Taxon: Bromus catharticus **Family:** Poaceae

Common Name(s): grazing brome
prairie grass
rescue grass
Schrader's bromegrass

Synonym(s): Bromus unioloides Raspail
Bromus willdenowii Kunth
Festuca unioloides Willd.

Assessor: Chuck Chimera **Status:** Assessor Approved **End Date:** 25 Sep 2015

WRA Score: 19.0 **Designation:** H(HPWRA) **Rating:** High Risk

Keywords: Annual Grass, Short-lived Perennial, Naturalized, Environmental Weed, Forage

Qsn #	Question	Answer Option	Answer
101	Is the species highly domesticated?	y=-3, n=0	n
102	Has the species become naturalized where grown?		
103	Does the species have weedy races?		
201	Species suited to tropical or subtropical climate(s) - If island is primarily wet habitat, then substitute "wet tropical" for "tropical or subtropical"	(0-low; 1-intermediate; 2-high) (See Appendix 2)	High
202	Quality of climate match data	(0-low; 1-intermediate; 2-high) (See Appendix 2)	High
203	Broad climate suitability (environmental versatility)	y=1, n=0	y
204	Native or naturalized in regions with tropical or subtropical climates	y=1, n=0	y
205	Does the species have a history of repeated introductions outside its natural range?	y=-2, ?=-1, n=0	y
301	Naturalized beyond native range	y = 1*multiplier (see Appendix 2), n= question 205	y
302	Garden/amenity/disturbance weed		
303	Agricultural/forestry/horticultural weed	n=0, y = 2*multiplier (see Appendix 2)	n
304	Environmental weed	n=0, y = 2*multiplier (see Appendix 2)	y
305	Congeneric weed	n=0, y = 1*multiplier (see Appendix 2)	y
401	Produces spines, thorns or burrs	y=1, n=0	n
402	Allelopathic		
403	Parasitic	y=1, n=0	n
404	Unpalatable to grazing animals	y=1, n=-1	n
405	Toxic to animals		
406	Host for recognized pests and pathogens		
407	Causes allergies or is otherwise toxic to humans	y=1, n=0	n
408	Creates a fire hazard in natural ecosystems		

Qsn #	Question	Answer Option	Answer
409	Is a shade tolerant plant at some stage of its life cycle	y=1, n=0	y
410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)	y=1, n=0	y
411	Climbing or smothering growth habit	y=1, n=0	n
412	Forms dense thickets	y=1, n=0	y
501	Aquatic	y=5, n=0	n
502	Grass	y=1, n=0	y
503	Nitrogen fixing woody plant	y=1, n=0	n
504	Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)	y=1, n=0	n
601	Evidence of substantial reproductive failure in native habitat	y=1, n=0	n
602	Produces viable seed	y=1, n=-1	y
603	Hybridizes naturally		
604	Self-compatible or apomictic	y=1, n=-1	y
605	Requires specialist pollinators	y=-1, n=0	n
606	Reproduction by vegetative fragmentation	y=1, n=-1	n
607	Minimum generative time (years)	1 year = 1, 2 or 3 years = 0, 4+ years = -1	1
701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	y=1, n=-1	y
702	Propagules dispersed intentionally by people	y=1, n=-1	n
703	Propagules likely to disperse as a produce contaminant	y=1, n=-1	y
704	Propagules adapted to wind dispersal	y=1, n=-1	y
705	Propagules water dispersed	y=1, n=-1	y
706	Propagules bird dispersed	y=1, n=-1	n
707	Propagules dispersed by other animals (externally)	y=1, n=-1	y
708	Propagules survive passage through the gut		
801	Prolific seed production (>1000/m2)		
802	Evidence that a persistent propagule bank is formed (>1 yr)	y=1, n=-1	y
803	Well controlled by herbicides	y=-1, n=1	y
804	Tolerates, or benefits from, mutilation, cultivation, or fire	y=1, n=-1	y
805	Effective natural enemies present locally (e.g. introduced biocontrol agents)		

Supporting Data:

Qsn #	Question	Answer
101	**Is the species highly domesticated?**	**n**
	Source(s)	**Notes**
	Jacobs, S.W.L. & Everett, J.(eds.). 2000. Grasses: Systematics and Evolution. CSIRO Publishing, Collingwood, Australia	[Assessment of wild type occurring in Hawaiian Islands. Unknown if commercial varieties has been domesticated to the degree that invasiveness is reduced] 'It is well known natural pasture grass and several commercial varieties are cultivated as winter forage."
	Quattrocchi, U. 2006. CRC World Dictionary of Grasses: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology. CRC Press, Boca Raton, FL	No evidence of domestication

102	**Has the species become naturalized where grown?**	
	Source(s)	**Notes**
	WRA Specialist. 2015. Personal Communication	NA

103	**Does the species have weedy races?**	
	Source(s)	**Notes**
	WRA Specialist. 2015. Personal Communication	NA

201	**Species suited to tropical or subtropical climate(s) - If island is primarily wet habitat, then substitute "wet tropical" for "tropical or subtropical"**	**High**
	Source(s)	**Notes**
	USDA, ARS, National Genetic Resources Program. 2015. Germplasm Resources Information Network - (GRIN) [Online Database]. National Germplasm Resources Laboratory, Beltsville, Maryland. URL: http://www.ars-grin.gov/. [Accessed 23 Sep 2015]	"Native: SOUTHERN AMERICA Northern South America: Venezuela - Federal District, Lara, Merida Brazil: Brazil - Parana, Rio Grande do Sul, Santa Catarina, Sao Paulo Western South America: Bolivia - Cochabamba, La Paz, Oruro, Potosi; Colombia - Antioquia, Cauca, Cundinamarca, Narino, Norte de Santander; Ecuador; Peru Southern South America: Argentina - Buenos Aires, Catamarca, Chaco, Chubut, Cordoba, Corrientes, Entre Rios, Jujuy, La Pampa, La Rioja, Mendoza, Neuquen, Rio Negro, Salta, San Juan, San Luis, Santa Cruz, Santa Fe, Tucuman; Chile - Antofagasta, Coquimbo, Santiago; Paraguay; Uruguay"

