

# Cal-IPC Plant Assessment Form

For use with “[Criteria for Categorizing Invasive Non-Native Plants that Threaten Wildlands](#)”  
by the California Invasive Plant Council and the Southwest Vegetation Management Association

Version February 2003, modified March 2009  
California Invasive Plant Council (formerly CA Exotic Pest Plant Council)  
Berkeley, CA [www.cal-ipc.org](http://www.cal-ipc.org), phone (510) 843-3902

**Table 1. Species and Evaluator Information**

<b>Species name</b> (Latin binomial):	<i>Tetragonia tetragonioides</i> (Pallas) Kuntze
<b>Synonyms:</b>	<i>Tetragonia tetragonoides</i> , <i>Demidovia tetragonoides</i> Pall. (basionym), <i>Tetragonia expansa</i> Murray
<b>Common names:</b>	New Zealand spinach, warrigal greens
<b>Evaluation date</b> (mm/dd/yy):	05/ 18/2011
<b>Evaluator #1 Name/Title:</b>	Elizabeth Brusati, Science Program Manager
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<b>Evaluator #2 Name/Title:</b>	Joseph M. DiTomaso, Specialist in Cooperative Extension
<b>Affiliation:</b>	Dept. of Plant Sciences, University of California-Davis
<b>Phone numbers:</b>	530-754-8715
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Section below for list committee use—please leave blank

<b>List committee members:</b>	
<b>Committee review date:</b>	
<b>List date:</b>	
<b>Re-evaluation date(s):</b>	

**General comments on this assessment:**

**Table 2. Criteria, Section, and Overall Scores**Species: *Tetragonia tetragonioides*

Region: California

<a href="#">1.1</a>	Impact on abiotic ecosystem processes	U	Unknown
<a href="#">1.2</a>	Impact on plant community	C	Observational
<a href="#">1.3</a>	Impact on higher trophic levels	U	Unknown
<a href="#">1.4</a>	Impact on genetic integrity	D	Rev'd Publ.

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

<b>Plant Score</b>
<i>Using matrix, determine Overall Score and Alert Status from the three section scores and enter below:</i>
<b>Limited No Alert</b>

<a href="#">2.1</a>	Role of anthropogenic and natural disturbance	B	Observational
<a href="#">2.2</a>	Local rate of spread with no management	C	Observational
<a href="#">2.3</a>	Recent trend in total area infested within state	C	Observational
<a href="#">2.4</a>	Innate reproductive potential <a href="#">Wksht A</a>	U	Other Publ. Mat.
<a href="#">2.5</a>	Potential for human-caused dispersal	C	Other Publ. Mat.
<a href="#">2.6</a>	Potential for natural long-distance dispersal	C	Observational
<a href="#">2.7</a>	Other regions invaded	C	Other Publ. Mat.

<b>Invasiveness</b>
<i>Enter the sum total of all points for Q2.1-2.7 below:</i>
<b>7</b>
<i>Use matrix to determine score and enter below:</i>
<b>C</b>

<b>Documentation</b>
<i>Average of all questions</i>
<b>1.7 out of 4.0</b>

<a href="#">3.1</a>	Ecological amplitude/Range	B	Observational
<a href="#">3.2</a>	Distribution/Peak frequency <a href="#">Wksht C</a>	D	Observational

<b>Distribution</b>
<i>Using matrix, determine score and enter below:</i>
<b>C</b>

**Table 3. Documentation** (Scores are explained in the “[Criteria for Categorizing Invasive Non-Native Plants that Threaten Wildlands](#)”. Short citations may be used in this table. List full citations at end of PAF.)

<b>Impact</b>	
<b>Question 1.1 Impact on abiotic ecosystem processes</b>	U Unknown <a href="#">back</a>
Identify ecosystem processes impacted:	
Sources of information: No information	
<b>Question 1.2 Impact on plant community composition, structure, and interactions</b>	C Observational <a href="#">back</a>
Identify type of impact or alteration: Level of impacts in California uncertain.	
I have found it to be somewhat abundant in the SF area and on Tomales Bay. Where it occurs, it can become abundant and I imagine likely has impacts. It is easily removed and seems to stay away once removed. (Dan Gluesenkamp, Audubon Canyon Ranch, email 2008). In marshes, it can displace <i>Frankenia salina</i> , and pickleweed ( <i>Salicornia</i> spp).	
In Hawaii, has been seen overgrowing other vegetation. (HEAR 2010)	
Sources of information: Email from Dan Gluesenkamp, HEAR 2010 Leia Giambastiani, pers. comm.	
<b>Question 1.3 Impact on higher trophic levels</b>	U Unknown <a href="#">back</a>
Identify type of impact or alteration: No information on impacts to trophic levels. Described as edible greens in Australia and sold in stores as an edible plant.	
Sources of information: No information	
<b>Question 1.4 Impact on genetic integrity</b>	D Rev'd Sci Publ <a href="#">back</a>
Identify impacts: None. No native <i>Tetragonia</i> in California.	
Sources of information: Hickman, J. C. (ed.) 1993. The Jepson Manual, Higher Plants of California. University of California Press. Berkeley, CA enter text here	
<b>Invasiveness</b>	
<b>Question 2.1 Role of anthropogenic and natural disturbance in establishment</b>	B Observational <a href="#">back</a>
Describe role of disturbance: Common on human-made levees disturbed by tidal events.	
Sources of information: Leia Giambastiani, pers. comm.	

