

Australia/New Zealand Weed Risk Assessment adapted for Florida.

Data used for analysis published in: Gordon, D.R., D.A. Onderdonk, A.M. Fox, R.K. Stocker, and C. Gantz. 2008. Predicting Invasive Plants in Florida using the Australian Weed Risk Assessment. Invasive Plant Science and Management 1: 178-195.

<i>Pennisetum setaceum (fountain grass)</i>			
Question number	Question	Answer	Score
1.01	Is the species highly domesticated?	n	0
1.02	Has the species become naturalised where grown?		
1.03	Does the species have weedy races?		
2.01	Species suited to Florida's USDA climate zones (0-low; 1-intermediate; 2-high)	2	
2.02	Quality of climate match data (0-low; 1-intermediate; 2-high)	2	
2.03	Broad climate suitability (environmental versatility)		
2.04	Native or naturalized in habitats with periodic inundation		
2.05	Does the species have a history of repeated introductions outside its natural range?	y	
3.01	Naturalized beyond native range	y	0
3.02	Garden/amenity/disturbance weed	y	0
3.03	Weed of agriculture	n	0
3.04	Environmental weed	y	0
3.05	Congeneric weed	y	0
4.01	Produces spines, thorns or burrs	n	0
4.02	Allelopathic	n	0
4.03	Parasitic	n	0
4.04	Unpalatable to grazing animals	y	1
4.05	Toxic to animals	n	0
4.06	Host for recognised pests and pathogens		
4.07	Causes allergies or is otherwise toxic to humans	n	0
4.08	Creates a fire hazard in natural ecosystems	y	1
4.09	Is a shade tolerant plant at some stage of its life cycle	n	0
4.1	Grows on infertile soils (oligotrophic, limerock, or excessively draining soils)	y	1
4.11	Climbing or smothering growth habit	n	0
4.12	Forms dense thickets	y	1
5.01	Aquatic	n	0

5.02	Grass	y	1
5.03	Nitrogen fixing woody plant	n	0
5.04	Geophyte	n	0
6.01	Evidence of substantial reproductive failure in native habitat		
6.02	Produces viable seed	y	1
6.03	Hybridizes naturally		
6.04	Self-compatible or apomictic	y	1
6.05	Requires specialist pollinators	n	0
6.06	Reproduction by vegetative fragmentation	n	-1
6.07	Minimum generative time (years)		
7.01	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	y	1
7.02	Propagules dispersed intentionally by people	y	1
7.03	Propagules likely to disperse as a produce contaminant	n	-1
7.04	Propagules adapted to wind dispersal	y	1
7.05	Propagules water dispersed	y	1
7.06	Propagules bird dispersed		
7.07	Propagules dispersed by other animals (externally)	y	1
7.08	Propagules dispersed by other animals (internally)	n	-1
8.01	Prolific seed production		
8.02	Evidence that a persistent propagule bank is formed (>1 yr)	y	1
8.03	Well controlled by herbicides	y?	-1
8.04	Tolerates, or benefits from, mutilation or cultivation	y	1
8.05	Effective natural enemies present in Florida, or east of the continental divide		
Total Score			20

Outcome	Reject*
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*Used secondary screen from: Daehler, C. C., J.L. Denslow, S. Ansari, and H. Kuo. 2004. A risk assessment system for screening out harmful invasive pest plants from Hawaii's and other Pacific islands. *Conserv. Biol.* 18: 360-368.

section	# questions answered	satisfy minimum?
A	6	yes
B	11	yes
C	18	yes
total	35	yes

Data collected 2006-2007

Question number	Reference	Source data
1.01		used horticulturally, but no evidence of selection for reduced weediness
1.02		
1.03		
2.01	USDA, NRCS. 2005. The PLANTS Database, Version 3.5 (http://plants.usda.gov). Data compiled from various sources by Mark W. Skinner. National Plant Data Center, Baton Rouge, LA 70874-4490 USA.	minimum temperature: 17°F
2.02		
2.03		
2.04		
2.05	Bossard, Randall, and Hoshovsky (2000) Invasive Plants of California's Wildlands. University of California Press, Berkeley.	"...fountain grass has been introduced to many areas, including Arizona, California, Florida, Hawaii, Fiji, South Africa, and Australia. It has spread in large part because of its popularity as an ornamental plant."
3.01	Weber (2003) Invasive Plant Species of the World. CABI Publishing.	Exotic or invasive in southern Africa, Australia, New Zealand, western U.S., and Hawaii.
3.02	Henderson (2001) Alien Weeds and Invasive Plants: a Complete Guide to Declared Weeds and Invaders in South Africa. Plant Protection Research Institute Handbook No. 12.	Invades roadsides and disturbed sites in South Africa.
3.03		no evidence
3.04	1. Tunison (1992) Fountain grass control in Hawaii Volcanoes National Park: management considerations and strategies. Pp. 376-393 in Stone, Smith, and Tunison (eds.) Alien Plant Invasions in Native Ecosystems of Hawaii: Management and Research. University of Hawaii Press, Honolulu. 2. Kairo, Ali, Cheesman, Haysom, and Murphy (2003) Invasive Species Threats in the Caribbean Region. Report to the Nature Conservancy. 3. Weber (2003) Invasive Plant Species of the World. CABI Publishing.	1. "Fountain grass (<i>Pennisetum setaceum</i>), perceived as one of the most disruptive alien species in Hawaii, has threatened native ecosystems below 3,940 ft (1,200 m) elevation in Hawaii Volcanoes National Park for about 30 years." 2. Considered invasive in Puerto Rico. 3. Considered invasive in Australia.