202	**Quality of climate match data**	**High**
	Source(s)	**Notes**
	USDA, ARS, National Genetic Resources Program. 2015. Germplasm Resources Information Network - (GRIN) [Online Database]. National Germplasm Resources Laboratory, Beltsville, Maryland. URL: http://www.ars-grin.gov/. [Accessed 23 Sep 2015]	

Qsn #	Question	Answer
203	**Broad climate suitability (environmental versatility)**	**y**
	Source(s)	**Notes**
	White, Mi.R. (ed.). 2013. Invasive Plants and Weeds of the National Forests and Grasslands in the Southwestern Region. Second Edition. USDA Forest Service, Southwestern Region, Apache-Sitgreaves National Forests	"Rescuegrass is able to survive in a variety of different habitats and can tolerate cold temperatures and drought conditions. These characteristics make it difficult to manage."
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	[Elevation range exceeds 2000 m, demonstrating environmental versatility] "in Hawai'i naturalized and common in pastures, open areas, and along trails and roadsides, 300-3,050 m,"

204	**Native or naturalized in regions with tropical or subtropical climates**	**y**
	Source(s)	**Notes**
	USDA, ARS, National Genetic Resources Program. 2015. Germplasm Resources Information Network - (GRIN) [Online Database]. National Germplasm Resources Laboratory, Beltsville, Maryland. URL: http://www.ars-grin.gov/. [Accessed 23 Sep 2015]	"Native: SOUTHERN AMERICA Northern South America: Venezuela - Federal District, Lara, Merida Brazil: Brazil - Parana, Rio Grande do Sul, Santa Catarina, Sao Paulo Western South America: Bolivia - Cochabamba, La Paz, Oruro, Potosi; Colombia - Antioquia, Cauca, Cundinamarca, Narino, Norte de Santander; Ecuador; Peru Southern South America: Argentina - Buenos Aires, Catamarca, Chaco, Chubut, Cordoba, Corrientes, Entre Rios, Jujuy, La Pampa, La Rioja, Mendoza, Neuquen, Rio Negro, Salta, San Juan, San Luis, Santa Cruz, Santa Fe, Tucuman; Chile - Antofagasta, Coquimbo, Santiago; Paraguay; Uruguay"

205	**Does the species have a history of repeated introductions outside its natural range?**	**y**
	Source(s)	**Notes**
	White, Mi.R. (ed.). 2013. Invasive Plants and Weeds of the National Forests and Grasslands in the Southwestern Region. Second Edition. USDA Forest Service, Southwestern Region, Apache-Sitgreaves National Forests	"Native to South America; rescuegrass has been widely introduced into the southern half of the U.S. as a forage crop."
	Quattrocchi, U. 2006. CRC World Dictionary of Grasses: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology. CRC Press, Boca Raton, FL	"weed species widely naturalized elsewhere"

301	**Naturalized beyond native range**	**y**
	Source(s)	**Notes**
	Queensland Government. 2011. Weeds of Australia - Bromus catharticus. http://keyserver.lucidcentral.org/weeds/data/03030800-0b07-490a-8d04-0605030c0f01/media/Html/Bromus_catharticus.htm. [Accessed 23 Sep 2015]	"A widely naturalised species that is very abundant in the south-eastern parts of Australia. It is most common and widespread in Victoria, New South Wales, ACT and south-eastern Queensland. Relatively common in the southern regions of Western Australia, in south-eastern South Australia and in Tasmania. Present in some parts of the Northern Territory and in other parts of Queensland, South Australia and Western Australia. Also naturalised on Lord Howe Island and Norfolk Island, and widely naturalised in other parts of the world (e.g. New Zealand, USA, Hawaii and La R union)."

Qsn #	Question	Answer
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	"Native to South America; in Hawai'i naturalized and common in pastures, open areas, and along trails and roadsides, 300-3,050 m, on Midway Atoll, O'ahu, Moloka'i, Maui, and Hawai'i. First collected on Moloka'i in 1909 (Rock s.n., BISH).-"
	Oppenheimer, H. 2008. New Hawaiian plant records for 2007. Bishop Museum Occasional Papers 100: 22-38	"Naturalized and common in Hawaii on the islands of Midway Atoll, Kauai, Oahu, Molokai, Maui, and Hawaii (Wagner et al. 1999a: 1508; Lorence & Flynn 1997: 11), rescue grass is now known from Länai, where it is found in lawns and waste areas in the Länai City area. The change in name from B. willdenowii Kunth was reported by Herbst & Clayton (1998: 20)."
	PlantNET. 2015. New South Wales Flora Online - Bromus catharticus. Nation Herbarium of NSW, Royal Botanic Garden, Sydney, Australia. http://plantnet.rbgsyd.nsw.gov.au/cgi bin/NSWfl.pl?page=nswfl&lvl=sp&name=Bromus~catharticus. [Accessed 23 Sep 2015]	"Widespread weed, but only growing in isolated patches, especially cultivated or moist, shady, ungrazed areas. Also grown as a pasture species; the seed is imported from U.S.A. and, when first planted, produces a perennial pasture that quickly appears to be replaced by annual or short lived perennial forms."
	Lorence, D. & Flynn, T. 1997. New Naturalized Plant Records for Kaua'i. Bishop Museum Occasional Papers 49: 9-13	[Bromus wildenowii = B. catharticus] "Bromus wildenowii Kunth New island record The following collection represents a new record for Kauai. Bromus willdenowii is widespread in the islands, having previously been recorded from Midway, Oahu, Molokai, Maui, and Hawaii. Material examined. KAUAI: Waimea District, Waimea Canyon State Park. Hwy 550 near mile 9, ca 2900 ft [884 m], locally common along roadside, 4 May 1987, Flynn 2180 (PTBG)."