<b>Question 2.2 Local rate of spread with no management</b>	C Observational <a href="#">back</a>
Describe rate of spread: Appears to be spreading, but his may be in local areas and not statewide.	
Sources of information: Leia Giambastiani, pers. comm. Joseph M. DiTomaso, personal observation	
<b>Question 2.3 Recent trend in total area infested within state</b>	C Observational <a href="#">back</a>
Describe trend: Plant has been in California for a long time and appears to be fairly stable in its spread and distribution.	
Sources of information: Joseph M. DiTomaso, personal observation	
<b>Question 2.4 Innate reproductive potential</b>	U Other Publ. Mat. <a href="#">back</a>
Describe key reproductive characteristics: Family Aizoaceae. Annual herb with diffuse trailing habit, succulent. “Warrigal greens seed can take a long time to germinate (Morris and Hardwick 1997), and germination can be irregular (Martin and Ruberté 1979). Warrigal greens was the subject of several germination trials in the USA in the 1930s and 1940s.” (Ahmed and Johnson 2000)	
Sources of information: Ahmed and Johnson 2000, Prakash 1967	
<b>Question 2.5 Potential for human-caused dispersal</b>	C Other Publ. Mat. <a href="#">back</a>
Identify dispersal mechanisms: Horticultural plant, has been researched as a possible vegetable crop in the San Joaquin Valley because it tolerates salinity. Is not widely sold and thus has limited opportunity for long distance human dispersal.	
Sources of information: Ahmed and Johnson 2000, Wilson et al. 2000	
<b>Question 2.6 Potential for natural long-distance dispersal</b>	C Observational <a href="#">back</a>
Identify dispersal mechanisms: Little opportunity for natural long-distance dispersal, unless it's washed away by the tides.	
Sources of information: Email from Dan Gluesenkamp, HEAR 2010	
<b>Question 2.7 Other regions invaded</b>	C Other Publ. Mat. <a href="#">back</a>
Identify other regions: Native to New Zealand. Naturalized in Australia (but also called native there, Ahmed and Johnson 2000), Japan, Europe, Mexico, Argentina, Chile (USDA GRIN 2011) Naturalized in Denmark, England, the Azores. In US, naturalized in CA, CT, FL, GA, HI, MA, NC, ND, NY, OH, PA, WA, WI, WV, USA+: (PR)	

Sources of information: Ahmed and Johnson 2000, HEAR 2011, Prakash 1967, USDA-GRIN 2011, USDA NRCS 2011	
<b>Distribution</b>	
<b>Question 3.1 Ecological amplitude/Range</b>	B Observation <a href="#">back</a>
Describe ecological amplitude, identifying date of source information and approximate date of introduction to the state, if known:	
Specimens collected from coastal counties from San Diego to Mendocino (Consortium of California Herbaria)	
San Pablo National Wildlife Refuge and surrounding areas. Habitat type: along levees on the San Pablo Bay with salt spray and tidal influence. Sunny open areas. Salt Marsh and Salt Marsh Transition zone between upland and marsh.	
We've seen (and attempted to remove) it in several sites in both the freshwater and brackish intertidal zones at Abbott's Lagoon (Pt Reyes National Seashore) and also rather surprisingly in a dune restoration site about 15 meters elevation above the beach at our B Ranch site (also Pt. Reyes). (Mark Langan, email 2008)	
There generally is a good deal of it in the Half Moon Bay area, particularly on the bluffs adjoining Francis Beach. (Jean Ouellette, email 2008)	
The Don Edwards refuge has it, as do the Farallones. (Erik Grijalva, Invasive Spartina Project, email 2008)	
At Lands End on GGNRA on edges of Monterey cypress/coastal scrub habitat on sandy soils (Loran May, email 2008)	
New Zealand Spinach is common in the coastal State Parks in Malibu, although not really actively spreading. (Michael O'Brien, email 2008)	
Sources of information: Emails from CalWeedTalk, specimen records from Consortium of California Herbaria Leia Giambastiani, pers. comm.	
<b>Question 3.2 Distribution/Peak frequency</b>	D Observational <a href="#">back</a>
Describe distribution: Seems to be fairly widespread along the coast but only in certain regions, based on emails and records in Calflora	
Sources of information: Emails from CalWeedTalk, specimen records from Consortium of California Herbaria	

**References**

List full citations for all references used in the PAF (short citations such as DiTomaso and Healy 2007 may be used in table above). **Websites** should include the name of the organization and the date accessed. **Personal communications** should include the affiliation of the person providing the observation. Enter each reference on a separate line; the table will expand as needed.

