

Taxon: *Typha latifolia* L.

Family: Typhaceae

Common Name(s): broadleaf cattail
bulrush
common cattail
Cooper's-reed
giant reed-mace
great cattail
soft-flag

Synonym(s):**Assessor:** No Assessor**Status:** Assessor Approved**End Date:** 5 Jun 2018**WRA Score:** 29.0**Designation:** H(HPWRA)**Rating:** High Risk**Keywords:** Aquatic Herb, Monocultures, Self-Fertile, Wind-Dispersed, Water-Dispersed

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	n=0, y = 1*multiplier (see Appendix 2)	y
303	Agricultural/forestry/horticultural weed	n=0, y = 2*multiplier (see Appendix 2)	y
304	Environmental weed		
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		

Qsn #	Question	Answer Option	Answer
406	Host for recognized pests and pathogens	y=1, n=0	n
407	Causes allergies or is otherwise toxic to humans		
408	Creates a fire hazard in natural ecosystems		
409	Is a shade tolerant plant at some stage of its life cycle	y=1, n=0	n
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	y
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	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	y=1, n=-1	y
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	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	n
704	Propagules adapted to wind dispersal	y=1, n=-1	y
705	Propagules water dispersed	y=1, n=-1	y
706	Propagules bird dispersed		
707	Propagules dispersed by other animals (externally)	y=1, n=-1	y
708	Propagules survive passage through the gut	y=1, n=-1	y
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	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
	Gucker, C. L. 2008. <i>Typha latifolia</i> . In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory. https://www.fs.fed.us/database/feis/plants/graminoid/typlat/all.html . [Accessed 4 Jun 2018]	[No evidence of domestication] "Broadleaf cattail is a cosmopolitan species found in North America, Mexico, Great Britain, Eurasia, India, Africa, New Zealand, and Australia. In Canada, broadleaf cattail occurs in all provinces and the Northwest Territories [76]. In the United States, broadleaf cattail is native to all states except Hawaii, where it is introduced [212]. It also occurs in Puerto Rico; nativity to Puerto Rico is unknown [107]. Flora of North America provides a distributional map of broadleaf cattail."
102	Has the species become naturalized where grown?	
	Source(s)	Notes
	WRA Specialist. 2018. Personal Communication	NA
103	Does the species have weedy races?	
	Source(s)	Notes
	WRA Specialist. 2018. 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
	Gucker, C. L. 2008. <i>Typha latifolia</i> . In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory. https://www.fs.fed.us/database/feis/plants/graminoid/typlat/all.html . [Accessed 4 Jun 2018]	"Broadleaf cattail is a cosmopolitan species found in North America, Mexico, Great Britain, Eurasia, India, Africa, New Zealand, and Australia. In Canada, broadleaf cattail occurs in all provinces and the Northwest Territories [76]. In the United States, broadleaf cattail is native to all states except Hawaii, where it is introduced [212]. It also occurs in Puerto Rico; nativity to Puerto Rico is unknown [107]. Flora of North America provides a distributional map of broadleaf cattail."
202	Quality of climate match data	High
	Source(s)	Notes
	Gucker, C. L. 2008. <i>Typha latifolia</i> . In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory. https://www.fs.fed.us/database/feis/plants/graminoid/typlat/all.html . [Accessed 4 Jun 2018]	
203	Broad climate suitability (environmental versatility)	y

Qsn #	Question	Answer
	Source(s)	Notes
	Gucker, C. L. 2008. <i>Typha latifolia</i> . In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory. https://www.fs.fed.us/database/feis/plants/graminoid/typlat/all.html . [Accessed 4 Jun 2018]	"Climate: Broadleaf cattail's wide distribution implies a wide tolerance of climatic conditions. Broadleaf cattail occurs in tropical, subtropical, southern and northern temperate, humid coastal, and dry continental climates [76]. The following climate descriptions represent some widely different climates experienced in broadleaf cattail habitats in the northern and southernmost portions of its North American range." ... "Elevation: Broadleaf cattail occupies sites from sea level to 7,500 feet (2,300 m) throughout North America [58]."
	Grace, J. B., & Harrison, J. S. 1986. The biology of Canadian weeds. 73. <i>Typha latifolia</i> L., <i>Typha angustifolia</i> L. and <i>Typha x glauca</i> Godr. Canadian Journal of Plant Science. 66: 361-379	"Climatic requirements - <i>Typha latifolia</i> tolerates a broad range of climatic conditions. It can be found in tropical, subtropical, southern and northern temperate zones. It can thrive in both humid coastal and dry continental climates."