302	Garden/amenity/disturbance weed	
	Source(s)	**Notes**
	Queensland Government. 2011. Weeds of Australia - Bromus catharticus. http://keyserver.lucidcentral.org/weeds/data/03030800-0b07-490a-8d04-0605030c0f01/media/Html/Bromus_catharticus.htm. [Accessed 23 Sep 2015]	"[Disturbance adapted environmental weed] Prairie grass (Bromus catharticus) is regarded as an environmental weed in many parts of south eastern Australia, particularly in New South Wales and Victoria. It forms dense swards that outcompete native ground layer plants and prevents natural regeneration in bushland. In Victoria it is a weed of riparian shrubland communities in the Goldfields Bioregion and of wetlands along the Lower Broken River."
	White, Mi.R. (ed.). 2013. Invasive Plants and Weeds of the National Forests and Grasslands in the Southwestern Region. Second Edition. USDA Forest Service, Southwestern Region, Apache-Sitgreaves National Forests	"Cultivated and disturbed or degraded sites in desert and semidesert grassland communities, and roadsides within elevations that generally range below 4,500 feet." ... "This species generally occurs as a weed in wildland areas of the Southwestern Region rather than as an invasive plant."
	Quattrocchi, U. 2006. CRC World Dictionary of Grasses: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology. CRC Press, Boca Raton, FL	"weed species widely naturalized elsewhere" ... "...common in waste and disturbed places, lawns, gardens, riverbanks, areas under irrigation, dry to moderately moist waste places, near water, along roadsides, bottomlands and moist bottom, agricultural fields, cultivated lands, bare soil , vacant lots, slopes, orchards"

303	Agricultural/forestry/horticultural weed	n
	Source(s)	**Notes**

Qsn #	Question	Answer
	Queensland Government. 2011. Weeds of Australia - Bromus catharticus. http://keyserver.lucidcentral.org/weeds/data/03030800-0b07-490a-8d04-0605030c0f01/media/Html/Bromus_catharticus.htm. [Accessed 23 Sep 2015]	"Prairie grass (Bromus catharticus) is regarded as an environmental weed in many parts of south eastern Australia, particularly in New South Wales and Victoria."

304	Environmental weed	y
	Source(s)	**Notes**
	Queensland Government. 2011. Weeds of Australia - Bromus catharticus. http://keyserver.lucidcentral.org/weeds/data/03030800-0b07-490a-8d04-0605030c0f01/media/Html/Bromus_catharticus.htm. [Accessed 23 Sep 2015]	"Impacts: Prairie grass (Bromus catharticus) is regarded as an environmental weed in many parts of south-eastern Australia, particularly in New South Wales and Victoria. It forms dense swards that outcompete native ground layer plants and prevents natural regeneration in bushland. In Victoria it is a weed of riparian shrubland communities in the Goldfields Bioregion and of wetlands along the Lower Broken River. It has also been recorded in conservation areas (e.g. Phillip Island Nature Park) and is a commonly reported weed species in remnant plant communities that are home to the threatened Euroa guinea-flower (Hibbertia humifusa subsp. erigens). It is also a weed of bushland (i.e. on the Cumberland Plain near Sydney) and conservation areas (e.g. Berkeley Nature Reserve in Woolongong) in New South Wales. It has also been recorded in numerous conservation areas in South Australia (i.e. Cobbler Creek Recreation Park, Onkaparinga River National Park, Black Hill Conservation Park, Cleland Conservation Park, Sturt Gorge Recreation Park and Cudlee Creek Conservation Park)."
	Medeiros, A.C., Loope, L.L. & Chimera, C.G. 1998. Flowering Plants and Gymnosperms of Haleakala National Park. Technical Report 120. Pacific Cooperative Studies Unit, Honolulu, HI	[Bromus willdenowii = Bromus catharticus. Invading Aeolian zone. Impacts unspecified] "Alpine (aeolian) zone ... Generally, non-native species are few, limited in cover, and largely restricted to habitats modified by man, such as on compacted cinder, surrounding buildings, and in pavement cracks in parking lots. Characteristic alien species include Hvpochoeris radicata (gosmore), Oenothera stricta (evening primrose), and Bromus willdenowii (rescue grass)." ... "Tall, coarse, perennial grass, somewhat uncommon, but apparently spreading. First collected on Maui at "Waiopai Ranch", Nu'u district in 1920 (C.N. Forbes 1856M, BISH). This species may in the future be transferred back to B. catharticus Vahl (BISH herbarium note by W.D. Clayton, 1994)."

