianthistle and each other.</p>	
<p>Rationale: No opportunity for hybridization with native species.</p>	
<p>Sources of information: Hickman, JC (ed.) 1993. <i>The Jepson Manual: Higher plants of California</i>. University of California Press: Berkeley.</p> <p>CDFA Encycloweededia. <<http://pi.cdfa.ca.gov/weedinfo.SALSOLA2.html>>.</p>	
<p>Question 2.1 Role of anthropogenic and natural disturbance in establishment</p>	<p>B Other Pub. Mat'l back</p>
<p>Describe role of disturbance: Seedlings require loose soil for successful establishment. Often the first spp to colonize disturbed sites. Primarily found in disturbed sites. "Russian thistle is so closely associated with human activity..." It has been observed to invade undisturbed sage brush areas.</p>	

<p>Rationale: Every paper considered referred to Salsola as an invader of disturbed sites. However, the spp is so widespread that it must occasionally be able to establish without disturbance or with only natural disturbance.</p>	
<p>Sources of information: DiTomaso, J., E. Healy. Weeds of California and Other Western States. Not yet published.</p> <p>Kostivkovsky, V., JA Young. 2000. Invasive exotic rangeland weeds: A glimpse at some of their native habitats. Rangelands 22(6): 3-6.</p> <p>CDFa-IPC internal document from files at Redding Field Office. Draft 1994 Action Plan for Scotch Thistle Eradication in Modoc and Lassen Counties.</p>	
<p>Question 2.2 Local rate of spread with no management</p>	<p>U No Information back</p>
<p>Describe rate of spread: enter text here</p>	
<p>Rationale: enter text here</p>	
<p>Sources of information: enter text here</p>	
<p>Question 2.3 Recent trend in total area infested within state</p>	<p>C Other Pub. Mat'l back</p>
<p>Describe trend: Introduced to SD ~1874, spread to several Canadian provinces and 16 states by 1895. Spreads to suitable habitat rapidly. Introduced to CA ~1890. Common throughout California, but largest infestations occur in the southern region of the state, to eastern North America, Mexico. To 2700 m.</p>	
<p>Rationale: At the rate this plant has spread historically, it is highly unlikely that it has not already invaded everywhere it is able in the 100+ years it's been in CA. If management is widespread the plant is likely declining. Without mgmt, it is likely stable.</p>	
<p>Sources of information: Evans, RA., JA. Young. 1982. Russian thistle and barbwire Russian thistle seed and seedbed ecology. USDA-ARS. ARR-W-25: October.</p> <p>CDFa Encycloweedea. <<http://pi.cdfa.ca.gov/weedinfo.SALSOLA2.html>>.</p>	
<p>Question 2.4 Innate reproductive potential</p>	<p>A Rev'd, Sci. Pub'n back</p>
<p>Describe key reproductive characteristics: Annual. Out-crossing and self-fertile. Flowers July-October. Main stems break off at ground level under windy conditions allowing plants to disperse numerous seeds as they blow in the wind. Seedlings require loose soil for successful establishment. In Great Basin, seeds produced late September-December. Seeds survive about 1 year, a few can survive up to 3 years. Small plants can produce 1500-2000 seeds/plant, large plants can produce up to 100,000 seeds/plant. May resprout when cut.</p>	
<p>Rationale: 7 points.</p>	
<p>Sources of information: DiTomaso, J., E. Healy. Weeds of California and Other Western States. Not yet published.</p>	

