

Family: *Equisetaceae*

Taxon: *Equisetum arvense*

Synonym: *Equisetum boreale* Bong.
Equisetum calderi B. Boivin
Equisetum saxicola Suksd.

Common Name: common horsetail
 field horsetail

Questionnaire :	current 20090513	Assessor:	Assessor	Designation:	H(HPWRA)
Status:	Assessor Approved	Data Entry Person:	Assessor	WRA Score	18
101	Is the species highly domesticated?		y=-3, n=0		n
102	Has the species become naturalized where grown?		y=1, n=-1		
103	Does the species have weedy races?		y=1, n=-1		
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)		Intermediate
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		n=0, y = 1*multiplier (see Appendix 2)		n
303	Agricultural/forestry/horticultural weed		n=0, y = 2*multiplier (see Appendix 2)		y
304	Environmental weed		n=0, y = 2*multiplier (see Appendix 2)		n
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		y=1, n=0		
403	Parasitic		y=1, n=0		n
404	Unpalatable to grazing animals		y=1, n=-1		n
405	Toxic to animals		y=1, n=0		y
406	Host for recognized pests and pathogens		y=1, n=0		
407	Causes allergies or is otherwise toxic to humans		y=1, n=0		
408	Creates a fire hazard in natural ecosystems		y=1, n=0		n
409	Is a shade tolerant plant at some stage of its life cycle		y=1, n=0		
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	n
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	y
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	y=1, n=-1	y
604	Self-compatible or apomictic	y=1, n=-1	
605	Requires specialist pollinators	y=-1, n=0	n
606	Reproduction by vegetative fragmentation	y=1, n=-1	y
607	Minimum generative time (years)	1 year = 1, 2 or 3 years = 0, 4+ years = -1	2
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	y
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	
707	Propagules dispersed by other animals (externally)	y=1, n=-1	
708	Propagules survive passage through the gut	y=1, n=-1	
801	Prolific seed production (>1000/m2)	y=1, n=-1	y
802	Evidence that a persistent propagule bank is formed (>1 yr)	y=1, n=-1	n
803	Well controlled by herbicides	y=-1, n=1	
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)	y=-1, n=1	

Designation: H(HPWRA)

WRA Score 18

Supporting Data:

101	2001. Parsons, W.T./Cuthbertson, E.G.. Noxious Weeds of Australia. Second Edition. CSIRO Publishing, Collingwood, Australia	[Is the species highly domesticated? No evidence]
102	2014. WRA Specialist. Personal Communication.	NA
103	2014. WRA Specialist. Personal Communication.	NA
201	2001. Parsons, W.T./Cuthbertson, E.G.. Noxious Weeds of Australia. Second Edition. CSIRO Publishing, Collingwood, Australia	[Species suited to tropical or subtropical climate(s) 0-Low] "Cold to warm temperate regions where the annual average temperatures vary from <5°C to >20°C, and annual rainfall from 100 to 2000 mm, especially in damp open woodlands, pastures, arable lands, roadsides, streambanks and embankments." ... "...common horetail occurs throughout the Northern Hemisphere, extending northwards to Alaska and Ellesmere Island at 83° North in North America, and to 71° North in Norway, Sweden, Finland and the Soviet Union and southwards to Texas, India and Iran. It is not as widespread or as important in the Southern Hemisphere but occurs in Argentina, Brazil, Chile, Madagascar, some Indian Ocean islands, Indonesia, New Zealand and Australia."
202	2001. Parsons, W.T./Cuthbertson, E.G.. Noxious Weeds of Australia. Second Edition. CSIRO Publishing, Collingwood, Australia	[Quality of climate match data 2-High]
203	1997. Holm, L.G./Doll, J./Holm, E./Pancho, J.V./Herberger, J.P.. World weeds: natural histories and distribution. John Wiley and Sons, Inc., New York, NY	[Broad climate suitability (environmental versatility)? Yes] "E. arvense is spread around the world ... but it grows most readily in the temperate zones." ... "In the United States they are found at altitudes up to 2,750 meters."
203	2014. CABI. Equisetum arvense In: Invasive Species Compendium. CAB International, Wallingford, UK www.cabi.org/isc	[Broad climate suitability (environmental versatility)? Yes] "E. arvense grows under a variety of soil and climatic conditions, but mainly in unproductive habitats such as marshes, swamps, ditches, river banks, open fields, open woods and areas such as road sides and railway embankments (Holm et al., 1977; Cody and Wagner, 1981)."
204	2014. USDA ARS National Genetic Resources Program. Germplasm Resources Information Network - (GRIN). http://www.ars-grin.gov/cgi-bin/npgs/html/index.pl	[Native or naturalized in regions with tropical or subtropical climates? Yes. Native range includes tropical latitudes, but likely at higher elevations] "ASIA-TROPICAL Indian Subcontinent: Bhutan; India [n.]; Nepal "
205	2014. CABI. Equisetum arvense In: Invasive Species Compendium. CAB International, Wallingford, UK www.cabi.org/isc	[Does the species have a history of repeated introductions outside its natural range?? Yes, but also widespread native range] "Holm et al. (1991) classifies E. arvense as a principal weed in Belgium, Canada, England, Finland, Germany, Japan, New Zealand, the former Soviet Union, the USA, the former Yugoslavia and as a common weed in Alaska, Argentina, Brazil, the former Czechoslovakia, France, India, Iran, Madagascar, Mauritius, Netherlands, Poland, Romania, Spain and Sweden. In Chile, China, Iceland, Italy, Korea and Turkey it is only reported as present."
301	1981. Brownsey, P. J.. Checklist of pteridophytes naturalised in New Zealand. New Zealand Journal of Botany. 19(1): 9-11.	[Naturalized beyond native range? Yes] "a potentially aggressive weed especially in damp ground. river beds. lake sides, etc."
301	1989. Brownsey, P.J./Smith-Dodsworth, J.C.. New Zealand Ferns and Allied Plants. David Bateman Ltd, Auckland, New Zealand	[Naturalized beyond native range? Yes] "...now naturalized in several rural riverbank areas from Kawhia to the Buller Gorge. Notes: An aggressive weed which should be eradicated from any new areas where found."
301	2001. Parsons, W.T./Cuthbertson, E.G.. Noxious Weeds of Australia. Second Edition. CSIRO Publishing, Collingwood, Australia	[Naturalized beyond native range? Yes] "When and how it originally entered Australia is not known, but it is naturalised only near Sydney in New South Wales."
301	2011. Richardson, F.J./Richardson, R.G./Shepherd, R.C.H.. Weeds of the South-East: An Identification Guide for Australia. Second Edition. RG and FJ Richardson, Victoria, Australia	[Naturalized beyond native range? Yes] "Found in damp bushland, pasture, crops, roadsides and stream banks/ [NSW]"
302	1981. Cody, W. J., & Wagner, V.. The biology of Canadian weeds. 49. Equisetum arvense L.. Canadian Journal of Plant Science. 61(1): 123-133.	[Garden/amenity/disturbance weed? No, but quickly establishes in disturbed areas] "E. arvense will form a dense ground cover on embankments, road-cuts, and riparian situations where it prevents soil erosion and leads to an accumulation of organic matter; it was noted as one of the first invaders of mine tailings at a site in Manitoba (Agriculture Canada plant identification service. pers. commun.)."