305	Congeneric weed	y
	Source(s)	**Notes**
	White, Mi.R. (ed.). 2013. Invasive Plants and Weeds of the National Forests and Grasslands in the Southwestern Region. Second Edition. USDA Forest Service, Southwestern Region, Apache-Sitgreaves National Forests	"Bromus tectorum ... Native to Eurasia and Africa; cheatgrass has a compressed phenology and usually dries out and casts seeds by mid-June; these dry plants can fuel wildfires; if fires occur frequently, perennials will likely give way to a community dominated by cheatgrass and other annuals. New Mexico Class C noxious weed."

Qsn #	Question	Answer
	Mack, R. N. (1981). Invasion of Bromus tectorum L. into western North America: an ecological chronicle. Agro-Ecosystems, 7(2): 145-165	"Bromus tectorum L., the most ubiquitous alien in steppe vegetation in the intermountain West of North America, entered British Columbia, Washington, and Utah ca. 1889–1894. By ca. 1928 the grass had reached its present distribution occupying much of the perennial grasslands in Washington, Idaho, Oregon, Nevada, Utah and British Columbia as native grasses dwindled with overgrazing and cultivation. In the process this cleistogamous winter annual may have competitively displaced both native colonizers (including cleistogamous us annual grasses) as well as the dominants of climax stands. The spread of B. tectorum demonstrates the degree of success an alien may achieve when preadaption, habitat alteration simultaneous with entry, unwitting conformation of agricultural practices to the plant's ecology and apparent susceptibility of the native flora to invasion, are all in phase."
	Weber, E. 2003. Invasive Plant Species of the World. A Reference Guide to Environmental Weeds. CABI Publishing, Wallingford, UK	Includes Bromus inermis, Bromus rubens & Bromus tectorum as environmental weeds

401	Produces spines, thorns or burrs	n
	Source(s)	**Notes**
	Clayton, W.D., Vorontsova, M.S., Harman, K.T. and Williamson, H. 2006 onwards. GrassBase - The Online World Grass Flora. http://www.kew.org/data/grasses-db.html. [Accessed]	[No evidence] "HABIT Perennial; caespitose. Culms erect, or geniculately ascending; 80-100 cm long. Leaf sheaths pubescent. Ligule an eciliate membrane. Leaf-blades 10-30 cm long; 3-8 mm wide. "

402	Allelopathic	
	Source(s)	**Notes**
	Chou, C. H. (1999). Roles of allelopathy in plant biodiversity and sustainable agriculture. Critical Reviews in Plant Sciences, 18(5): 609-636	[Leachate stimulates seedling growth] "These experiments, conducted at the Meifeng Highland Experimental Station farm of the National Taiwan University, were designed to evaluate the competitive and allelopathic nature of cover grasses, namely; Bromus catharticus, Dactylis glomerata, Eragrotis curvula, Lolium multiflorum, L. perenne, Paspalum notatum, P. dilatatum, Pennisetum clandestinum, and Triflorum repens (Chou, 1988). The soil leachate of each grass was used for watering pear seedlings (Pyrus lindleyi) of about 10 cm in height." ... "When they were grown in soil without fertilizer their growth was stimulated by four of the leachates (D. glomerata, B. catharticus, L. multiflorum, and E. curvula) (Chou, 1988), whereas remaining leachates, however, caused little inhibition of seedling growth."

Qsn #	Question	Answer
403	**Parasitic**	**n**
	Source(s)	**Notes**
	USDA, ARS, National Genetic Resources Program. 2015. Germplasm Resources Information Network - (GRIN) [Online Database]. National Germplasm Resources Laboratory, Beltsville, Maryland. URL: http://www.ars-grin.gov/. [Accessed 23 Sep 2015]	"Family: Poaceae (alt. Gramineae) subfamily: Pooideae tribe: Bromeae" [Not parasitic]

404	Unpalatable to grazing animals	n
	Source(s)	**Notes**
	Hatch, S.L., Schuster, J.L. & Drawe, D.L. 1999. Grasses of the Texas Gulf Prairies and Marshes. Texas A&M University Press, College Station, TX	"Good early spring forage for livestock and white-tailed deer."
	Quattrocchi, U. 2006. CRC World Dictionary of Grasses: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology. CRC Press, Boca Raton, FL	"palatable or relatively palatable, medicinal value, used by dogs and horses, native pasture species, cultivated as a pasture species , good forage, fodder,"
	White, Mi.R. (ed.). 2013. Invasive Plants and Weeds of the National Forests and Grasslands in the Southwestern Region. Second Edition. USDA Forest Service, Southwestern Region, Apache-Sitgreaves National Forests	"Rescuegrass has excellent forage quality."

405	Toxic to animals	
	Source(s)	**Notes**
	Australian Biological Resources Study. 2002. Flora of Australia, Volume 43. Poaceae 1. Introduction and Atlas. CSIRO Publishing, Collingwood, Australia	"Bromus catharticus (Prairie Grass), cultivated under irrigation as a pasture grass, is also a weed of orchards and gardens, and sometimes nitrate-toxic."
	Quattrocchi, U. 2006. CRC World Dictionary of Grasses: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology. CRC Press, Boca Raton, FL	"contains toxic levels of nitrates"
	Bryson, C.T.& DeFelice, M.S. 2009. Weeds of the South. University of Georgia Press, Athens, GA	"The long awns of various species of Bromus can injure grazing animals, with tetanus a possible result; plants may be infected with fungi that cause ergot."