204	Native or naturalized in regions with tropical or subtropical climates	y
	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.	"In Hawai'i, sparingly naturalized in low elevation, marshy sites"
	Grace, J. B., & Harrison, J. S. 1986. The biology of Canadian weeds. 73. <i>Typha latifolia</i> L., <i>Typha angustifolia</i> L. and <i>Typha x glauca</i> Godr. Canadian Journal of Plant Science. 66: 361-379	" <i>Typha latifolia</i> tolerates a broad range of climatic conditions. It can be found in tropical, subtropical, southern and northern temperate zones."
	Staples, G. W., Imada, C.T. & Herbst, D. R. 2003. New Hawaiian plant records for 2001. Bishop Museum Occasional Papers. 74: 7-21	"Wagner et al.(1999: 1614) list the common cattail as sparingly naturalized on Kaua'i and O'ahu, "and perhaps also on Hawai'i." The following collection verifies the species' presence on the Big Island. Material examined. HAWAII: Hämākua Distr., Waip'ō Valley, common in fallow taro lo'i, 13 Mar 2001, C. Imada & R. Englund 2001 -13."

205	Does the species have a history of repeated introductions outside its natural range?	y
	Source(s)	Notes
	Weber, E. 2003. Invasive Plant Species of the World. A Reference Guide to Environmental Weeds. CABI Publishing, Wallingford, UK	Australia, New Zealand, Southern Africa, Caribbean, Chile, Argentina, Hawaii

301	Naturalized beyond native range	y
	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.	"in Hawai'i sparingly naturalized in low elevation, marshy sites, at least along the Wailua River, Kaua'i, and in the Salt Lake and Pearl Harbor areas, O'ahu, and perhaps also on Hawai'i. First collected on O'ahu in 1979 (Liu s.n., BISH)."

Qsn #	Question	Answer
	USDA, ARS, Germplasm Resources Information Network. 2018. National Plant Germplasm System [Online Database]. http://www.ars-grin.gov/npgs/index.html . [Accessed 4 Jun 2018]	"Naturalized Australasia AUSTRALIA: Australia NEW ZEALAND: New Zealand Pacific NORTH-CENTRAL PACIFIC: United States [Hawaii] Southern America CARIBBEAN: West Indies South America (s.)"
	Staples, G. W., Imada, C.T. & Herbst, D. R. 2003. New Hawaiian plant records for 2001. Bishop Museum Occasional Papers. 74: 7-21	"Wagner et al.(1999: 1614) list the common cattail as sparingly naturalized on Kaua'i and O'ahu, "and perhaps also on Hawai'i." The following collection verifies the species' presence on the Big Island. Material examined. HAWAII: Hämākua Distr., Waip'ō Valley, common in fallow taro lo'i, 13 Mar 2001, C. Imada & R. Englund 2001-13."