303	2001. Parsons, W.T./Cuthbertson, E.G.. Noxious Weeds of Australia. Second Edition. CSIRO Publishing, Collingwood, Australia	[Agricultural/forestry/horticultural weed? Yes] "Common horsetail is a weed of many crops, pastures, and fruit-growing areas in the United States, Canada, Europe and Japan and is a major weed of cereals, flax, forest nurseries, orchards, potatoes and other vegetables in northern Europe." ... "It is not always a serious competitor but can reduce yield drastically if present in sufficient numbers."
303	2007. DiTomaso, J.. Weeds of California and Other Western States, Volume 1. UCANR Publications, Oakland, CA	[Agricultural/forestry/horticultural weed? Yes] "It is a state-listed noxious weed in Oregon (class b) and a noxious weed in parts of Australia."
303	2011. Richardson, F.J./Richardson, R.G./Shepherd, R.C.H.. Weeds of the South-East: An Identification Guide for Australia. Second Edition. RG and FJ Richardson, Victoria, Australia	[Agricultural/forestry/horticultural weed? Yes] "Equisetum species (horsetails), some of the world's worst agricultural weeds, are perennial herbs with vigorous creeping underground stems (rhizomes) that produce numerous erect, hollow, finely ribbed shoots at close intervals."
304	2007. DiTomaso, J.. Weeds of California and Other Western States, Volume 1. UCANR Publications, Oakland, CA	[Environmental weed? No. Agricultural weed] "In natural areas, Equisetum species are a desirable component of the ecosystem. However, dense colonies can be problematic in agricultural fields, pastures, and controlled aquatic systems."
304	2014. CABI. Equisetum arvense In: Invasive Species Compendium. CAB International, Wallingford, UK www.cabi.org/isc	[Environmental weed? No. Agricultural weed] "Although E. arvense is found with many crops (Håkansson, 1995a,b,c) it is not competitive with a vigorous crop and therefore has little impact on crop yield (Williams, 1979). However, it can cause difficulty during grain harvesting by clogging harvesting and threshing equipment with its bulk (Hoyt and Carder, 1962)."
305	2006. Ainsworth, N./Gunasekera, L./Bonillo, J.. Management of horsetail species using herbicides. Pp. 279-282 in Proceedings of the 15th Australian Weeds Conference.	[Congeneric weed? Yes] "All Equisetum spp. are now declared noxious weeds in all Australian states and territories except the Northern Territory..." ... "Overseas, Equisetum species are also significant weeds of pastures, crops and gardens (Parsons and Cuthbertson 2001)."
401	2013. Wu, Z.Y./Raven,P.H./Hong, D.Y. (eds.). Flora of China. Vol. 2-3 (Lycopodiaceae through Polypodiaceae). Science Press & Missouri Botanical Garden Press, Beijing & St. Louis	[Produces spines, thorns or burrs? No] "Plants small to medium-sized. Rhizome ascending, erect, or creeping, blackish brown, nodes and roots with sparse long yellowish brown trichomes or glabrous. Aerial stem annual, dimorphic. Fertile stems appearing in spring earlier than sterile branches, yellowish brown, 5–35 cm tall, 3–5 mm in diam. At middle, not