3.05	Parsons and Cuthbertson (2001) Noxious Weeds of Australia. CSIRO Publishing, Collingwood, Australia.	<i>Pennisetum macrourum</i> , <i>P. polystachion</i> , and <i>P. villosum</i> considered noxious weeds in Australia.
4.01	Wagner, Herbst, and Sohmer (1999) Manual of the flowering plants of Hawai'i. University of Hawai'i Press/Bishop Museum Press, Honolulu.	no description of these traits
4.02	USDA, NRCS. 2005. The PLANTS Database, Version 3.5 (http://plants.usda.gov). Data compiled from various sources by Mark W. Skinner. National Plant Data Center, Baton Rouge, LA 70874-4490 USA.	not allelopathic
4.03	Wagner, Herbst, and Sohmer (1999) Manual of the flowering plants of Hawai'i. University of Hawai'i Press/Bishop Museum Press, Honolulu.	no description of this
4.04	Bossard, Randall, and Hoshovsky (2000) Invasive Plants of California's Wildlands. University of California Press, Berkeley.	"In Hawaii cattle eat fountain grass only when no other grasses are available."
4.05	USDA, NRCS. 2005. The PLANTS Database, Version 3.5 (http://plants.usda.gov). Data compiled from various sources by Mark W. Skinner. National Plant Data Center, Baton Rouge, LA 70874-4490 USA.	no toxicity (and no mention of toxicity in horticultural or toxicity references)
4.06		
4.07	USDA, NRCS. 2005. The PLANTS Database, Version 3.5 (http://plants.usda.gov). Data compiled from various sources by Mark W. Skinner. National Plant Data Center, Baton Rouge, LA 70874-4490 USA.	no toxicity (and no mention of toxicity in horticultural or toxicity references)
4.08	Tunison (1992) Fountain grass control in Hawaii Volcanoes National Park: management considerations and strategies. Pp. 376-393 in Stone, Smith, and Tunison (eds.) Alien Plant Invasions in Native Ecosystems of Hawaii: Management and Research. University of Hawaii Press, Honolulu.	"This large bunchgrass...is stimulated by fire, and enhances fuel loadings, thus endangering native woody plant communities it invades."
4.09	1. USDA, NRCS. 2005. The PLANTS Database, Version 3.5 (http://plants.usda.gov). Data compiled from various sources by Mark W. Skinner. National Plant Data Center, Baton Rouge, LA 70874-4490 USA. 2. Horticipia 4.0	1. shade tolerance: intolerant 2. exposure: full sun
4.1	Horticipia 4.0	suitable soil is well-drained/loamy, sandy, or clay
4.11	USDA, NRCS. 2005. The PLANTS Database, Version 3.5 (http://plants.usda.gov). Data compiled from various sources by Mark W. Skinner. National Plant Data Center, Baton Rouge, LA 70874-4490 USA.	graminoid
4.12	Bossard, Randall, and Hoshovsky (2000) Invasive Plants of California's Wildlands. University of California Press, Berkeley.	"densely clumped growth form...Thick infestations of fountain grass interfere with regeneration of native plant species." up to 1.5 m high
5.01		terrestrial