302	Garden/amenity/disturbance weed	y
	Source(s)	Notes
	Gucker, C. L. 2008. <i>Typha latifolia</i> . In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory. https://www.fs.fed.us/database/feis/plants/graminoid/typlat/all.html . [Accessed 4 Jun 2018]	"Broadleaf cattail is typical of early-seral, open-canopy communities. It occurs immediately or soon after disturbance in moist or wet habitats and occurs early in the primary succession of open water or debris flows. In forested habitats, broadleaf cattail persists only temporarily in disturbed sites. Broadleaf cattail occurred with up to 39% cover after a severe fire in pondcypress (<i>Taxodium distichum</i> var. <i>imbricarium</i>) domes near Gainesville, Florida. Five years after the fire, broadleaf cattail cover ranged from 0% to 5%"
	Holm, L.G., Doll, J., Holm, E., Pancho, J.V. & Herberger, J.P. 1997. World weeds: natural histories and distribution. John Wiley and Sons, Inc., New York, NY	"Cattail stands can be damaging-they increase silting, obstruct travel, hinder fishing and recreational activities, offer breeding ground for mosquitoes, and increase water loss in fields and reservoirs."
	Holmes, R. 1997. Taylor's Guide to Ornamental Grasses. Houghton Mifflin Harcourt, New York	"Highly invasive. Choose a spot with care; once established, cattails are very difficult, if not impossible, to remove."
	Drohan, P. J., Ross, C. N., Anderson, J. T., Fortney, R. F., & Rentch, J. S. (2006). Soil and hydrological drivers of <i>Typha latifolia</i> encroachment in a marl wetland. <i>Wetlands Ecology and Management</i> , 14(2), 107-122	"In some areas, broadleaf cattail has increased at the expense of other native species. In Harewood Marsh of Jefferson County, West Virginia, hydrologic changes and increased nutrient inputs may have facilitated broadleaf cattail increases, which may threaten rare species' persistence."
	Grace, J. B., & Harrison, J. S. 1986. The biology of Canadian weeds. 73. <i>Typha latifolia</i> L., <i>Typha angustifolia</i> L. and <i>Typha x glauca</i> Godr. <i>Canadian Journal of Plant Science</i> . 66: 361-379	"Under certain circumstances, it is regarded as a weed, even though it has beneficial value for waterfowl and wildlife. Cattails interfere with the use and upkeep of irrigation and drainage canals, and they obstruct water transport, fishing, and other events in lakes, reservoirs, rivers, ponds, and marshes."

303	Agricultural/forestry/horticultural weed	y
	Source(s)	Notes

Qsn #	Question	Answer
	Mitich, L. M. (2000). Common cattail, <i>Typha latifolia</i> L. Weed Technology, 14(2), 446-450	"Although common cattail is found in 58 countries, few African countries report it as an important weed. It is more prevalent as a weed in Europe and North America than other regions. Common cattail is the main weed of irrigation systems in Australia, India, and Rumania, and of rice in Morocco and Russia. It is a common U.S. rice (<i>Oryza sativa</i> L.) weed that also occurs in rice in Greece, India, Iran, Mexico, the Philippines, and Portugal."
	Grace, J. B., & Harrison, J. S. 1986. The biology of Canadian weeds. 73. <i>Typha latifolia</i> L., <i>Typha angustifolia</i> L. and <i>Typha x glauca</i> Godr. Canadian Journal of Plant Science. 66: 361-379	" <i>Typha latifolia</i> , in particular, is considered one of the worst aquatic weeds in Alberta (Burland and Catling, pers. commun.). <i>Typha</i> has also been reported to cause a significant amount of water loss through evapo-transpiration (Otis 1914). Due to this and other characteristics, such as rapid invasion of sandbars and influence on siltation rates, <i>Typha</i> is considered a serious problem in reservoirs both in Canada and in the western United States (Fletcher and Elmendorf 1955; Hallock 1973)."

304	Environmental weed	
	Source(s)	Notes
	USDA NRCS. 2006. Broad-Leaved Cattail - <i>Typha latifolia</i> . Plant Guide. https://plants.usda.gov/plantguide/pdf/cs_tyla.pdf . [Accessed 4 Jun 2018]	"Ecologically, cattails tend to invade native plant communities when hydrology, salinity, or fertility changes. In this case they out compete native species, often becoming monotypic stands of dense cattails. Maintaining water flows into the wetland, reducing nutrient input and maintaining salinity in tidal marshes will help maintain desirable species composition. If cattails begin to invade, physical removal may be necessary."
	WRA Specialist. 2018. Personal Communication	Most impacts associated with water obstruction, and other amenities [Answer Yes to Question 3.02]