whorled, ridges inconspicuous, with dense grooves, internodes 2–6 cm; sheath castaneous or pale yellow, ca. 0.8 cm, only upper portion of sheath abaxially with a shallow groove; sheath teeth 9–12, castaneous, narrowly deltoid, 4–7 mm. Fertile stems dying back after spores shed (ephemeral). Sterile stems green, up to 40 cm, middle portion of main stem 1.5–3 mm, multiple whorled, below middle portion of main stem branched; internodes 2–3 cm; ridges arc shaped abaxially, without edges, with cross grains, without tubercles; sheath green, long, narrow; sheath teeth 5 or 6, deltoid, middle portion blackish brown, margin membranous, light brown, persistent. Lateral branches slender, flattened, with 3 or 4 narrow and tall ridges, ridges abaxially with cross grains; sheath teeth 3–5, green, lanceolate, margin membranous, persistent. Strobilus terete, 1.8–4 cm, 0.9–1 cm in diam., apex blunt; stalk prolonged when mature and 3–6 cm."
402	2013. Husby, C.. Biology and Functional Ecology of Equisetum with Emphasis on the Giant Horsetails. The Botanical Review. 79(2): 147-177.	[Allelopathic? Possibly] "Equisetum species, like many angiosperms, appear to exhibit allelopathy. Milton and Duckett (1985) found that sporophytes of E. sylvaticum inhibit gametophyte development of that species. Furthermore, the same investigators found that water extracts from several Equisetum species reduced the germination of grass seedlings. Two of the three species studied were members of the subgenus Equisetum (E. arvense and E. palustre) and one was a member of the subgenus Hippochaete (E. variegatum). The inhibitory effects of the members of the subgenus Equisetum were greater than that of E. variegatum. This suggests that members of the subgenus Hippochaete, and hence the giant equisetata, may be less allelopathic than members of the subgenus Equisetum."
403	2013. Wu, Z.Y./Raven,P.H./Hong, D.Y. (eds.). Flora of China. Vol. 2-3 (Lycopodiaceae through Polypodiaceae). Science Press & Missouri Botanical Garden Press, Beijing & St. Louis	[Parasitic? No] "Plants small to medium-sized. Rhizome ascending, erect, or creeping, blackish brown, nodes and roots with sparse long yellowish brown trichomes or glabrous." [Equisetaceae]
404	1981. Cody, W. J., & Wagner, V.. The biology of Canadian weeds. 49. Equisetum arvense L.. Canadian Journal of Plant Science. 61(1): 123-133.	[Unpalatable to grazing animals? No] "The tubers of Equisetum urvense. which are rich in starch, have been reported to be eaten by ducks in Alaska (Hauke 1966)."
404	2001. Parsons, W.T./Cuthbertson, E.G.. Noxious Weeds of Australia. Second Edition. CSIRO Publishing, Collingwood, Australia	[Unpalatable to grazing animals? No, which results in poisoning] "Sheep and cattle are most seriously affected when eating fresh green material and horses by dried material in hay."
404	2009. Bryson, C.T./DeFelice, M.S.. Weeds of the South. University of Georgia Press, Athens, GA	[Unpalatable to grazing animals? No] "...they are usually eaten during winter months by cattle, sheep, and horses."

