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)**:**	Imperata cylindrica
Synonyms:	Imparata brasiliensis Trin.
Common names:	Japanese blood grass, cogon grass, alang-alang, spear grass
Evaluation date (mm/dd/yy)**:**	01/18/2010
Evaluator #1 Name/Title:	Nicholas Krick/Graduate Research Assistant
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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:
Imperata cylindrica (cogongrass) can be an aggressive invader in tropical and subtropic regions. It is capable of forming dense monocultures and displacing native plants. In 1977 (Holm et al.) placed this species in the top 10 of the world's worst weeds. Disturbance, especially by fire, drives the establishment and persistence of this species. Colorado's climate is likely not suitable for large scale infestation of this species; however, a more cold tolerant cultivar "Red Baron" has been developed as an ornamental and is being sold in the state. Red Baron is growing in Michigan and is being monitored. Should this cold tolerant cultivar hybridize with a more aggressive cultivar of the south, the progeny may be well apt for the Colorado climate.

George Beck consulted with a USDA/ARS scientist from Mississippi (can't recall his name) who has ample experience with cogongrass, and his concern with Red Baron cultivar growing in Michigan, caused him to advise not allowing planting the cultivar in Colorado. CDA should consult with the horticultural industry to determine how much Red Baron is sold in Colorado to aid in the decision on whether or not to place this on the A list.

Table 2. Criteria, Section, and Overall Scores

1.1	Impact on abiotic ecosystem processes	A	Other Pub. Mat'l	**Impact** *Enter four characters from Q1.1-1.4 below:* **AAAA** *Using matrix, determine score and enter below:* **A**		
1.2	Impact on plant community	A	Rev'd, Sci. Pub'n			
1.3	Impact on higher trophic levels	A	Other Pub. Mat'l			
1.4	Impact on genetic integrity	A	Other Pub. Mat'l			
2.1	Role of anthropogenic and natural disturbance	B (2 pts)	Other Pub. Mat'l	**Invasiveness** *Enter the sum total of all points for Q2.1-2.7 below:* **16** *Use matrix to determine score and enter below:* **B**		**Wildlands Plant Score** *Using matrix, determine Overall Score and Alert Status from the first, second, and third section scores and enter below:* **High** **Red Alert**
2.2	Local rate of spread with no management	A (3 pts)	Anecdotal			
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)	Other Pub. Mat'l			
2.6	Potential for natural long-distance dispersal	A (3 pts)	Rev'd, Sci. Pub'n			
2.7	Other regions invaded	B (2 pts)	Other Pub. Mat'l			
3.1	Ecological amplitude/Range	D	Other Pub. Mat'l	**Distribution** *Using matrix, determine score and enter below:* **D**		
3.2	Distribution/Peak frequency Wrksht B	U	Other Pub. Mat'l			

4.1	Poisonous to livestock	**D (0 pts)**	**Other Pub. Mat'l**
4.2	Detrimental to economic crops	**A (3 pts)**	**Other Pub. Mat'l**
4.3	Detrimental to management of agricultural system, rangeland and pasture	**A (3 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:

9

Use matrix to determine score and enter below:

A

Agricultural Plant Score

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

Moderate

Red Alert

Table 3. Documentation

Question 1.1 Impact on abiotic ecosystem processes A Other Pub. Mat'l back
Identify ecosystem processes impacted: Capable of altering fire regimes and nutrient cycling.
Rationale: Large infestations of I. cylindrica can alter the normal fire regime of a fire-driven ecosystem by causing more frequent and more intense fires that injure or destroy native plants. I. cylindrica may increase a fire's rate of spread and intensity on invaded sites. It forms a continuous bed of fine fuel compared to native bunch grass. At mature heights, it can induce crown fire development that can destroy mature stands of timber.
Sources of information: Johnson, E. and Shilling, J. PCA Alien Plant Working Group - Cogon Grass (Imperata cylindrica. Plant Conservation Alliance. 7 July 2009. [http://www.nps.gov/plants/alien/fact/imcy1.htm] Howard, Janet L. 2005. Imperata brasiliensis, I. cylindrica. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: http://www.fs.fed.us/database/feis/ [2010, January 20].
Question 1.2 Impact on plant community composition, structure, and interactions A Other Pub. Mat'l back
Identify type of impact or alteration: I. cylindrica is a competitive species that can crowd out native vegetation, reduce plant diversity, and inhibit the establishment of tree seedlings.
Rationale: Dense monocultures are capable of outcompeting other species for water, nutrients, and sunlight. I. cylindrica can invade and overtake disturbed ecosystems. It is capable of forming a dense mat of thatch and leaves that make it nearly impossible for other plants to coexist. Once established, it can inhibit the success of other species including the establishment of pine seedlings.
Sources of information: Johnson, E. and Shilling, J. PCA Alien Plant Working Group - Cogon Grass (Imperata cylindrica. Plant Conservation Alliance. 7 July 2009. [http://www.nps.gov/plants/alien/fact/imcy1.htm] Howard, Janet L. 2005. Imperata brasiliensis, I. cylindrica. In: Fire Effects Information System. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory. Available: [http://www.fs.fed.us/database/feis/ (2010, January 20)]. Holm, L. G., P. Donald, J. V. Pancho, and J. P. Herberger. 1977. The World's Worst Weeds: Distribution and Biology. The University Press of Hawaii, Honolulu, Hawaii. 609 pp.
Question 1.3 Impact on higher trophic levels A Other Pub. Mat'l back
Identify type of impact or alteration: Literature indicates that I. cylindrica negatively impacts many southeastern wildlife species.
Rationale: I. cylindrica stands are poor habitat for most southeastern wildlife species. The grass is nearly three times the height of native Florida grasses, which likely impedes movement of small animals. Ground-dwelling

species can be displaced by dense cover of I. cylindrica. In central Florida, habitat quality of two keystone fossorial animals, gopher tortoises and scarab beetles, was reduced on invaded sites compared to uninvaded sites. Beetle populations were reduced approximately 76% on invaded sites. Threatened gopher tortoise populations were too low to allow quantitative assessment; however, thick rhizome growth that deters burrowing, reduces the number of open areas for egg laying, reduces herbaceous forage species, and lowers gopher tortoise habitat quality. Southeastern pocket gophers, another keystone fossorial animal, were not affected by I. cylindrica presence.

I. cylindrica is relatively unpalatable and innutritious for livestock and North American wildlife. The leaf blades are sharp and rough at the edges, discouraging animals from grazing. It is more palatable in early growth stages.

I. cylindrica has also been found to be allelopathic.

Sources of information:

Howard, Janet L. 2005. Imperata brasiliensis, I. cylindrica. In: Fire Effects Information System. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory. Available: [http://www.fs.fed.us/database/feis/ (2010, January 20)].

Question 1.4 Impact on genetic integrity A Other Pub. Mat'l back

Identify impacts: Hybridizing potential with Imperata brasiliensis.

Rationale: I. cylindrica is genetically and morphologically similar to I. brasiliensis and hybridization is common. Hybrids between the two speies are capable of producing viable offspring and inhabit similar ecosystems.

No compatible species, native to Colorado, were found in the literature.

Sources of information:

Howard, Janet L. 2005. Imperata brasiliensis, I. cylindrica. In: Fire Effects Information System. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory. Available: [http://www.fs.fed.us/database/feis/ (2010, January 20)].

Question 2.1 Role of anthropogenic and natural disturbance in establishment B Other Pub. Mat'l back

Describe role of disturbance: I. cylindrica is capable of colonizing disturbed and undisturbed ecosystems.