5.02	Bossard, Randall, and Hoshovsky (2000) Invasive Plants of California's Wildlands. University of California Press, Berkeley.	Poaceae
5.03	USDA, NRCS. 2005. The PLANTS Database, Version 3.5 (http://plants.usda.gov). Data compiled from various sources by Mark W. Skinner. National Plant Data Center, Baton Rouge, LA 70874-4490 USA.	does not fix nitrogen (and is herbaceous)
5.04	USDA, NRCS. 2005. The PLANTS Database, Version 3.5 (http://plants.usda.gov). Data compiled from various sources by Mark W. Skinner. National Plant Data Center, Baton Rouge, LA 70874-4490 USA.	not propagated by bulbs, corms, or tubers
6.01		
6.02	Bossard, Randall, and Hoshovsky (2000) Invasive Plants of California's Wildlands. University of California Press, Berkeley.	"Fountain grass can reproduce by either fertilized or unfertilized seeds."
6.03	Dujardin and Hanna (1989) Crossability of pearl millet with wild <i>Pennisetum</i> species. Crop Science 29: 77-80.	<i>P. setaceum</i> hybridizes with pearl millet in the lab. [nature?]
6.04	Bossard, Randall, and Hoshovsky (2000) Invasive Plants of California's Wildlands. University of California Press, Berkeley.	"Fountain grass is apomictic."
6.05		most grasses wind pollinated
6.06	1. USDA, NRCS. 2005. The PLANTS Database, Version 3.5 (http://plants.usda.gov). Data compiled from various sources by Mark W. Skinner. National Plant Data Center, Baton Rouge, LA 70874-4490 USA. 2. Goergen and Daehler (2002) Factors affecting seedling recruitment in an invasive grass (<i>Pennisetum setaceum</i>) and a native grass (<i>Heteropogon contortus</i>) in the Hawaiian Islands. Plant Ecology 161: 147-156.	1. vegetative spread rate: none 2. relies on recruitment by seeds
6.07	1. USDA, NRCS. 2005. The PLANTS Database, Version 3.5 (http://plants.usda.gov). Data compiled from various sources by Mark W. Skinner. National Plant Data Center, Baton Rouge, LA 70874-4490 USA. 2. Horticultura 4.0	1. moderate growth rate 2. fast growth rate
7.01	Tunison (1992) Fountain grass control in Hawaii Volcanoes National Park: management considerations and strategies. Pp. 376-393 in Stone, Smith, and Tunison (eds.) Alien Plant Invasions in Native Ecosystems of Hawaii: Management and Research. University of Hawaii Press, Honolulu.	readily dispersed by vehicles
7.02	Bossard, Randall, and Hoshovsky (2000) Invasive Plants of California's Wildlands. University of California Press, Berkeley.	"...fountain grass has been introduced to many areas, including Arizona, California, Florida, Hawaii, Fiji, South Africa, and Australia. It has spread in large part because of its popularity as an ornamental plant."
7.03		no evidence
7.04	Tunison (1992) Fountain grass control in Hawaii	readily dispersed by wind

	Volcanoes National Park: management considerations and strategies. Pp. 376-393 in Stone, Smith, and Tunison (eds.) Alien Plant Invasions in Native Ecosystems of Hawaii: Management and Research. University of Hawaii Press, Honolulu.	
7.05	Tunison (1992) Fountain grass control in Hawaii Volcanoes National Park: management considerations and strategies. Pp. 376-393 in Stone, Smith, and Tunison (eds.) Alien Plant Invasions in Native Ecosystems of Hawaii: Management and Research. University of Hawaii Press, Honolulu.	readily dispersed by water
7.06	Tunison (1992) Fountain grass control in Hawaii Volcanoes National Park: management considerations and strategies. Pp. 376-393 in Stone, Smith, and Tunison (eds.) Alien Plant Invasions in Native Ecosystems of Hawaii: Management and Research. University of Hawaii Press, Honolulu.	possibly dispersed by birds [not yes here - yes for 7.07]
7.07	1. Goergen and Daehler (2002) Factors affecting seedling recruitment in an invasive grass (<i>Pennisetum setaceum</i>) and a native grass (<i>Heteropogon contortus</i>) in the Hawaiian Islands. Plant Ecology 161: 147-156. 2. Bossard, Randall, and Hoshovsky (2000) Invasive Plants of California's Wildlands. University of California Press, Berkeley.	1. "Seeds of <i>P. setaceum</i> are dispersed in feathery spikelets that are easily carried by wind and animals." 2. easily dispersed by livestock
7.08		wind dispersed
8.01		
8.02	1. Bossard, Randall, and Hoshovsky (2000) Invasive Plants of California's Wildlands. University of California Press, Berkeley. 2. Tunison (1992) Fountain grass control in Hawaii Volcanoes National Park: management considerations and strategies. Pp. 376-393 in Stone, Smith, and Tunison (eds.) Alien Plant Invasions in Native Ecosystems of Hawaii: Management and Research. University of Hawaii Press, Honolulu.	1. "Seeds may remain viable in the soil for at least seven years." 2. "Treatment data at Kamo'oali'i suggested that fountain grass seed may be viable in the soil for several years." [no percentages, but long time frame]
8.03	Bossard, Randall, and Hoshovsky (2000) Invasive Plants of California's Wildlands. University of California Press, Berkeley.	"Extensive infestations of fountain grass are probably best controlled with the help of herbicides, especially those with some systemic activity. Ten percent liquid hexazinone (as Velpar) at <5.14 kg ai/ha can be used as a post-emergent or pre-emergent herbicide once a year in areas with high densities."
8.04	Bossard, Randall, and Hoshovsky (2000) Invasive Plants of California's Wildlands. University of California Press, Berkeley.	"Fountain grass is well adapted to fire, and plants can recover to pre-burn density, even increase in density, following a burn. Fire can

		actually contribute to the spread of fountain grass."
8.05		