405	2001. Parsons, W.T./Cuthbertson, E.G.. Noxious Weeds of Australia. Second Edition. CSIRO Publishing, Collingwood, Australia	[Toxic to animals? Yes] "It is much more of a problem in pastures, not only reducing yield, but, when ingested, poisoning the animals." ... "Symptoms of poisoning include weakness of the hindquarters, lack of co-ordination, excitability, trembling, increased pulse rate, convulsions, coma and death."
405	2009. Bryson, C.T./DeFelice, M.S.. Weeds of the South. University of Georgia Press, Athens, GA	[Toxic to animals? Yes] "Equisetum species contain a neurotoxin leading to muscle weakness, trembling, and collapse but rarely consumed in quantities sufficient to cause toxicity; they are usually eaten during winter months by cattle, sheep, and horses."
405	2011. Richardson, F.J./Richardson, R.G./Shepherd, R.C.H.. Weeds of the South-East: An Identification Guide for Australia. Second Edition. RG and FJ Richardson, Victoria, Australia	[Toxic to animals? Yes] "Poisonous to livestock and all species are potentially serious weeds of moist places."
406	1981. Cody, W. J., & Wagner, V.. The biology of Canadian weeds. 49. Equisetum arvense L.. Canadian Journal of Plant Science. 61(1): 123-133.	[Host for recognized pests and pathogens?] "Homoptera: Macrosteles borealis (Dorst) is a general feeder on Equisetum spp. and probably E. arvense (N. D. Hamilton, pers. commun.); Hymenoptera: Dolerus spp. feed on E. arvense (H. Goulet, pers. commun.); Coleoptera: Grypidius equiseti Fab., Grypus spp. and Hippuriphila spp. Are associated with Equisetum spp. (E. Becker, pers. commun.). (b) Microorganisms and vi ras es - Conners (1967) listed the following fungal species as being found on Equisetum arvense: Fusarium semitectum Berk. & Rav. In Alaska; Leptosphaerie hiemalis Sacc. In Franklin District, N.W.T.; Mycosphaerella tassiana (de Not.) Johans. in Greenland; and Phoma equiseti Desm. in Nova Scotia. In addition there is a specimen of Gloeosporium equiseti Ell. & Ev. from Ontario preserved in the Mycological Herbarium of Agriculture Canada at Ottawa."
407	2014. CABI. Equisetum arvense In: Invasive Species Compendium. CAB International, Wallingford, UK www.cabi.org/isc	[Causes allergies or is otherwise toxic to humans? Unlikely, but maybe possible if ingested] "E. arvense can be toxic owing to the thiaminase that is primarily found in its leaves and stems. Thiaminase is an enzyme that splits the B vitamin thiamine rendering it inactive. Hay containing this weed may be more poisonous than fresh plants in the field. Thiamine is involved in decarboxylation reactions in animals. Deficiency of thiamine leads to accumulation of pyruvate in the blood, with a resulting impairment in energy metabolism and cellular shortage of ATP. Hay that contains E. arvense at a level of 20% or more may produce symptoms of thiamine deficiency in horses in 2-5 weeks. Ruminants are not generally affected by thiamine deficiency because thiamine is made in the rumen (Henderson et al., 1952; Cheeke and Schull, 1985). Uses E. arvense is an astringent herb and has a diuretic action. Fresh E. arvense can be bruised and applied to wounds to stop bleeding (Hauke, 1978). It has also been used to treat deep seated lung damage such as that caused by tuberculosis or emphysema (Ode, 1993). What makes E. arvense valuable as a medicine is its mineral and silica content. It contains up to about 7.4 % silica (Carnat et al., 1991). Silica is important in strengthening many tissues in the body including bone, hair and nails. It promotes calcium absorption and helps fight against plaque deposits in the arteries. Historically, the dried stems of E. arvense were used to polish pewter and other metals. Other chemical constituents are flavonoids (0.3%), potassium (1.8%), isquercitroside (0.12%), phenolic acids (0.7%), calcium (1.3%) (Carnat et al., 1991) as well as traces of alkaloids (nicotine, palustrine and palustrinine), saponins, phytosterols, tannins, and the minerals manganese, sulfur, and magnesium (Ode, 1993)."
408	2001. Parsons, W.T./Cuthbertson, E.G.. Noxious Weeds of Australia. Second Edition. CSIRO Publishing, Collingwood, Australia	[Creates a fire hazard in natural ecosystems? No evidence. Not listed among negative impacts]
408	2007. DiTomaso, J.. Weeds of California and Other Western States, Volume 1. UCANR Publications, Oakland, CA	[Creates a fire hazard in natural ecosystems? No evidence. Not listed among negative impacts]
408	2014. CABI. Equisetum arvense In: Invasive Species Compendium. CAB International, Wallingford, UK www.cabi.org/isc	[Creates a fire hazard in natural ecosystems? No evidence. Not listed among negative impacts]
409	1981. Cody, W. J., & Wagner, V.. The biology of Canadian weeds. 49. Equisetum arvense L.. Canadian Journal of Plant Science. 61(1): 123-133.	[Is a shade tolerant plant at some stage of its life cycle? Possibly Yes] "In a single clone, stems in the shade may be tall and regular, while those in exposed and sunny situations are shorter and more irregular, decumbent or even prostrate."
409	1997. Holm, L.G./Doll, J./Holm, E./Pancho, J.V./Herberger, J.P.. World weeds: natural histories and distribution. John Wiley and Sons, Inc., New York, NY	[Is a shade tolerant plant at some stage of its life cycle?] "In E. arvense, therefore, the shoots are without functional leaves. This explains in part why the plants cannot tolerate much shading."
409	2014. CABI. Equisetum arvense In: Invasive Species Compendium. CAB International, Wallingford, UK www.cabi.org/isc	[Is a shade tolerant plant at some stage of its life cycle? Yes] "E. arvense is adapted to sunny habitats. It is dependent on its rhizomes and tubers for growth under heavy shade."