406	Host for recognized pests and pathogens	
	Source(s)	**Notes**
	Freitag, J. H. (1951). Host range of the Pierce's disease virus of grapes as determined by insect transmission. Phytopathology, 41(10): 920-934	"Natural infection by the virus was demonstrated for 36 species (including 8 grasses, 9 ornamentals, and 13 weeds) in 18 families" ... "The 22 species of Gramineae experimentally infected by the virus included, besides those already mentioned, Avena fatua, Bromus catharticus, B. rigidus, Digitaria sanguinalis, Echinochloa crus-galli, Sudan grass, Hordeum murinum, barley, Poa annua, Phalaris minor, Pennisetum clandestinum, and Setaria lutescens [Setaria pumila]."
	Jones, R. A. (2013). Virus diseases of pasture grasses in Australia: incidences, losses, epidemiology, and management. Crop and Pasture Science, 64(3): 216-233	"Table 2. Viruses found infecting individual pasture and wild grass species in Australia" [Bromus catharticus - Viruses found = Bromus catharticus striate mosaic virus (BCSMV), Barley yellow dwarf virus (BYDV), Cereal chlorotic mottle virus (CCMV)]

Qsn #	Question	Answer
	Garcia-Guzman, G., Burdon, J. J., & Nicholls, A. O. (1996). Effects of the systemic flower infecting-smut Ustilago bullata on the growth and competitive ability of the grass Bromus catharticus. Journal of Ecology, 84(5): 657-665	[No alternate hosts reported] "The effects of the flower infecting-smut fungus Ustilago bullata on the performance of its host Bromus catharticus were investigated through a series of glasshouse-based experiments"

407	Causes allergies or is otherwise toxic to humans	n
	Source(s)	**Notes**
	Wagstaff, D.J. 2008. International poisonous plants checklist: an evidence-based reference. CRC Press, Boca Raton, FL	No evidence

408	Creates a fire hazard in natural ecosystems	
	Source(s)	**Notes**
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai‘i Press and Bishop Museum Press, Honolulu, HI.	[Unknown. May contribute to fuel load & increase intensity & frequency of wild fires] "in Hawai'i naturalized and common in pastures, open areas, and along trails and roadsides"

409	Is a shade tolerant plant at some stage of its life cycle	y
	Source(s)	**Notes**
	Hornby Shire Council. 2013. Grasses: Native & Exotic in the Hornsby Shire. Hornby Shire Council, Hornsby NSW	"Isolated patches usually in corners of paddocks, roadside verges and orchards particularly in wetter margins although it is quite drought tolerant. Tolerates shade too."
	Peel, B. 2010. Rainforest Restoration Manual for South-Eastern Australia. CSIRO Publishing, Collingwood, Australia	[Shade-dependent] "So, one of the major objectives of rainforest restoration is to get as much shade cover on the bare restoration site as soon as possible. This generally leads to the establishment of less aggressive shade-dependent weeds, such as Prairie Brome Grass 'Bromus catharticus..."

410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)	y
	Source(s)	**Notes**
	McLeod, E. 1982. Feed the Soil. Organic Agriculture Research Institute, Graton, CA	"It grows in any soil type and has a low lime requirement."
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai‘i Press and Bishop Museum Press, Honolulu, HI.	[Broad distribution suggests no substrate limitations] "in Hawai'i naturalized and common in pastures, open areas, and along trails and roadsides, 300-3,050 m, on Midway Atoll, O'ahu, Moloka'i, Maui, and Hawai'i."

411	Climbing or smothering growth habit	n
	Source(s)	**Notes**
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai‘i Press and Bishop Museum Press, Honolulu, HI.	"Stout annuals or short-lived perennials; culms erect to spreading, (2.5-)6-15 dm tall, glabrous."

Qsn #	Question	Answer
412	**Forms dense thickets**	**y**
	Source(s)	**Notes**
	Queensland Government. 2011. Weeds of Australia - Bromus catharticus. http://keyserver.lucidcentral.org/weeds/data/03030800-0b07-490a-8d04-0605030c0f01/media/Html/Bromus_catharticus.htm. [Accessed 23 Sep 2015]	" It forms dense swards that outcompete native ground layer plants and prevents natural regeneration in bushland. "

501	**Aquatic**	**n**
	Source(s)	**Notes**
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	[Terrestrial grass] "in Hawai'i naturalized and common in pastures, open areas, and along trails and roadsides"

502	**Grass**	**y**
	Source(s)	**Notes**
	USDA, ARS, National Genetic Resources Program. 2015. Germplasm Resources Information Network - (GRIN) [Online Database]. National Germplasm Resources Laboratory, Beltsville, Maryland. URL: http://www.ars-grin.gov/. [Accessed 23 Sep 2015]	"Family: Poaceae (alt. Gramineae) subfamily: Pooideae tribe: Bromeae"

503	**Nitrogen fixing woody plant**	**n**
	Source(s)	**Notes**
	Quattrocchi, U. 2006. CRC World Dictionary of Grasses: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology. CRC Press, Boca Raton, FL	[Poaceae] "Annual growth habit or short -lived perennial or biennial , variable, bunchgrass, herbaceous, unbranched, densely tufted, robust, open, stout , erect or spreading, erect or decumbent"

504	**Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)**	**n**
	Source(s)	**Notes**
	White, Mi.R. (ed.). 2013. Invasive Plants and Weeds of the National Forests and Grasslands in the Southwestern Region. Second Edition. USDA Forest Service, Southwestern Region, Apache-Sitgreaves National Forests	"It does not have creeping stolons or rhizomes; however, it has an extensive fibrous root system and tillers profusely."

