Part IV. Plant Assessment Form

For use with "Criteria for Categorizing Invasive Non-Native Plants that Threaten Colorado's Wildlands and Agriculture"
By the Colorado Noxious Weed Advisory Committee

Electronic version: December 4, 2008

Table 1. Species and Evaluator Information

Species name (Latin binomial)**:**	Cortideria jubata (Lem.) Stapf and Cortideria selloana (Schult. & Schult. f.) Asch. & Graebn.
Synonyms:	
Common names:	pampas grass, jubata grass, common pampas grass, purple pampas grass, pink pampas grass, Uruguyan pampas grass
Evaluation date (mm/dd/yy)**:**	01/27/10
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Section below for list committee use—please leave blank

List committee members:	enter text here
Committee review date:	enter text here
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	Rev'd, Sci. Pub'n		**Impact** *Enter four characters from Q1.1-1.4 below:* **ABCD** *Using matrix, determine score and enter below:* **B**	
1.2	Impact on plant community	B	Rev'd, Sci. Pub'n			
1.3	Impact on higher trophic levels	C	Rev'd, Sci. Pub'n			
1.4	Impact on genetic integrity	D	Rev'd, Sci. Pub'n			
2.1	Role of anthropogenic and natural disturbance	B (2 pts)	Rev'd, Sci. Pub'n		**Invasiveness** *Enter the sum total of all points for Q2.1-2.7 below:* **17** *Use matrix to determine score and enter below:* **A**	**Wildlands Plant Score** *Using matrix, determine Overall Score and Alert Status from the first, second, and third section scores and enter below:* **Moderate** **Red Alert**
2.2	Local rate of spread with no management	A (3 pts)	Rev'd, Sci. Pub'n			
2.3	Recent trend in total area infested within state	U (0 pts)	Other Pub. Mat'l			
2.4	Innate reproductive potential Wksht A	A (3 pts)	Other Pub. Mat'l			
2.5	Potential for human-caused dispersal	A (3 pts)	Rev'd, Sci. Pub'n			
2.6	Potential for natural long-distance dispersal	A (3 pts)	Rev'd, Sci. Pub'n			
2.7	Other regions invaded	A (3 pts)	Other Pub. Mat'l			
3.1	Ecological amplitude/Range	U	Other Pub. Mat'l		**Distribution** *Using matrix, determine score and enter below:* **U**	
3.2	Distribution/Peak frequency Wrksht B	U	Other Pub. Mat'l			

4.1	Poisonous to livestock	**D (0 pts)**	**Rev'd, Sci. Pub'n**
4.2	Detrimental to economic crops	**U (0 pts)**	**Rev'd, Sci. Pub'n**
4.3	Detrimental to management of agricultural system, rangeland and pasture	**B (2 pts)**	**Other Pub. Mat'l**
4.4	Human impacts Wrksht C	**A (3 pts)**	**Other Pub. Mat'l**

Agricultural / Human Impact

Enter the sum total of all points for Q4.1-4.4 below:

5

Use matrix to determine score and enter below:

B

Agricultural Plant Score

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

High

Red Alert

Table 3. Documentation

Question 1.1 Impact on abiotic ecosystem processes A Rev'd, Sci. Pub'n back
Identify ecosystem processes impacted: Domination of an ecosystem by grass, such as pampas grass, alters the fire cycle, dune formation, as well as canopy temperature and humidity.
Rationale: Displacement of native shrubs with grass, such as pampas grass, alter the fire regime by providing large amounts of dry, standing, biomass by comparison that can increase the frequency and intensity of fires. Grasses are innately more adapted to restoration after fire than large, woody, shrubs (1). Pampas grass also has the ability to change the size and shape of sand dunes, which may influence erosion (1). Finally, grass canopies tend to be hotter and drier that native shrub canopies, further favoring C-4 grass establishment (1).
Sources of information: (1) D'Antonio, C.M. and P.M. Vitousek. 1992. Biological invasions by exotic grasses, the grass/fire cycle, and global change. Annu. Rev. Ecol. Syst. 23: 63-87.
Question 1.2 Impact on plant community composition, structure, and interactions B Rev'd, Sci. Pub'n back
Identify type of impact or alteration: Reduces native shrub species richness, but has been found to increase overall species richness and significanly changes structural layers of the ecosystem. Additionally, papmas grass competes directly with native plants for soil resources.
Rationale: One study showed that native shrub diversity, characteristic of marritime chapparal, was reduced when invaded by pampas grass, however, overall species (native and non-native) richness was increased (1). It was also found that ecosystems dominated by pampas grass only had only a single herbacious structural layer in contrast to shrubland with both canopy and understory layers (1). Other invasive grasses of similar root architecture to pampas grass have been shown to directly compete with shrub species, especially seedlings, for soil resources such as water and nutrients (2). Furthermore, the thatch layer formed in grass-dominated ecosystems prevents seed germination of native shrubs (3).
Sources of information: (1) Lambrinos, J.G. 2000. The impact of the alien invasive grass Cortaderia jubata (Lemoine) Stapf on an endangered Mediterranean-style shrubland in California. Diversity and Distributions 6(5): 217-231. (2) D'Antonio, C.M. and B.E. Mahall. 1991. Root profiles and competition bewteen an invasive, exotic, perennial, Carpobrotus edulis, and two native shrub species in California coastal shrub. Trends in Ecology and Evolution 11: 362-366. (3) D'Antonio, C.M. and P.M. Vitousek. 1992. Biological invasions by exotic grasses, the grass/fire cycle, and global change. Annu. Rev. Ecol. Syst. 23: 63-87.
Question 1.3 Impact on higher trophic levels C Rev'd, Sci. Pub'n back
Identify type of impact or alteration: Reduces habitat for arthropods and some small rodents, but provides cover for rabbits.
Rationale: One study found fewer and less diverse arthropod species in pampas grasslands opposed to native marritime chapparal with the Hemiptera, Odonata, Opiliones, and Orthoptera orders absent in pampas grass dominated ecosystems (1). Also, woodrat and mouse scat was found less frequently in pampas grass invaded ecosystems compared to maritime chapparal due to lower woody species density, but rabbit droppings were more commonly found in pampas grass habitat, suggesting that the pampas grass provides more adequate cover

(1). These changes in small mammal densities have far-reaching impacts on food-chains.

Sources of information: (1) Lambrinos, J.G. 2000. The impact of the alien invasive grass Cortaderia jubata (Lemoine) Stapf on an endangered Mediterranean-style shrubland in California. Diversity and Distributions 6(5): 217-231

Question 1.4 Impact on genetic integrity D Rev'd, Sci. Pub'n back

Identify impacts: No impact on genetic integrity

Rationale: There are no known relatives of pampas grass established in Colorado so hybridization in this state should not occur. However, there have been successful hybridizations with other species of Cortaderia in New Zealand, but the progeny were sterile (1).

Sources of information: (1) Connor, H.E. 1983. Cortaderia (Gramineae): Interspecific hybrids and the breeding system. Heredity 51: 395-403.

Question 2.1 Role of anthropogenic and natural disturbance in establishment B Rev'd, Sci. Pub'n back

Describe role of disturbance: Soil distubance of natural or anthropogenic origins increases the establishment of pampas grass, but it can invade undisturbed sites, albeit unfrequently.

Rationale: Pampas grass readily establishes in disturbed sites resulting from landslides, graded areas, roadsides, quarries annd logging (1,2). However, there are reports of pampas grass invading undisturbed coastal regions with serpentine soil (3).

Sources of information: (1) Fritzke, S. and P. Moore. 1998. Exotic plant management in National Parks of California. Fremontia 26(4):49-53.

(2) Harradine, A. R. 1991. The impact of pampas grass as weeds in southern Australia. Plant Prot. Q. 6:111-115.

(3) DiTomaso, J. M. 2000. Cortaderia jubata Uubatagrass). Pages 124-128 in C. Bossard, J. M. Randall, and M. Hoshovsky, eds. Invasive Plants of California's Wildlands. Berkeley, CA: California Exotic Pest Plant Council, University of California Press.