410	2001. Parsons, W.T./Cuthbertson, E.G.. Noxious Weeds of Australia. Second Edition. CSIRO Publishing, Collingwood, Australia	[Tolerates a wide range of soil conditions? Yes] "It is found mainly on neutral or slightly basic gravelly sandy or silty clay loams where the water table is high, extending at times into acid soils."
410	2014. CABI. Equisetum arvense In: Invasive Species Compendium. CAB International, Wallingford, UK www.cabi.org/isc	[Tolerates a wide range of soil conditions? Yes] "E. arvense is more common on sandy soils than on clay (Buchli, 1936). It grows in almost any substrate but prefers neutral or slightly basic soils (Meusel et al., 1971).
411	2013. Wu, Z.Y./Raven, P.H./Hong, D.Y. (eds.). Flora of China. Vol. 2-3 (Lycopodiaceae through Polypodiaceae). Science Press & Missouri Botanical Garden Press, Beijing & St. Louis	[Climbing or smothering growth habit? No] "Plants small to medium-sized. Rhizome ascending, erect, or creeping, blackish brown, nodes and roots with sparse long yellowish brown trichomes or glabrous."
412	1981. Cody, W. J., & Wagner, V.. The biology of Canadian weeds. 49. Equisetum arvense L.. Canadian Journal of Plant Science. 61(1): 123-133.	[Forms dense thickets? Yes] "E. arvense will form a dense ground cover on embankments, road-cuts, and riparian situations where it prevents soil erosion and leads to an accumulation of organic matter"
412	2007. DiTomaso, J.. Weeds of California and Other Western States, Volume 1. UCANR Publications, Oakland, CA	[Forms dense thickets? Yes] "In natural areas, Equisetum species are a desirable component of the ecosystem. However, dense colonies can be problematic in agricultural fields, pastures, and controlled aquatic systems."
501	2007. DiTomaso, J.. Weeds of California and Other Western States, Volume 1. UCANR Publications, Oakland, CA	[Aquatic? No. Not truly aquatic, but can invade aquatic areas] "Moist, disturbed places, pastures, orchards, nursery crops, agricultural fields, and irrigation ditches; also, moist meadows and riparian sites in natural areas. Grows best in sandy neutral to slightly alkaline soils on sites with a high water table and poor drainage."
502	1990. Kramer, K.U./Green, P.S.. The Families and genera of vascular plants. Volume 1. Pteridophytes and gymnosperms. Springer-Verlag, Berlin, Heidelberg, New York	[Grass? No] Equisetaceae
503	2014. CABI. Equisetum arvense In: Invasive Species Compendium. CAB International, Wallingford, UK www.cabi.org/isc	[Nitrogen fixing woody plant? No. Not woody] "E. arvense is a perennial fern ally, with conspicuous nodes (joints) that are easily separated." ... "The roots of E. arvense also associate with several strains of nitrogen-fixing bacteria in a nitrogen-free mineral nutrient solution (Uchino et al., 1984). Distribution"
504	2001. Parsons, W.T./Cuthbertson, E.G.. Noxious Weeds of Australia. Second Edition. CSIRO Publishing, Collingwood, Australia	[Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)? Yes] "Tuber initiation, however, seems to be delayed until late summer but they continue to increase in number and size throughout the autumn period. About half the tubers formed are found below 50 cm depth."
504	2014. CABI. Equisetum arvense In: Invasive Species Compendium. CAB International, Wallingford, UK www.cabi.org/isc	[Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)? Yes] "E. arvense can tolerate extended periods without rain because its rhizomes can extend several metres down into the soil (Cloutier and Watson, 1985; Reuss and Bachthaler, 1988) to escape the effects of tillage and herbicides (Williams, 1979). The tubers on the rhizomes act as organs of storage and regeneration, but the tubers may also disseminate the weed (Holm et al., 1977). Tuber size increases with depth (Williams, 1979), contributing to the plant's strong regenerative capacity. It has been reported to emerge through silt layers up to 1 m thick following flooding (Holm et al., 1977)."
601	2014. CABI. Equisetum arvense In: Invasive Species Compendium. CAB International, Wallingford, UK www.cabi.org/isc	[Evidence of substantial reproductive failure in native habitat? No. Widespread] "E. arvense is circumpolar in distribution, throughout Europe and Asia, south to Turkey, Iran, the Himalayas, and across China (except the southeastern part), Korea and Japan. It is also found throughout Canada and the USA as far south as Georgia, Alabama, Arkansas, Texas, Arizona, New Mexico and California (Hultén and Fries, 1986). Holm et al. (1991) classifies E. arvense as a principal weed in Belgium, Canada, England, Finland, Germany, Japan, New Zealand, the former Soviet Union, the USA, the former Yugoslavia and as a common weed in Alaska, Argentina, Brazil, the former Czechoslovakia, France, India, Iran, Madagascar, Mauritius, Netherlands, Poland, Romania, Spain and Sweden. In Chile, China, Iceland, Italy, Korea and Turkey it is only reported as present."
602	2001. Parsons, W.T./Cuthbertson, E.G.. Noxious Weeds of Australia. Second Edition. CSIRO Publishing, Collingwood, Australia	[Produces viable seed? Yes. Spores] "An erect, non-flowering perennial herb with ribbed or grooved annual stems from 10 to 60 cm or more high, reproducing by spores and tuber-bearing hairy creeping rhizomes."
603	1973. Page, C. N.. Two hybrids in Equisetum new to the British flora. Watsonia. 9(3): 229-237.	[Hybridizes naturally? Yes] "Within the British flora two hybrids in Equisetum subgenus Equisetum (the deciduous horsetails) have previously been known. One of these, Equisetum palustre L. x E. fluviatile L., has been recorded only from a single station in the Outer Hebrides (Page 1963). The other, E. arvense L. x E. fluviatile L. (E. x litorale Kiihlew.), has long been familiar to botanists and is widespread. This paper reports the presence in Britain of two further interspecific hybrids in the subgenus. These are Equisetum arvense L. x E. palustre L. (E. x rothmaleri hybr. DOV.) and E. palustre L. x E. telmateia Ehrh. (E. x font-queri Rothm.)."