**Examples:**

Mitich, L. W. 1995. Intriguing world of weeds: Tansy ragwort. *Weed Technology*. 9: 402-404.

HEAR. Date unknown. *Emex spinosa*. Hawaiian Ecosystems at Risk. [www.hear.org/pier/species/emex\\_spinosa.htm](http://www.hear.org/pier/species/emex_spinosa.htm). Accessed March 17, 2009

DiTomaso, J. M. Personal communication from Dr. Joe DiTomaso, Dept. of Plant Science, UC Davis. Email received 3/17/09.

Ahmed, A. K., and K. A. Johnson. 2000. Turner Review No. 3. Horticultural development of Australian native edible plants. *Australian Journal of Botany*. 48: 417-426

Consortium of California Herbaria. 2011. Data provided by the participants of the Consortium of California Herbaria ([ucjeps.berkeley.edu/consortium/](http://ucjeps.berkeley.edu/consortium/)). [Accessed May 18, 2011]

HEAR. 2011. Rod Randall's Global Compendium of Weeds database, posted at Hawaiian Ecosystems at Risk website. <http://hear.org/gcw> [Accessed May 18, 2011]

HEAR. 2010. Weed Risk Assessment for *Tetragonia tetragonioides*. Pacific Island Ecosystems at Risk (PIER) <http://www.hear.org/pier/wra.htm> [Accessed May 18, 2011]

Prakash, N. 1967. Life history of *Tetragonia tetragonioides* (Pall.) O. Kuntze. *Australian Journal of Botany*. 15:413-424

USDA-GRIN. 2011 GRIN Taxonomy for Plants. United States Department of Agriculture, Germplasm Resources Information Network. <http://www.ars-grin.gov/cgi-bin/npgs/html/taxon.pl?36385> [Accessed May 18, 2011]

USDA, NRCS. 2011. The PLANTS Database (<http://plants.usda.gov>, 18 May 2011). National Plant Data Center, Baton Rouge, LA 70874-4490 USA.

Wilson, C., S. M. Lesch, and C. M. Grieve, 2000. Growth stage modulates salinity tolerance of New Zealand spinach (*Tetragonia tetragonioides*, Pall.) and Red Orach (*Atriplex hortensis* L.). *Annals of Botany* 85: 501-509, 2000 doi:10.1006/anbo.1999.1086,

**Worksheet A**

[back](#)

Reaches reproductive maturity in 2 years or less	<b>Yes 1 pt</b>
Dense infestations produce >1,000 viable seed per square meter	<b>No</b>
Populations of this species produce seeds every year.	<b>Yes 1 pt</b>
Seed production sustained over 3 or more months within a population annually	<b>Unknown</b>
Seeds remain viable in soil for three or more years	<b>Unknown</b>
Viable seed produced with <i>both</i> self-pollination and cross-pollination	<b>Unknown</b>
Has quickly spreading vegetative structures (rhizomes, roots, etc.) that may root at nodes	<b>No</b>
Fragments easily and fragments can become established elsewhere	<b>No</b>
Resprouts readily when cut, grazed, or burned	<b>No</b>
	<b>2      Unknown 3</b>
	<b>U</b>

**Note any related traits:**

**Worksheet C - California Ecological Types**[back](#)*(sensu* Holland 1986)

Major Ecological Types	Minor Ecological Types	Code*
<b>Marine Systems</b>	marine systems	score
<b>Freshwater and Estuarine Aquatic Systems</b>	lakes, ponds, reservoirs	score
	rivers, streams, canals	score
	estuaries	D
<b>Dunes</b>	coastal	D
	desert	score
	interior	score
<b>Scrub and Chaparral</b>	coastal bluff scrub	D
	coastal scrub	score
	Sonoran desert scrub	score
	Mojavean desert scrub (incl. Joshua tree woodland)	score
	Great Basin scrub	score
	chenopod scrub	score
	montane dwarf scrub	score
	Upper Sonoran subshrub scrub	score
	chaparral	score
<b>Grasslands, Vernal Pools, Meadows, and other Herb Communities</b>	coastal prairie	score
	valley and foothill grassland	score
	Great Basin grassland	score
	vernal pool	score
	meadow and seep	score
	alkali playa	score
	pebble plain	score
<b>Bog and Marsh</b>	bog and fen	score
	marsh and swamp	score
<b>Riparian and Bottomland</b>	riparian forest	score
	riparian woodland	score
	riparian scrub (incl. desert washes)	score
<b>Woodland</b>	cismontane woodland	score
	piñon and juniper woodland	score
	Sonoran thorn woodland	score
<b>Forest</b>	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
<b>Alpine Habitats</b>	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).