Question 2.2 Local rate of spread with no management A Rev'd, Sci. Pub'n back

Describe rate of spread: Increases rapidly, especially in disturbed sites

Rationale: Pampas grass forms large tussocks which grow rapidly and create dense thickets from root divisions(1). In its native range of the Andes Mountians of South America, it can form solid stands of several hundred hecatres(1). Plants reach reproductive maturity in 1-2 years and produce thousands to millions of seeds within their lifetime capable of establishing far from original source, which were probably originally cultivated ornamental plantings (1, 2, 3).

Sources of information: (1) Starr, F., K. Starr, L. Loope. 2003. Cortaderia spp. Hawaiian Ecosystems At Risk

Project Available: http://www.hear.org/starr/hiplants/reports/pdf/cortaderia_spp.pdf. Accessed 10/27/10.

(2) Connor, H.E. 1973. Breeding systems in Cortaderia (Gramineae). Evolution 27: 663- 678.

(3) DiTomaso, J.M., E. Healy, C.E. Bell, J. Drewitz, and A. Tschohl. 1999. Pampasgrass and jubatagrass threaten California coastal habitats. University of California, Weed Research and Information Center. Available: http://www.wric.ucdavis.edu/information/pampasgrass.html. Accessed 10/27/10.

Question 2.3 Recent trend in total area infested within state U Other Pub. Mat'l back

Describe trend: Pampas grass of either species has not yet been reported in Colorado

Rationale: There are no documented reports of either C. jubata or C. selloana in Colorado

Sources of information: USDA-NRCS PLANTS database. 2010. Available: http://plants.usda.gov/. Accessed 10/27/10

Question 2.4 Innate reproductive potential A Other Pub. Mat'l back

Describe key reproductive characteristics: Pampas grass reaches reproductive maturity within 1-2 years and plants can produce thousands of viable seed from each head every year after maturity. Pampas grass can also establish from root fragments.

Rationale: Pampas grass produces up to 100,000 seeds per flower head annually after it reaches maturity in 1-2 years (1,2). Seeds of C. jubata do not require fertilization and can be produced apomictically, while seed set in C. selloana requires cross-pollination (1,2). Flowering can last several months (2), however seeds have short viability (3). Pampas grass also reproduces vegetatively from root fragments that can easily re-establish to form solid stands (1).

Sources of information: (1) (1) Starr, F., K. Starr, L. Loope. 2003. Cortaderia spp. Hawaiian Ecosystems At Risk Project. Available: http://www.hear.org/starr/hiplants/reports/pdf/cortaderia_spp.pdf. Accessed 10/27/10.

(2) Pampas grass (Cortaderia species) Available: http://www.farmpoint.tas.gov.au/farmpoint.nsf/downloads/9098558CA591A94DCA257552000BE4DB/$file/Pampas_note.pdf. Accessed 10/27/10.

(3) Huxley. A. 1992. The New RHS Dictionary of Gardening. MacMillan Press

Question 2.5 Potential for human-caused dispersal A Rev'd, Sci. Pub'n back

Identify dispersal mechanisms: The potential for human dispersal is high.

Rationale: Pampas grass has long been cultivated around the world as an ornamental, since the 1800s (1). Pampas grass is still sold across the U.S. as an ornamental grass, for forage, and erosion control. Due to long-range wind-dispersal of seed, new colonies of pampas grass can establish quite easily far from the original source (1). Recent genetic analysis points to landscape plantings as the source of the invasion of pampas grass (2).

Sources of information: (1) Starr, F., K. Starr, L. Loope. 2003. Cortaderia spp. Hawaiian Ecosystems At Risk

Project. Available: http://www.hear.org/starr/hiplants/reports/pdf/cortaderia_spp.pdf. Accessed 10/27/10.

(2) Okada, M., R. Ahmad, M. Jasieniuk. 2007. Microsatellite variation points to local landscape plantings as sources of invasive pampas grass (Cortaderia selloana) in California. Molecular Ecology 16: 4956-4971.

Question 2.6 Potential for natural long-distance dispersal A Rev'd, Sci. Pub'n back

Identify dispersal mechanisms: Potential for long-range seed dispersal is high.