Rationale: In its native range, I. cylindrica grasslands are an early successional stage that develops following a stand-replacement event, usually fire. In tropical and subtropical ecosystems of Asia, it ordinarily declines and disappears with post-disturbance canopy closure. Normally, it does not occur in closed forests but it appears once the forests are opened up for agriculture or timber harvest. Does not require fire for establishment, but it can spread rapidly following fire.

Sources of information:

Howard, Janet L. 2005. Imperata brasiliensis, I. cylindrica. In: Fire Effects Information System. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory. Available: [http://www.fs.fed.us/database/feis/ (2010, January 20)].

Question 2.2 Local rate of spread with no management	A Anecdotal back
Describe rate of spread: I. cylindrica expands aggressively by rhizomes and by seeds, which can be dispersed long distances.	
Rationale: In its native range, I. cylindrica grasslands are an early successional stage that develops following a stand-replacement event, usually fire. In tropical and subtropical ecosystems of Asia, I. cylindrica ordinarily declines and disappears with post disturbance canopy closure. Mowing and fire can increase spread and seed production. It is inferred that without management, I. cylindrica will spread rapidly, particularly in areas that experience regular fires. Canopy closure can cause populations to decline, but with regular fire, canopy closing plants, such as trees and shrubs, cannot reach maturity.	
Sources of information: Howard, Janet L. 2005. Imperata brasiliensis, I. cylindrica. In: Fire Effects Information System. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory. Available: [http://www.fs.fed.us/database/feis/ (2010, January 20)].	
Question 2.3 Recent trend in total area infested within state	U Other Pub. Mat'l back
Describe trend: No known problematic populations in Colorado.	
Rationale: Worldwide, I. cylindrica is most common at elevations from sea level to 3,000 feet (as of 2005). There are horticulturalists in Colorado selling I. cylindrica, so it is likely present in the state as an ornamental. One nursery claims that these plants can survive at elevations up to 6000 feet.	
Sources of information: Howard, Janet L. 2005. Imperata brasiliensis, I. cylindrica. In: Fire Effects Information System. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory. Available: [http://www.fs.fed.us/database/feis/ (2010, January 20)]. USDA-NRCS PLANTS Database. Plant profile for Imperata cylindrica (cogongrass). [http://plants.usda.gov/java/profile?symbol=IMCY] Generated 1/2010.	
Question 2.4 Innate reproductive potential	A Other Pub. Mat'l back
Describe key reproductive characteristics: I. cylindrica reproduces both vegetatively and from seed, but population expansion is primarily driven by rhizome production.	
Rationale: I. cylindrica is an outcrosssing species. A single plant can produce several thousand very small seeds that are short lived, generally remaining viable in the soil for about one year. Vegetative spread is aided by its tough and massive rhizomes that may remain dormant for extended periods of time before sprouting. Isolated populations will not produce seed unless they are pollinated by an outside population. Rhizomes cannot recover when subject to temperatures of approximately 14 °F. A study conducted in Alabama found that rhizomes survived winter temperatures that dropped to 7 °F; however, in Mississippi, rhizomes did not survive winter temperatures of 18 °F. These findings suggest that Colorado climate may not permit establishment and reproduction of I. cylindrica.	

Sources of information:

Howard, Janet L. 2005. Imperata brasiliensis, I. cylindrica. In: Fire Effects Information System. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory. Available: [http://www.fs.fed.us/database/feis/ (2010, January 20)].

Question 2.5 Potential for human-caused dispersal A Other Pub. Mat'l back

Identify dispersal mechanisms: Humans can facilitate dispersal of I. cylindrica.

Rationale: Rhizomes of I. cylindrica may be transported to new sites in contaminated fill dirt or by equipment used in infested areas. Roads and road construction are important corridors for I. cylindrica dispersal. It may also be dispersed as an ornamental.

Sources of information:

Howard, Janet L. 2005. Imperata brasiliensis, I. cylindrica. In: Fire Effects Information System. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory. Available: [http://www.fs.fed.us/database/feis/ (2010, January 20)].