305	Congeneric weed	y
	Source(s)	Notes
	Angeloni, N. L., Jankowski, K. J., Tuchman, N. C., & Kelly, J. J. (2006). Effects of an invasive cattail species (<i>Typha x glauca</i>) on sediment nitrogen and microbial community composition in a freshwater wetland. FEMS microbiology letters, 263(1), 86-92	"ABSTRACT Sediments from Cheboygan Marsh, a coastal freshwater wetland on Lake Huron that has been invaded by an emergent exotic plant, <i>Typha x glauca</i> , were examined to assess the effects of invasion on wetland nutrient levels and sediment microbial communities. Comparison of invaded and uninvaded zones of the marsh indicated that the invaded zone showed significantly lower plant diversity, as well as significantly higher aboveground plant biomass and soil organic matter. The sediments in the invaded zone also showed dramatically higher concentrations of soluble nutrients, including greater than 10-fold higher soluble ammonium, nitrate, and phosphate, which suggests that <i>Typha x glauca</i> invasion may be impacting the wetland's ability to remove nutrients. Terminal restriction fragment length polymorphism analyses revealed significant differences in the composition of total bacterial communities (based on 16S-rRNA genes) and denitrifier communities (based on nirS genes) between invaded and uninvaded zones. This shift in denitrifiers in the sediments may be ecologically significant due to the critical role that denitrifying bacteria play in removal of nitrogen by wetlands."

Qsn #	Question	Answer
	Grace, J. B., & Harrison, J. S. 1986. The biology of Canadian weeds. 73. <i>Typha latifolia</i> L., <i>Typha angustifolia</i> L. and <i>Typha x glauca</i> Godr. Canadian Journal of Plant Science. 66: 361-379	"All species of <i>Typha</i> are considered weeds that can present serious problems in irrigated agricultural lands and managed aquatic systems (National Academy of Sciences-National Research Council 1976)."
	Hickman, J.C. 1993. The Jepson Manual: Higher Plants of California. University of California Press, Berkeley	"The 15 species of <i>Typha</i> are prevalent and bothersome emergent aquatic weeds with a worldwide distribution"

401	Produces spines, thorns or burrs	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.	[No evidence] "Plants usually coarse and stout; stems 1-3 m long. Leaves 12-16 per vegetative stem, pale green, nearly flat, 8-20 mm wide, sheath open to base, the scarious upper margins tapering or rarely truncate. Staminate and pistillate spikes contiguous or occasionally separated by an interval up to 2.5 cm long; staminate spikes pale brown, the flowers with simple hairs, stamens on branched filaments, pollen yellow or occasionally orange, in tetrads; pistillate spikes dark brown, 10-18 cm long, 1.5-3 cm in diameter, flowers without scales or hairs, on slender, often hair-like, compound pedicels 1-2 mm long. Fruit ellipsoid, (0.9-) 1.2-1.5 (-1.6) mm long"

402	Allelopathic	
	Source(s)	Notes
	Bonaser, J., Lynch, J., & Leck, M. A. (1979). Comparison of the allelopathic potential of four marsh species. Bulletin of the Torrey Botanical Club, 106(3): 217-222	"Abstract: A study of allelopathic potential of 4 spp. and 3 soils from a New Jersey [USA] freshwater tidal marsh was made using 4 bioassay species. <i>Ambrosia trifida</i> leaf- and <i>Peltandra virginica</i> leaf- and petiole-extracts almost universally decreased germination and root growth of lettuce, radish, tomato and cucumber. <i>Ambrosia</i> stem-extract inhibited growth but not germination. <i>Bidens laevis</i> leaf-extract was generally inhibitory, but <i>Bidens</i> stem-extract only inhibited germination and growth of lettuce. <i>Typha latifolia</i> leaf-extract was inhibitory to growth and to radish germination at 24 h. <i>Typha</i> root- and rhizome-extracts were the least inhibitory. The marsh soils from cattail, ragweed and mixed vegetation sites at 0-5 and 5-10 cm had no effect on germination of radish or cucumber. Cattail 0-5 cm soil-extract enhanced cucumber growth at 72 h and radish growth at 48 h. Of the bioassay species, lettuce was the most sensitive, radish and tomato somewhat less sensitive, and cucumber the least sensitive."