601	**Evidence of substantial reproductive failure in native habitat**	**n**
	Source(s)	**Notes**
	Quattrocchi, U. 2006. CRC World Dictionary of Grasses: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology. CRC Press, Boca Raton, FL	"Southern America." ... "weed species widely naturalized elsewhere" [No evidence. Widespread native & introduced range]

Qsn #	Question	Answer
602	**Produces viable seed**	y
	Source(s)	**Notes**
	White, Mi.R. (ed.). 2013. Invasive Plants and Weeds of the National Forests and Grasslands in the Southwestern Region. Second Edition. USDA Forest Service, Southwestern Region, Apache-Sitgreaves National Forests	"Reproduces by seed."
	Queensland Government. 2011. Weeds of Australia - Bromus catharticus. http://keyserver.lucidcentral.org/weeds/data/03030800-0b07-490a-8d04-0605030c0f01/media/Html/Bromus_catharticus.htm. [Accessed 23 Sep 2015]	"This species reproduces entirely by seed. Seeds may be spread about by mowers, slashers and in dumped garden waste and are dispersed larger distances in contaminated agricultural produce (e.g. fodder). They can also be dispersed by wind and animals, and become attached to vehicles and clothing."

603	**Hybridizes naturally**	
	Source(s)	**Notes**
	Stebbins Jr, G. L., & Tobgy, H. A. (1944). The cytogenetics of hybrids in Bromus. I. Hybrids within the section Ceratochloa. American Journal of Botany, 31(1): 1-11	[Possibly. Artificial hybrids possible] "F1 hybrids have been obtained between four different octoploid strains of the Bromus carinatus complex, three of which are classified as typical B. carinatus and the fourth as either B. polyanthus or B. marginatus. A second series of hybrids is between three of the above mentioned strains of B. carinatus and the hexaploid B. catharticus. These hybrids are all vigorous in growth and morphologically intermediate between their parents"

604	**Self-compatible or apomictic**	y
	Source(s)	**Notes**
	Frankel, R. & Galun, E. 1977. Pollination Mechanisms, Reproduction and Plant Breeding. Volume 2 of Monographs on Theoretical and Applied Genetics. Springer-Verlag, Berlin, Heidelberg	"Cleisto-chasmogamic floral dimorphism often exists in grasses. Panicles of rescue grass (Bromus catharticus) produce many cleistogamous florets in dry and hot weather."

605	**Requires specialist pollinators**	n
	Source(s)	**Notes**
	Zomlefer, W.B. 1994. Guide to Flowering Plant Families. The University of North Carolina Press, Chapel Hill & London	Poaceae [anemophilous. Wind-pollinated]

606	**Reproduction by vegetative fragmentation**	n
	Source(s)	**Notes**
	White, Mi.R. (ed.). 2013. Invasive Plants and Weeds of the National Forests and Grasslands in the Southwestern Region. Second Edition. USDA Forest Service, Southwestern Region, Apache-Sitgreaves National Forests	[No evidence] "Rescuegrass is a loosely cespitose or tufted cool-season annual, biennial, or perennial bunchgrass. In areas that have hot, dry summers and severe winter temperatures, it grows as an annual. It does not have creeping stolons or rhizomes; however, it has an extensive fibrous root system and tillers profusely." ... "Reproduces by seed."

Qsn #	Question	Answer
607	**Minimum generative time (years)**	**1**
	Source(s)	**Notes**
	Quattrocchi, U. 2006. CRC World Dictionary of Grasses: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology. CRC Press, Boca Raton, FL	"Annual growth habit or short -lived perennial or biennial"

701	**Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)**	**y**
	Source(s)	**Notes**
	Quattrocchi, U. 2006. CRC World Dictionary of Grasses: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology. CRC Press, Boca Raton, FL	"common in waste and disturbed places, lawns, gardens, riverbanks, areas under irrigation, dry to moderately moist waste places, near water, along roadsides, bottomlands and moist bottom, agricultural field s, cultivated lands, bare soil , vacant lots, slopes, orchards,"
	Queensland Government. 2011. Weeds of Australia - Bromus catharticus. http://keyserver.lucidcentral.org/weeds/data/03030800-0b07-490a-8d04-0605030c0f01/media/Html/Bromus_catharticus.htm. [Accessed 23 Sep 2015]	"This species reproduces entirely by seed. Seeds may be spread about by mowers, slashers and in dumped garden waste and are dispersed larger distances in contaminated agricultural produce (e.g. fodder). They can also be dispersed by wind and animals, and become attached to vehicles and clothing."
	White, Mi.R. (ed.). 2013. Invasive Plants and Weeds of the National Forests and Grasslands in the Southwestern Region. Second Edition. USDA Forest Service, Southwestern Region, Apache-Sitgreaves National Forests	[Roadsides] "Cultivated and disturbed or degraded sites in desert and semidesert grassland communities, and roadsides within elevations that generally range below 4,500 feet."

702	**Propagules dispersed intentionally by people**	**n**
	Source(s)	**Notes**
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai‘i Press and Bishop Museum Press, Honolulu, HI.	[Probably intentionally dispersed in the past. No evidence of current introduction or intentional movement] "in Hawai'i naturalized and common in pastures, open areas, and along trails and roadsides, 300 -3,050 m, on Midway Atoll, O'ahu, Moloka'i, Maui, and Hawai'i. First collected on Moloka'i in 1909 (Rock s.n., BISH).-"

703	**Propagules likely to disperse as a produce contaminant**	**y**
	Source(s)	**Notes**
	Queensland Government. 2011. Weeds of Australia - Bromus catharticus. http://keyserver.lucidcentral.org/weeds/data/03030800-0b07-490a-8d04-0605030c0f01/media/Html/Bromus_catharticus.htm. [Accessed 23 Sep 2015]	"This species reproduces entirely by seed. Seeds ... are dispersed larger distances in contaminated agricultural produce (e.g. fodder)."