Bryson, Charles T.; Carter, Richard. 1993. Cogongrass, Imperata cylindrica, in the United States. Weed Technology. 7(4): 1005-1009.

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

Identify dispersal mechanisms: Long distance dispersal occurs frequently.

Rationale: Seeds are light weight and easily transported by wind, capable of travelling up to 15 miles in open country. Wind can disperse spikelets up to 360 feet from the parent plant.

Sources of information:

Howard, Janet L. 2005. Imperata brasiliensis, I. cylindrica. In: Fire Effects Information System. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory. Available: [http://www.fs.fed.us/database/feis/ (2010, January 20)].

Shilling, Donn G.; Bewick, T. A.; Gaffney, J. F.; McDonald, S. K.; Chase, C. A.; Johnson, E. R. R. L. 1997. Ecology, physiology, and management of cogongrass (Imperata cylindrica). Publication No. 03-107-140. Gainesville, FL: University of Florida. p. 128

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

Identify other regions: The most current distribution records indicate that I. cylindrica prefers tropical regions at lower elevations, with warmer temperatures. It is designated as noxious in the south east United States, where the sup-tropical climate is suitable for establishment.

Rationale: I. cylindrica likely exists in the state as an ornamental, but no records are found that indicate it has escaped to other systems. It has the potential to invade three or more ecological types, but this is unlikely based on the climate of Colorado.

In North America I. cylindrica occurs along the Gulf Coast from Mexico east to South Carolina. In the United States it is found in 11 states, most common in Mississippi, coastal Alabama, and Florida. It is invasive in many tropical regions of the world and is well adapted to the subtropical pine ecosystems in the Florida peninsula. A record indicates a collection of I. cylindrica was made in Oregon in 1950.

Sources of information:

Howard, Janet L. 2005. Imperata brasiliensis, I. cylindrica. In: Fire Effects Information System. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory. Available: [http://www.fs.fed.us/database/feis/ (2010, January 20)].

Tu, Mandy. 2002. Weed Notes: Imperata cylindrica 'Red Baron' (Japanese Blood Grass). Nature Conservancy Wildland Invasive Species Team. Accessed: 1/27/2010. lhttp://www.cogongrass.org/impcyl01.pdf]

Barkworth, Mary E.; Capels, Kathleen M.; Long, Sandy; Piep, Michael B., eds. 2003. Flora of North America north of Mexico. Volume 25: Magnoliophyta: Commelinidae (in part): Poaceae, part 2. New York: Oxford University Press. 783 p. Available online: http://herbarium.usu.edu/webmanual/.

USDA-NRCS PLANTS Database. Plant profile for Imperata cylindrica (cogongrass). [http://plants.usda.gov/java/profile?symbol=IMCY] Generated 1/2010.

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

Describe ecological amplitude, identifying date of source information and approximate date of introduction to the state, if known: I. cylindrica likely exists in the state as an ornamental, but no records are found that indicate that is has escaped cultivation and has become invasive. It has the potential to invade three or more major ecological types, but this is unlikely based on the climate of Colorado.

Rationale:

In it's native range in Asia, I. cylindrica occupies grasslands, deforested areas, old fields, cultivated fields, riparian areas, swamps, flood plains, dry scrubs, sand dunes, sandhills, pastures, roadsides, mined lands and other disturbed sites.

I. cylindrica is native to Korea, Japan, China, India, and tropical eastern Africa. In the US I. cylindrica is common on disturbed sites such as roadsides, mine spoils, pastures, agricultural lands, plantations, and early seral pine forests. It also occurs on relatively undisturbed sites including wet and dry bottomland and old-growth longleaf pine forests.