603	1981. Cody, W. J., & Wagner, V.. The biology of Canadian weeds. 49. <i>Equisetum arvense</i> L.. Canadian Journal of Plant Science. 61(1): 123-133.	[Hybridizes naturally? Yes] "The following hybrids involving <i>Equisetum arvense</i> have been reported (Hauke 1978): <i>Equisetum x litorale</i> Kuhlewein (<i>E. arvense</i> x <i>fluviatile</i>), <i>Equisetum x suecicum</i> Rothm. (<i>E. arvense</i> x <i>pratense</i>), <i>Equisetum x rothmaleri</i> Page (<i>E. arvense</i> x <i>palustre</i>); <i>Equisetum x dubium</i> Dostal (<i>E. arvense</i> x <i>telmateia</i>); and <i>Equisetum x wallichianum</i> (<i>E. arvense</i> x <i>diffusum</i>)."
604	1990. Kramer, K.U./Green, P.S.. The Families and genera of vascular plants. Volume 1. Pteridophytes and gymnosperms. Springer-Verlag, Berlin, Heidelberg, New York	[Self-compatible or apomictic? Possibly Yes] "Although their spores are homosporous, the gametophytes are unisexual in most cases ... The archegonial gametophyte, if unfertilized, commonly change over to antheridial, and during a short period may be functionally bisexual and self-fertile."
605	2001. Parsons, W.T./Cuthbertson, E.G.. Noxious Weeds of Australia. Second Edition. CSIRO Publishing, Collingwood, Australia	[Requires specialist pollinators? No. Requires moisture] "Multiflagellate motile sperm from the antheridia, if moisture is present, fertilise the single egg cell in each archegonium"
605	2007. DiTomaso, J.. Weeds of California and Other Western States, Volume 1. UCANR Publications, Oakland, CA	[Requires specialist pollinators? No, but requires water for fertilization] "Plants produce large numbers of spores, but few spores survive because they are short-lived and grow best on mud that has recently been flooded and is rich in nutrients. Haploid gametophytes develop from the spores. These produce gametes that need water for fertilization. The transition through these vulnerable stages limits the survival of young plants."
606	2001. Parsons, W.T./Cuthbertson, E.G.. Noxious Weeds of Australia. Second Edition. CSIRO Publishing, Collingwood, Australia	[Reproduction by vegetative fragmentation? Yes] "Basically, common horsetail spreads almost wholly by vegetative means. The persistent, deeply penetrating rhizome system buds off starch-filled tubers and produces new stems throughout the growing season. New plants form as the rhizome breaks down or is damaged mechanically."
607	1981. Cody, W. J., & Wagner, V.. The biology of Canadian weeds. 49. <i>Equisetum arvense</i> L.. Canadian Journal of Plant Science. 61(1): 123-133.	[Minimum generative time (years)? Probably < 1 year for gametophyte generation. Probably > 1 year for sporophyte generation] "Annual stems from extensively creeping and forking, dark-felted, tuber-bearing perennial rhizomes. Stems dimorphic. Fertile stems usually precocious, whitish and succulent, appearing early in the spring, elongating up to 30 cm or more in height, with a terminal long-petioled spore-bearing cone, and several dark nodal sheaths with partly connate teeth; withering as soon as the spores are shed"
607	2014. Shoot Gardening. <i>Equisetum arvense</i> (Field horsetail). http://www.shootgardening.co.uk/plant/equisetum-arvense [Accessed 04 Feb 2014]	[Minimum generative time (years)? Probably < 1 year for gametophyte generation. Probably > 1 year for sporophyte generation] "2-5 years To maturity"
701	2001. Parsons, W.T./Cuthbertson, E.G.. Noxious Weeds of Australia. Second Edition. CSIRO Publishing, Collingwood, Australia	[Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)? Yes] "Cultivation, roadmaking, grading and cartage of contaminated soils out of infested areas carry rhizome fragments and tubers long distances, there to start new colonies."
701	2013. NSW Department of Primary Industries. Weed Alert: Horsetails. http://www.dpi.nsw.gov.au/agriculture/pests-weeds/weeds/profiles/horsetails [Accessed 07 Jan 2014]	[Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)? Yes] "New infestations can result when garden waste containing rhizomes is dumped or when plants are sold illegally for ornamental or medicinal purposes."
702	2001. Parsons, W.T./Cuthbertson, E.G.. Noxious Weeds of Australia. Second Edition. CSIRO Publishing, Collingwood, Australia	[Propagules dispersed intentionally by people? Yes] "When and how it originally entered Australia is not known, but it is naturalised only near Sydney in New South Wales. It has, however, been imported and sold recently by nurseries in some States."
703	2006. Sakamaki, Y., & Ino, Y.. Tubers and rhizome fragments as propagules: competence for vegetative reproduction in <i>Equisetum arvense</i> . Journal of Plant Research. 119(6): 677-683.	[Propagules likely to disperse as a produce contaminant? Yes] "Dispersal of <i>Equisetum</i> to distant locations has been shown to be due to the presence of fragments of plants mixed with transported soil (Page and Barker 1985; Ohba 2002)."
704	2001. Parsons, W.T./Cuthbertson, E.G.. Noxious Weeds of Australia. Second Edition. CSIRO Publishing, Collingwood, Australia	[Propagules adapted to wind dispersal? Yes] "Common horsetail is a diploid plant or sporophyte, producing haploid spores by division." ... "In addition, some spread also occurs as a result of spore dissemination by wind and water, aided by cooling and unwinding of their elators as humidity varies."
705	2001. Parsons, W.T./Cuthbertson, E.G.. Noxious Weeds of Australia. Second Edition. CSIRO Publishing, Collingwood, Australia	[Propagules water dispersed? Yes] "In addition, some spread also occurs as a result of spore dissemination by wind and water, aided by cooling and unwinding of their elators as humidity varies."
705	2007. DiTomaso, J.. Weeds of California and Other Western States, Volume 1. UCANR Publications, Oakland, CA	[Propagules water dispersed? Yes] "Fragments and tubers disperse with water, soil movement, and human activities."