<p>The Habitat Restoration Group. Unwanted Poster. Date unknown.</p> <p>Evans, RA., JA. Young. 1982. Russian thistle and barbwire Russian thistle seed and seedbed ecology. USDA-ARS. ARR-W-25: October.</p> <p>Ryan, FJ., DR Ayres. 2000. Molecular markers indicate two cryptic genetically divergent populations of Russian thistle (<i>Salsola tragus</i>) in California. Canadian Journal of Botany. V. 78: 59-67.</p> <p>CDFa Encyclopedea. www.cdfa.ca.gov. Accessed 8/10/2004.</p>	
<p>Question 2.5 Potential for human-caused dispersal</p>	<p>C Anecdotal back</p>
<p>Identify dispersal mechanisms: Sold as an ornamental.</p>	
<p>Rationale: No literature indicated that human dispersal is currently an important factor in the spread of <i>Salsola</i>. Roads and highways may allow wind-blown plants to move further than they would otherwise, spreading seed over a wider area.</p>	
<p>Sources of information: Personal inference, Brianna Richardson.</p> <p>Thompson & Morgan, <i>Onopordum acanthium</i> <<http://seeds.thompson-morgan.com/us/en/product/8492/1>>.</p>	
<p>Question 2.6 Potential for natural long-distance dispersal</p>	<p>A Rev'd, Sci. Pub'n back</p>
<p>Identify dispersal mechanisms: Adult plants break off at ground level and are blown by the wind, spreading seeds as they roll. Plants have been found to travel between 60-4069m over 6 weeks on fallow fields, dropping an average of 35,600 seeds/plant. Wind-pollinated. Main stems of Russian thistle break off at ground level under windy conditions allowing plants to disperse numerous seeds as they tumble over long distances. Frequently, new infestations appear as a trail of tumbleweed seedlings across fields. Skeletons persist for at least one year and are typically found along fences and other structures. Older plants will recover mowing by axial branching below the cutting level.</p>	
<p>Rationale: Frequent, long-distance dispersal by animals or abiotic mechanisms.</p>	
<p>Sources of information: Ryan, FJ., DR Ayres. 2000. Molecular markers indicate two cryptic genetically divergent populations of Russian thistle (<i>Salsola tragus</i>) in California. Canadian Journal of Botany. V. 78: 59-67.</p> <p>CDFa Encyclopedea. <<http://pi.cdfa.ca.gov/weedinfo.SALSOLA2.html>>.</p>	
<p>Question 2.7 Other regions invaded</p>	<p>C Other Pub. Mat'l back</p>
<p>Identify other regions: Common throughout the entire contiguous US, occupying the same habitat it occupies in CA.</p>	
<p>Rationale: Invades the same ecological types in other places that it does in CA.</p>	
<p>Sources of information: DiTomaso, J., E. Healy. Weeds of California and Other Western States. Not yet published.</p> <p>Ryan, FJ, DR Ayres, DE Bell. 1999. There's more to tumbleweed (Russian thistle) than meets the eye.</p>	

Proceedings of the California Invasive Plant Council 1999 Symposium.	
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: Native to Eurasia. Introduced to SD around 1874 in flax seed from Russia--quickly spread throughout the US. First noted in CA in 1890. Disturbed sites, waste places, roadsides, fields, cultivated fields, disturbed natural and semi-natural plant communities. All continuous states except FL. Invades disturbed areas in Artemisia-dominated vegetation. Found in at least scrub and grasslands in the Sonoran and Mojave deserts and the Great Basin. Likely found in additional sites. Found in desert sand dunes in Coachella Valley.	
Rationale: Invades at least (and likely more) 3 major ecotypes and 5 minor in CA.	
Sources of information: DiTomaso, J., E. Healy. Weeds of California and Other Western States. Not yet published. Ryan, FJ, DR Ayres, DE Bell. 1999. There's more to tumbleweed (Russian thistle) than meets the eye. Proceedings of the California Invasive Plant Council 1999 Symposium. Barrows, CW. 1997. Habitat relationships of the Coachella Valley fringe-toed lizard (<i>Uma inornata</i>). The Southwestern Naturalist 42(2): 218-223. Evans, RA., JA. Young. 1982. Russian thistle and barbwire Russian thistle seed and seedbed ecology. USDA-ARS. ARR-W-25: October. CDFA Encycloweedia. << http://pi.cdfa.ca.gov/weedinfo.SALSOLA2.html >>.	
Question 3.2 Distribution/Peak frequency	U No Information back
Describe distribution: Common throughout CA, esp. in the southern region of the state.	
Rationale: No literature documented the extent of this plant's distribution. However, it spreads to suitable habitat rapidly, and likely occurs in all the suitable habitat that exists in the state. It could be rated an "A" with more documentation.	
Sources of information: DiTomaso, J., E. Healy. Weeds of California and Other Western States. Not yet published.	

Worksheet A[back](#)

Reaches reproductive maturity in 2 years or less	Yes: 1 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	No: 0 pt
Fragments easily and fragments can become established elsewhere	No: 0 pts
Resprouts readily when cut, grazed, or burned	Yes: 1 pt
	7 pts Total Unknowns
	A (6+ pts)

Note any related traits: enter text here

Worksheet C - California Ecological Types

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(*sensu* Holland 1986)

Major Ecological Types	Minor Ecological Types	Code*
Marine Systems	marine systems	score
Freshwater and Estuarine Aquatic Systems	lakes, ponds, reservoirs	score
	rivers, streams, canals	score
	estuaries	score
Dunes	coastal	score
	desert	D. present
	interior	score
Scrub and Chaparral	coastal bluff scrub	score
	coastal scrub	score
	Sonoran desert scrub	D. present
	Mojavean desert scrub (incl. Joshua tree woodland)	C. 5-20%
	Great Basin scrub	D. present
	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	score
	alkali playa	D. present
	pebble plain	score
Bog and Marsh	bog and fen	score
	marsh and swamp	score
Riparian and Bottomland	riparian forest	score
	riparian woodland	score
	riparian scrub (incl. desert washes)	score
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).