I. cylindrica is native to regions of wet-tropical and subtropical Asia and Africa where annual rainfall averages between 40 and 100 inches; however, it can tolerate a wide range of site conditions across its worldwide range. It is drought tolerant, and somewhat shade and salt tolerant. It does best in full sun and has also been found to tolerate waterlogging, fire, cultivation and short-term shade at a single site.

I. cylindrica inhabits the following Kuchler Plant Associations: oak-hickory-pine, Southern mixed forest, Pocosin, Sand pine scrub, Subtropical pine forest. It is aslo associated with the following SRM Cover types: mixed hardwood and pine, and longleaf pine-turkey oak hills, South Florida flatwoods, North Florida flatwoods, Cabbage palm flatwoods, Cabbage palm hammocks, oak hammocks, and everglades flatwoods.

Sources of information:

Howard, Janet L. 2005. Imperata brasiliensis, I. cylindrica. In: Fire Effects Information System. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory. Available: [http://www.fs.fed.us/database/feis/ (2010, January 20)].

Terry, P. J.; Adjers, G.; Akobundu, I. O.; Anoka, A. U.; Drilling, M. E.; Tjitrosemito, S.; Utomo, M. 1997. Herbicides and mechanical control of Imperata cylindrica as a first step in grassland rehabilitation. Agroforestry Systems. 36(1-3): 151-179.

Stanturf, J. A.; Conner, W. H.; Gardiner, E. S.; Schweitzer, C. J.; Ezell, A. W. 2004. Recognizing and overcoming difficult site conditions for afforestation of bottomland hardwoods. Ecological Restoration. 22(3): 183-193.

Duever, L.C., 2003. Floridata: Imperata cylindrica. FLORIDATA: Florida, USA. 26/1/2010. [http://www.floridata.com/ref/i/impe_cyl.cfm]

Question 3.2 Distribution/Peak frequency U Other Pub. Mat'l back

Describe distribution: Although not invasive in Colorado, the literature indicates that I. cylindrica invades hundreds of thousands of acres in tropical regions worldwide.

Rationale: Invades 1.2 billion acres in subtropical and tropical regions worldwide. In the US, at least 100,000 hectares are estimated to be infested in Alabama, Florida, and Mississippi.

Sources of information:

Lippincott, C. and S. McDonald. 1996. Imperata cylindrica – cogongrass. In: Randall, J.M. and J. Marinelli (eds.) Invasive Plants: Weeds of the Global Garden. Brooklin Botanic Garden, Brooklyn.

Schmitz, D. C. and T. C. Brown (project directors). 1994. An assessment of invasive non-indigenous species in Florida's public lands. Technical Report No. TSS-94-100. Florida Department of Environmental Protection, Tallahassee, Florida, USA.

Question 4.1 Poisonous to Livestock D Other Pub. Mat'l back

Describe impacts in terms of high probability of death, long-term health impacts, or short-term health impacts: Not poisonous to livestock, but not highly palatable.

Rationale: I. cylindrica is relatively unpalatable and innutritious for livestock and North American wildlife. The leaf blades are sharp and rough at the edges, discouraging animals from grazing. It is more palatable in early growth stages.

Sources of information:

Howard, Janet L. 2005. Imperata brasiliensis, I. cylindrica. In: Fire Effects Information System. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory. Available: [http://www.fs.fed.us/database/feis/ (2010, January 20)].

Question 4.2 Detrimental to Economic Crops A Other Pub. Mat'l back

Describe impacts to all aspects of cropping systems (see guidelines): I. cylindrica can be a pest in many cropping systems, reducing yields and requiring control inputs.

Rationale: Outside of the United States, I. cylindrica has been reported as a problem in more than 35 annual and

perennial crops, including rubber, coconut, oil palm, coffee, date, tea, citrus, forests, field crops (rice), and row crops (corn). I. cylindrica infestations damage crops through competition, causing suppressed growth, reduced yields, and delayed harvests. In addition to being highly competitive, the rhizomes may physically injure other plants and it appears to be allelopathic to some degree.