704	**Propagules adapted to wind dispersal**	**y**
	Source(s)	**Notes**

Qsn #	Question	Answer
	Queensland Government. 2011. Weeds of Australia - Bromus catharticus. http://keyserver.lucidcentral.org/weeds/data/03030800-0b07-490a-8d04-0605030c0f01/media/Html/Bromus_catharticus.htm. [Accessed 23 Sep 2015]	"This species reproduces entirely by seed. ... They can also be dispersed by wind and animals, and become attached to vehicles and clothing."

705	Propagules water dispersed	y
	Source(s)	**Notes**
	DiTomaso, J. 2007. Weeds of California and Other Western States, Volume 2. UCANR Publications, Oakland, CA	"Reproduces by seed. Seeds disperse within the vicinity of the parent plant or to greater distances with water, soil movement, mud, animals, and human activities."
	Quattrocchi, U. 2006. CRC World Dictionary of Grasses: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology. CRC Press, Boca Raton, FL	[Possibly. Along riverbanks & near water] "common in waste and disturbed places, lawns, gardens, riverbanks, areas under irrigation, dry to moderately moist waste places, near water"

706	Propagules bird dispersed	n
	Source(s)	**Notes**
	Hatch, S.L., Schuster, J.L. & Drawe, D.L. 1999. Grasses of the Texas Gulf Prairies and Marshes. Texas A&M University Press, College Station, TX	"Seed eaten by a number of birds and rodents." [Presumably depredated by these animals]

707	Propagules dispersed by other animals (externally)	y
	Source(s)	**Notes**
	Queensland Government. 2011. Weeds of Australia - Bromus catharticus. http://keyserver.lucidcentral.org/weeds/data/03030800-0b07-490a-8d04-0605030c0f01/media/Html/Bromus_catharticus.htm. [Accessed 23 Sep 2015]	"This species reproduces entirely by seed. Seeds may be spread about by mowers, slashers and in dumped garden waste and are dispersed larger distances in contaminated agricultural produce (e.g. fodder). They can also be dispersed by wind and animals, and become attached to vehicles and clothing."

708	Propagules survive passage through the gut	
	Source(s)	**Notes**
	Vignolio, O. R., & Fernández, O. N. (2010). Cattle dung as vector of spreading seeds of exotic species in the Flooding Pampa grasslands (Buenos Aires, Argentina). Annales Botanici Fennici 47(1): 14-22	"Emergence of seedlings from cattle dung collected in different seasons from grasslands of the Flooding Pampa was analysed." ... "We found 121 plant species growing in the grasslands. The number of species emerging from dung was 41." [Unknown. Bromus catharticus recorded in the grasslands of the Flooding Pampa, but not documented in cattle dung]
	Hatch, S.L., Schuster, J.L. & Drawe, D.L. 1999. Grasses of the Texas Gulf Prairies and Marshes. Texas A&M University Press, College Station, TX	[Unknown if viable seeds are excreted after consumption by livestock or deer] "Good early spring forage for livestock and white-tailed deer."

801	Prolific seed production (>1000/m2)	

Qsn #	Question	Answer
	Source(s)	**Notes**
	DiTomaso, J. 2007. Weeds of California and Other Western States, Volume 2. UCANR Publications, Oakland, CA	"A large proportion of seeds is usually viable." [Densities unspecified]
	Rodriguez, A. M., & Jacobo, E. J. (2013). Glyphosate effects on seed bank and vegetation composition of temperate grasslands. Applied Vegetation Science, 16(1): 51-62	[Seed densities may exceed 1000/m2 in glyphosate treated plots] "We studied paddocks dominated by native grassland on a commercial livestock farm." ... "Glyphosate treatment caused a dramatic shift in seed bank composition, so that seed densities of cool-season annual grasses increased while cool and warm-season perennial grasses, sedges, legumes and dicotyledonous herbs decreased." ... "Appendix 1 Average number of seeds germinating m 2 of species registered in seed banks of untreated and glyphosate treated paddocks fromthe upper and lower slope positions." [Bromus catharticus seed densities range from 161 seeds/m2 in the Untreated Upper slope position to 2168 seeds/m2 in the Glyphosate treated Upper slope position]

802	Evidence that a persistent propagule bank is formed (>1 yr)	y
	Source(s)	**Notes**
	DiTomaso, J. 2007. Weeds of California and Other Western States, Volume 2. UCANR Publications, Oakland, CA	"Seeds are able to germinate upon maturation or remain dormant for at least several months depending on the population and environmental conditions."
	Snyman, H. A. (2010). Longevity of grass seeds in a semi-arid grassland. Grassroots, 10(2): 8-15	[Found in seed bank for 4-5 years] "Aristida congesta, Tragus koelerioides, Elionurus muticus and Bromus catharticus are the only species emerging in the seed bank after four years of seed removal, but were not found where the seed was not removed." ... "Those species only occurring in the seed bank over the 5 years, but not in the field, included Helictotrichon turgidulum, Panicum stapfianum, Pentaschistis setifolium, E. lehmanniana, E. superba, E. plana, Agrostis lachnantha, E. gummiflua, Cynodon dactylon, C. hirsutus, Elionurus muticus, Bromus catharticus and Eleusine coracana (13/27 species)."