Qsn #	Question	Answer
	Grace, J. B. (1983). Autotoxic inhibition of seed germination by <i>Typha latifolia</i> : an evaluation. <i>Oecologia</i> , 59(2-3), 366-369	"Abstract: Seeds of <i>T. latifolia</i> were exposed to leaf extracts, leaf pieces and soil water from adult plants of <i>T. latifolia</i> . In liquid culture, only extracts of concentration greater than or equal to 3% (dry weight to volume) inhibited seed germination. Adding soil to the liquid cultures increased the inhibition of seed germination by extracts. The inhibitory effects of extracts were correlated with the development of water molds in the cultures; prior to the development of water molds, even 15% extracts were not inhibitory to germination. In contrast to results from extracts, neither 3% concentrations of senesced leaf pieces nor soil water from 1 yr old pots of <i>T. latifolia</i> had any detrimental effects on germination. Seeds sown into pots containing established <i>T. latifolia</i> germinated as well as seeds sown into control pots. These results do not support the contention that <i>T. latifolia</i> inhibits the germination of its seeds by the release of allelopathic substances."
	WRA Specialist. 2018. Personal Communication	Experimental evidence, but little or no evidence from field conditions

403	Parasitic	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.	"Glabrous perennial herbs of wet or swampy habitats, with extensive starchy, creeping rhizomes, often forming large dense colonies; stems erect, unbranched, terminating in an inflorescence." [Typhaceae. No evidence]

404	Unpalatable to grazing animals	n
	Source(s)	Notes
	Gucker, C. L. 2008. <i>Typha latifolia</i> . In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory. https://www.fs.fed.us/database/feis/plants/graminoid/typlat/all.html . [Accessed 4 Jun 2018]	"Although broadleaf cattail is not considered particularly palatable to livestock, it may be consumed when water levels drop and/or other upland forage is unavailable. Grazing and trampling can reduce broadleaf cattail abundance."
	Sojda, R. S. & Solberg, K. L. 1993. Management and Control of Cattails. Fish and Wildlife Leaflet 13.4.13. U.S. Fish & Wildlife Service, Washington, D.C.	"Grazing by cows, geese, muskrats, and other animals on seedling and young cattails without extensive rhizomes can remove entire plants, reducing stem densities or eliminating stands. Grazing on mature plants in association with proper water-level management reduces the survival of cattails through the combined effects of severing the aerenchyma link between the rhizomes and leaves and stressing the storage and conversion of starches. To minimize starch storage, cattails should be heavily grazed by cattle during the 3-week period centered on the time when the pistillate spike is lime green and the staminate spike is dark green."

405	Toxic to animals	
	Source(s)	Notes

Qsn #	Question	Answer
	Grace, J. B., & Harrison, J. S. 1986. The biology of Canadian weeds. 73. <i>Typha latifolia</i> L., <i>Typha angustifolia</i> L. and <i>Typha x glauca</i> Godr. Canadian Journal of Plant Science. 66: 361-379	[Conflicting accounts of potential toxicity] "Both <i>Typha latifolia</i> and <i>T. angustifolia</i> have been reported as potentially poisonous to humans or livestock, although <i>Typha</i> species as a group are generally considered edible (Fernald et al. 1958). Kingsbury (1964) mentioned a case in which <i>T. latifolia</i> was suspected in the fatal poisoning of horses in Indiana. <i>Typha angustifolia</i> was also suspected in a case of cattle poisoning in New South Wales, but no toxic effects could be demonstrated in controlled tests on the leaves and flowering heads (Hurst 19 12). Woodcock (1925) mentioned that the ground-up stems and rhizomes of <i>T. latifolia</i> "in some instances has proved poisonous to people"; Pammell (191 1) also reported "the cattail" (species unidentified) as poisonous."
	Gucker, C. L. 2008. <i>Typha latifolia</i> . In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory. https://www.fs.fed.us/database/feis/plants/graminoid/typlat/all.html . [Accessed 4 Jun 2018]	[No evidence] "Grazing/trampling: Broadleaf cattail abundance can be reduced by common muskrat and livestock grazing. Common muskrats feed extensively on broadleaf cattail roots and rhizomes. Common muskrat populations can affect successional development and productivity in broadleaf cattail stands [37]. In a wetland north of Cambridge, Maryland, a researcher observed heavy broadleaf cattail feeding by common muskrats. Twelve years after heavy use, the broadleaf cattail marsh was converted to green arrow arum (<i>Peltandra virginica</i> -dominated vegetation. Extensive common muskrat feeding converted solid broadleaf cattail rhizome mats to unconsolidated, anoxic, organic substrates, and water levels were lowered by 2 to 6 inches (5-15 cm) [66]. Additional information is available in Common muskrats. Although broadleaf cattail is not considered particularly palatable to livestock, it may be consumed when water levels drop and/or other upland forage is unavailable. Grazing and trampling can reduce broadleaf cattail abundance. In northwestern Montana, heavy livestock use may convert broadleaf cattail communities to a Nebraska sedge (<i>Carex nebrascensis</i>) type [18]. In wetlands of southeastern Alberta, heavy cattle grazing and trampling killed nearly all broadleaf cattail seedlings on exposed mud. Trampling did not affect established stands. The researcher concluded that "broadleaf cattail as an established emergent is little affected by cattle, but as a moist soil stand it is often badly trampled" [111]."