Sources of information:

Van Loan, Meeker, Minno. Chapter 28 Cogon Grass. Biological control of invasive plants in the eastern United States. The Bugwood Network. Accessed: 1/27/2010. [http://www.invasiveplants.net/biologicalcontrol/28CogonGrass.html] In: Van Driesche, R., et al., 2002, Biological Control of Invasive Plants in the Eastern United States, USDA Forest Service Publication FHTET-2002-04, 413 p.

Howard, Janet L. 2005. Imperata brasiliensis, I. cylindrica. In: Fire Effects Information System. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory. Available: [http://www.fs.fed.us/database/feis/ (2010, January 20)].

Question 4.3 Detrimental to Mgmt of Agricultural System, Rangeland and Pasture A Other Pub. Mat'l back

Describe impacts to water diversion systems, increased water use, reduced forage for livestock: Large infestations can require management inputs, increase water use, and reduce forage for livestock.

Rationale: Can be very competitive in agronomic settings and may require extensive control measures. Not palatable for livestock and can displace desirable forage.

Sources of information:

Howard, Janet L. 2005. Imperata brasiliensis, I. cylindrica. In: Fire Effects Information System. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory. Available: [http://www.fs.fed.us/database/feis/ (2010, January 20)].

Van Loan, Meeker, Minno. Chapter 28 Cogon Grass. Biological control of invasive plants in the eastern United States. The Bugwood Network. Accessed: 1/27/2010. [http://www.invasiveplants.net/biologicalcontrol/28CogonGrass.html] In: Van Driesche, R., et al., 2002, Biological Control of Invasive Plants in the Eastern United States, USDA Forest Service Publication FHTET-2002-04, 413 p.

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: Heavy infestations can increase fire risks and lower property values.

Rationale: Large infestations of I. cylindrica can alter the normal fire regime of a fire-driven ecosystem by causing more frequent and more intense fires that injure or destroy native plants. I. cylindrica may increase a fire's rate of spread and intensity on invaded vs. uninvaded sites. It forms a more continuous bed of fine fuel compared to native bunch grass and at mature heights, it can induce crown fire development.

Sources of information:

Howard, Janet L. 2005. Imperata brasiliensis, I. cylindrica. In: Fire Effects Information System. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory. Available: [http://www.fs.fed.us/database/feis/ (2010, January 20)].

Van Loan, Meeker, Minno. Chapter 28 Cogon Grass. Biological control of invasive plants in the eastern United States. The Bugwood Network. Accessed: 1/27/2010. [http://www.invasiveplants.net/biologicalcontrol/28CogonGrass.html] In: Van Driesche, R., et al., 2002, Biological Control of Invasive Plants in the Eastern United States, USDA Forest Service Publication FHTET-2002-04, 413 p.

Worksheet A

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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	**No: 0 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: enter text here

Worksheet B - Colorado Ecological Types and Land Use

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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	**Unknown**
	Riparian shrublands	**Unknown**
	Wet meadows	**Unknown**
Grasslands	Shortgrass prairie	**Unknown**
	Tallgrass prairie	**Unknown**
	Sandsage prairie	**Unknown**
	Montane meadows	**score**
Irrigated Agriculture	Hay meadows	**Unknown**
	Irrigated crops (alfalfa, corn, sugar beets)	**Unknown**
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	**Unknown**
	Limber pine	**Unknown**
Forest	Lodgepole pine	**Unknown**
	Spruce-fir	**score**
Alpine	Boulder and rock fields	**score**
	Dwarf shrublands	**score**
	Tundra	**score**
Barrens (lower elevation)	Dunes	**Unknown**
	Rock outcrops	**score**
	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.	**Unkown: 0 pts**
Impact of listing detrimental to industry; agriculture, horticulture, nursery, and/or seed	**Yes: 2 pt**
6 pts	**1 unknown**
A (4+ pts)	
Note any related traits: enter text here	