803	Well controlled by herbicides	y
	Source(s)	**Notes**
	Texasinvasives.org. 2015. Invasive Database - Bromus catharticus. http://texasinvasives.org/plant_database/detail.php symbol=BRCA6. [Accessed 23 Sep 2015]	"Chemical: In degraded areas use 10 ml/10 L glyphosate on seedlings, young plants or when flowering. "

Qsn #	Question	Answer
	Warner, H. L., & Holmdal, J. A. (1995). Thiazopyr weed control in perennial crops. In Brighton crop protection conference: weeds. Proceedings of an international conference, Brighton, UK, 20-23 November 1995. (Vol. 3, pp. 943-946). British Crop Protection Council	"Trials conducted in California and the Pacific Northwest in 1993-94 on apples, walnuts and grapes indicated that a single pre-emergence application of thiazopyr at 0.44 kg a.i./ha provided annual grass and selected broadleaf weed control equivalent to 2.2 kg a.i. norflurazon, 4.4 kg a.i. oryzalin or 4.4 kg a.i. pendimethalin/ha. Thiazopyr was most effective for the control of annual grass species and provided excellent long-term control with pre-emergence rates at or above 0.11 kg a.i./ha. Annual grasses controlled included Echinochloa crus-galli, Poa annua, Setaria viridis, Bromus catharticus and Cynodon dactylon. Broadleaf weeds controlled at 0.45 kg a.i./ha included Stellaria media, Calandrinia caulescens, Malva parviflora, Lamium amplexicaule, Urtica dioica, Sisymbrium irio, Capsella bursa-pastoris, Solanum nigrum, Hippuris vulgaris, Sonchus oleraceus, Senecio vulgaris, Anthemis cotula, Amaranthus retroflexus, Chenopodium album, Epilobium paniculatum, Lactuca serriola, Erodium moschatum and Ranunculus muricatus. When tank-mixed with oxyfluorfen, additional control of the following weeds was obtained: Cyperus esculentus, Echinochloa crus-galli, Calandrinia caulescens, Raphanus raphanistrum, Sisymbrium irio and Kochia scoparia."
	Ratliff, R. L., & Peeper, T. F. (1987). Bromus control in winter wheat (Triticum aestivum) with the ethylthio analog of metribuzin. Weed Technology, 1(3): 235-241	"Twenty field experiments were conducted in Oklahoma from 1983 through 1986 to evaluate the ethylthio analog of metribuzin [4-amino-6-(1,1-dimethylethyl)-3-(ethylthio)-1,2,4-triazin-5(4H -one] for selective control of cheat (Bromus secalinus L. #3 BROSE), downy brome (Bromus tectorum L. # BROTE), and rescuegrass (Bromus catharticus Vahl. # BROCA) in winter wheat (Triticum aestivum L.). The ethylthio analog of metribuzin applied postemergence at 1.1 kg ai/ha before the weeds tillered controlled 91 to 100% of these Bromus spp. in winter wheat. Control of tillered Bromus spp. was less consistent. As Bromus spp. control increased, wheat yields increased, and dockage decreased. The herbicide was selective on wheat over a wide range of soils, including sands. Adding surfactant to very early postemergence applications of 0.6 kg ai/ha increased cheat control but injured wheat slightly. Surfactant use had little or no effect on dockage reduction and yields."

804	Tolerates, or benefits from, mutilation, cultivation, or fire	y
	Source(s)	**Notes**
	Baars, J. A., & Cranston, A. (1977). Performance of 'Grasslands Matua'prairie grass under close mowing in the central North Island. Proceedings of the NZ Grassland Association 39: 139-147	[Tolerates mowing & grazing] "'Grasslands Matua' prairie grass (Rronzus catharticus) was evaluated under close mowing (a) against cocksfoot, phalaris, and tall fescue as a companion grass for lucerne, on a pumice soil from 1974 to 1977..." ... "Annual production of Matua and Nui ryegrass swards was not significantly different. Matua swards were, however, superior to Nui from midsummer to early spring, whereas over spring/early summer Nui swards outproduced Matua swards"

805	Effective natural enemies present locally (e.g. introduced biocontrol agents)	
	Source(s)	**Notes**

Qsn #	Question	Answer
	Wagner, W.L., Herbst, D.R.& Sohmer, S.H. 1999. Manual of the flowering plants of Hawaii. Revised edition. University of Hawai‘i Press and Bishop Museum Press, Honolulu, HI.	[Probably not. Widespread] "Native to South America; in Hawai'i naturalized and common in pastures, open areas, and along trails and roadsides, 300-3,050 m, on Midway Atoll, O'ahu, Moloka'i, Maui, and Hawai'i."

Summary of Risk Traits:

High Risk / Undesirable Traits
• Elevation range exceeds 2000 m, demonstrating environmental versatility
• Grows in tropical climates
• Naturalized on main Hawaiian Islands & widely naturalized elsewhere
• Environmental weed in Australia
• Other Bromus species are invasive
• Contains toxic levels of nitrates (may be toxic to livestock if consumed at high levels)
• Shade tolerant
• Tolerates many soil types
• Able to form dense swards
• Reproduces by seed
• Cleistogamous (capable of automatic self-pollination) in certain conditions
• Able to reach maturity in 1 growing season
• Seeds dispersed by a variety of vectors (attached to machinery, clothing, animals, by wind, water & as a contaminant
• Prolific seed production under certain conditions
• Seeds can form a persistent seed bank (4-5 years)
• Tolerates mowing & grazing

Low Risk Traits
• Unarmed (no spines, thorns or burrs)
• Provides fodder for livestock (palatable despite reports of potential toxicity)
• Not reported to spread vegetatively
• Herbicides may provide effective control