706	2003. Glisson, B.T.. Conservation Assessment of Variegated Scouring Rush in the Black Hills National Forest, South Dakota and Wyoming. USDA Forest Service Rocky Mountain Region, Custer, South Dakota	[Propagules bird dispersed? Unknown for <i>Equisetum arvense</i> . Birds described as a potential vector for other <i>Equisetum</i> species] "Migratory birds or insects may represent another likely, but undocumented mode of transfer of spores and/or rhizome fragments." ... "The present geographic isolation of Black Hills' variegated scouring rush populations from the nearest locations in Wyoming, Colorado, and Montana would appear to prohibit any interbreeding between them, although there is the possibility of spore or vegetative propagule transfer via birds or air masses."
707	2014. WRA Specialist. Personal Communication.	[Propagules dispersed by other animals (externally)? Unknown] Spores small enough that they could potentially adhere to animals
708	1981. Cody, W. J., & Wagner, V.. The biology of Canadian weeds. 49. <i>Equisetum arvense</i> L.. Canadian Journal of Plant Science. 61(1): 123-133.	[Propagules survive passage through the gut? Unknown, but probably No] "...spores are relatively short-lived and many die because germination can only take place on a suitably moist substrate." [Ungulates may ingest <i>E. arvense</i> , but it is unknown whether viable spores can survive gut passage]
801	1981. Cody, W. J., & Wagner, V.. The biology of Canadian weeds. 49. <i>Equisetum arvense</i> L.. Canadian Journal of Plant Science. 61(1): 123-133.	[Prolific seed production (>1000/m ²)? Yes] "A large number of spores are produced in each sporangium on an <i>Equisetum</i> cone. Hauke (1978) calculated that if a large clone produced 1000 cones per year, each with 100 000 spores, for 100 yrs, its total spore production would be 10 ¹⁰ ."
801	2001. Parsons, W.T./Cuthbertson, E.G.. Noxious Weeds of Australia. Second Edition. CSIRO Publishing, Collingwood, Australia	[Prolific seed production (>1000/m ²)? Yes] "Common horsetail produces a very large number of spores each year but most die."
801	2010. Gordon, D.R./Mitterdorfer, B./Pheloung, P.C. et al.. Guidance for addressing the Australian Weed Risk Assessment questions. Plant Protection Quarterly. 25(2): 56-74.	[Prolific seed production (>1000/m ²)? Yes] "Assume 'yes' for fern taxa unless contradictory evidence exists."
802	2001. Parsons, W.T./Cuthbertson, E.G.. Noxious Weeds of Australia. Second Edition. CSIRO Publishing, Collingwood, Australia	[Evidence that a persistent propagule bank is formed (>1 yr)? No] "The spores must germinate almost immediately."
803	1981. Cody, W. J., & Wagner, V.. The biology of Canadian weeds. 49. <i>Equisetum arvense</i> L.. Canadian Journal of Plant Science. 61(1): 123-133.	[Well controlled by herbicides? Yes, under certain conditions] "Hoyt and Carder (1962) in Alberta confirmed earlier studies (Hollv 1953: Adamson 1954) that if application of MCPA was delayed until field horsetail plants had completed emergence, 100% control of top growth was obtained for the remainder of the season. They also showed that for appreciable reduction in number of field horsetail plants in the year following application, complete emergence of the weed at the time of treatment was essential"
803	2006. Ainsworth, N./Gunasekera, L./Bonillo, J.. Management of horsetail species using herbicides. Pp. 279-282 in Proceedings of the 15th Australian Weeds Conference.	[Well controlled by herbicides? Possibly Yes] "Eleven herbicide treatments were tested on two species of horsetail <i>Equisetum hyemale</i> L. (scouring rush) and <i>Equisetum arvense</i> L. (field or common horsetail) to provide additional information on control options, in the context of ongoing efforts to eradicate early infestations." ... "Results are discussed in relation to previous trials and to recent experiences in the eradication program for <i>Equisetum</i> spp. In Victoria. Glyphosate wiping, amitrole and MCPA all appear to be treatments that may be useful additions to current control practice in particular circumstances."
803	2007. DiTomaso, J.. Weeds of California and Other Western States, Volume 1. UCANR Publications, Oakland, CA	[Well controlled by herbicides? Possibly No] "Field horsetail tolerates most herbicides used in agriculture."
804	2001. Parsons, W.T./Cuthbertson, E.G.. Noxious Weeds of Australia. Second Edition. CSIRO Publishing, Collingwood, Australia	[Tolerates, or benefits from, mutilation, cultivation, or fire? Yes] "Because of the extensive rhizome system and the deeply buried tubers, common horsetail is difficult to control. Cultivation, fire, mowing and slashing are ineffective, as new stems quickly arise from the rhizomes."
805	2001. Parsons, W.T./Cuthbertson, E.G.. Noxious Weeds of Australia. Second Edition. CSIRO Publishing, Collingwood, Australia	[Effective natural enemies present locally (e.g. introduced biocontrol agents)? Unknown] "Biological control is being considered in Italy where ten fungal pathogens are under investigation."
805	2014. WRA Specialist. Personal Communication.	[Effective natural enemies present locally (e.g. introduced biocontrol agents)? Unknown. No <i>Equisetaceae</i> native or known to be naturalized in the Hawaiian Islands]

Summary of Risk Traits

High Risk / Undesirable Traits

- Broad climate suitability, and elevation range exceeds 1000 m
- Naturalized
- Weedy and difficult to remove
- A serious agricultural weed
- Related Equisetum species have become invasive
- Toxic to cattle and other grazing animals
- Tolerates many soil types
- Forms dense stands that may exclude other vegetation
- May hybridize with other Equisetum species
- Spread by spores and vegetatively by rhizomes
- Can resprout if only aboveground vegetative material is removed

Low Risk Traits

- Thrives mainly in temperate climates, so may only threaten higher elevation ecosystems in the tropics
- Unarmed (no spines, thorns, or burrs)
- Short-lived spores
- Herbicides may provide effective control