Rationale: Seed of pampas grass of wind dispersed (1) with documented distances of travel of up to 20 miles (2)

Sources of information: (1) Connor, H.E. 1973. Breeding systems in Cortaderia (Gramineae). Evolution 27: 663-678.

(3) DiTomaso, J.M., E. Healy, C.E. Bell, J. Drewitz, and A. Tschohl. 1999. Pampasgrass and jubatagrass threaten California coastal habitats. University of California, Weed Research and Information Center. Available: http://www.wric.ucdavis.edu/information/pampasgrass.html. Accessed 10/27/10.

Question 2.7 Other regions invaded A Other Pub. Mat'l back

Identify other regions: The potential for invasion in Colorado specific ecosystems is high.

Rationale: Pampas grass has currently invaded coastal and lowland shrub and forest margins, sand dunes, cliffs, bluffs, riverbeds, inshore islands and coastal areas, disturbed forest and shrublands, roadsides, railway lines, quarries, and wasteland in several U.S. states including: AL, CA, GA, HI, IA, LA, MO, NJ, NC, OR, SC, TN, TX, UT, and VA, as well as similar areas in Austarlia, New Zealand, and South Africa (1,2,3). Therefore, pampas grass has the potential to invade Colorado riparian shrublands, developed lands, as well as low elevation dunes, rock outcrops, and canyonlands.

Sources of information: (1) Starr, F., K. Starr, L. Loope. 2003. Cortaderia spp. Hawaiian Ecosystems At Risk Project. Available: http://www.hear.org/starr/hiplants/reports/pdf/cortaderia_spp.pdf. Accessed 10/27/10.

(2) USDA-NRCS PLANTS database. 2010. Available: http://plants.usda.gov/. Accessed 10/27/10

(3) Haley, N. 1997. Information on Cortaderia spp. in New Zealand. Department of Conservation, Auckland, New Zealand. Available: http://www.envbop.govt.nz/. Accessed 1/27/10.

Question 3.1 Ecological amplitude/Range U Other Pub. Mat'l back

Describe ecological amplitude, identifying date of source information and approximate date of introduction to the state, if known: Pampas grass has not yet been documented in the state of Colorado

Rationale: There are no documented reports of either species of pampas grass in Colorado (1), but Colorado has several of the ecosystems that they thrive in.

Sources of information: (1) USDA-NRCS PLANTS database. 2010. Available: http://plants.usda.gov/. Accessed 10/27/10

Question 3.2 Distribution/Peak frequency U Other Pub. Mat'l back
Describe distribution: Pampas grass has not yet been reported in the state of Colorado
Rationale: There are no documented reports of either species of pampas grass in Colorado (1), but Colorado has several of the ecosystems that it thrives in.
Sources of information: (1) USDA-NRCS PLANTS database. 2010. Available: http://plants.usda.gov/. Accessed 10/27/10
Question 4.1 Poisonous to Livestock D Rev'd, Sci. Pub'n back
Describe impacts in terms of high probability of death, long-term health impacts, or short-term health impacts: There are no known toxins in pampas grass and low probability of long- or short-term health impacts.
Rationale: Pampas grass has long been used for cattle forage and does not present a risk to livestock (1)
Sources of information: (1) Pleasants, A.B. and P.H. Whitehead. 1977. Pampas grass as winter feed. New Zealand J. Agric. 135(1): 2-3.
Question 4.2 Detrimental to Economic Crops U Rev'd, Sci. Pub'n back
Describe impacts to all aspects of cropping systems (see guidelines): Pampas grass is not known to invade cropland
Rationale: While pampas grass is not reported to invade cropland, it is known to establish in disturbed sites, so it is unknown how it will interact with Colorado crops.
Sources of information: (1) Fritzke, S. and P. Moore. 1998. Exotic plant management in National Parks of California. Fremontia 26(4):49-53. (2) Harradine, A. R. 1991. The impact of pampas grass as weeds in southern Australia. Plant Prot. Q. 6:111-115.
Question 4.3 Detrimental to Mgmt of Agricultural System, Rangeland and Pasture B Other Pub. Mat'l back
Describe impacts to water diversion systems, increased water use, reduced forage for livestock: The agricultural impact of pampas grass may be moderate in riparian shrubland found in range and pasture. However, pampas grass does provide suitable forage for cattle.
Rationale: The impact of pampas grass to agricultural lands would be competition for soil resources such as water and nutrients with established range and pasture grasses (1,2). On the other hand, pampas grass would provide a large amount of forage for cattle (3).
Sources of information: (1) D'Antonio, C.M. and B.E. Mahall. 1991. Root profiles and competition bewteen an invasive, exotic, perennial, Carpobrotus edulis, and two native shrub species in California coastal shrub. Trends

in Ecology and Evolution 11: 362-366. (2) D'Antonio, C.M. and P.M. Vitousek. 1992. Biological invasions by exotic grasses, the grass/fire cycle, and global change. Annu. Rev. Ecol. Syst. 23: 63-87. (3) Pleasants, A.B. and P.H. Whitehead. 1977. Pampas grass as winter feed. New Zealand J. Agric. 135(1): 2-3.
Question 4.4 Human Health Impacts A Other Pub. Mat'l back
Describe key human impacts such as; irritants, property values, recreational values, and industry impacts: Pampas grass presents a high level of human impacts.
Rationale: Pampas grass has razor-like leaf edges that will readily cut exposed skin (1). This will obviously reduce property values and recreational use of land. The alteration of the fire regime also puts personal property at risk (2). Finally, listing pampas grass as a noxious weed will impact the horticultural industry as it sells pampas grass as an ornamental.
Sources of information: (1) Cowan, B. 1976. The menace of pampas grass. Fremontia 4(2):14 16. (2) D'Antonio, C.M. and P.M. Vitousek. 1992. Biological invasions by exotic grasses, the grass/fire cycle, and global change. Annu. Rev. Ecol. Syst. 23: 63-87.

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 *both* 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	**Unknown: 0 pts**
9 pts	**1 unknown**
A (6+ pts)	

Note any related traits: enter text here

Worksheet B - Colorado Ecological Types and Land Use

back

Major Ecological and Land Use Types	Minor Ecological and Land Use Types	Code*
Freshwater and Aquatic Systems	lakes, ponds, reservoirs	**score**
	rivers, streams, canals	**score**
Riparian and wetlands	Riparian forest	**score**
	Riparian shrublands	**Unknown**
	Wet meadows	**score**
Grasslands	Shortgrass prairie	**score**
	Tallgrass prairie	**score**
	Sandsage prairie	**score**
	Montane meadows	**score**
Irrigated Agriculture	Hay meadows	**score**
	Irrigated crops (alfalfa, corn, sugar beets)	**score**
Dryland Agriculture	Dryland crops (wheat, corn, millet, dryland grass hay, sunflowers, mustard for biodiesel)	**score**
Developed Lands	Urban, exurban, industrial	**Unknown**
Arid Shrublands	Sagebrush shrublands	**score**
	Foothills shrublands	**score**
	Gambel oak shrublands	**score**
Woodlands	Pinyon - juniper	**score**
	Ponderosa pine	**score**
	Limber pine	**score**
Forest	Lodgepole pine	**score**
	Spruce-fir	**score**
Alpine	Boulder and rock fields	**score**
	Dwarf shrublands	**score**
	Tundra	**score**
Barrens (lower elevation)	Dunes	**Unknown**
	Rock outcrops	**Unknown**
	Canyonlands	**Unknown**

* 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).

Worksheet C – Human Impacts

Human health impacts; irritants (sap), spines, poisonous, and/or smoke impacts	**Yes: 1 pt**
Property values are decreased due to increased risk of fire	**Yes: 1 pt**
Decreased property value due to moderate to heavy infestations	**Yes: 2 pts**
Decreased land value for recreational use; boating, fishing, camping, etc.	**Yes: 1 pt**
Impact of listing detrimental to industry; agriculture, horticulture, nursery, and/or seed	**Yes: 2 pt**
7 pts	**Total Unknowns**
A (4+ pts)	

Note any related traits: enter text here