406	Host for recognized pests and pathogens	n
	Source(s)	Notes
	Gucker, C. L. 2008. <i>Typha latifolia</i> . In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory. https://www.fs.fed.us/database/feis/plants/graminoid/typlat/all.html . [Accessed 4 Jun 2018]	No evidence

407	Causes allergies or is otherwise toxic to humans	
	Source(s)	Notes

Qsn #	Question	Answer
	Grace, J. B., & Harrison, J. S. 1986. The biology of Canadian weeds. 73. <i>Typha latifolia</i> L., <i>Typha angustifolia</i> L. and <i>Typha x glauca</i> Godr. Canadian Journal of Plant Science. 66: 361-379	[Conflicting accounts of toxicity] "Both <i>Typha latifolia</i> and <i>T. angustifolia</i> have been reported as potentially poisonous to humans or livestock, although <i>Typha</i> species as a group are generally considered edible (Fernald et al. 1958). Kingsbury (1964) mentioned a case in which <i>T. latifolia</i> was suspected in the fatal poisoning of horses in Indiana. <i>Typha angustifolia</i> was also suspected in a case of cattle poisoning in New South Wales, but no toxic effects could be demonstrated in controlled tests on the leaves and flowering heads (Hurst 19 12). Woodcock (1925) mentioned that the ground-up stems and rhizomes of <i>T. latifolia</i> "in some instances has proved poisonous to people"; Pammell (191 1) also reported "the cattail" (species unidentified) as poisonous. The "floss" or "down" (presumably, gynophore hairs attached to the seed) of cattails has been reported to be irritating to the eyes but the pollen is not considered to cause any significant allergic reactions in humans (Morton 1975)."
	Quattrocchi, U. 2012. CRC World Dictionary of Medicinal and Poisonous Plants: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology. CRC Press, Boca Raton, FL	[Used medicinally] "Poultice of crushed roots disinfectant, applied to wounds, bleeding navels, bleeding wounds and cuts, carbuncles and boils, sores, infections; root chewed by women for gonorrhea; roots and leaves for abdominal cramps. A sterilizer, a decoction of the rhizomes mixed with <i>Catasetum fimbriatum</i> for regulating fertility. Leaves used for sores. Stalks decoction taken for whooping cough. Ceremonial, whole plant emetic, leaves used in the Sun Dance ceremony. Veterinary medicine, roots used as a wash for horses with bleeding cuts."

408	Creates a fire hazard in natural ecosystems	
	Source(s)	Notes
	Gucker, C. L. 2008. <i>Typha latifolia</i> . In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory. https://www.fs.fed.us/database/feis/plants/graminoid/typlat/all.html . [Accessed 4 Jun 2018]	[Possibly Yes] "Fire regimes: Broadleaf cattail is restricted to moist or wet sites; however, some indicate that these habitats can burn frequently [40,65]. Fires are not considered frequent in all broadleaf cattail habitats, though. In alluvial communities of the southeastern Coastal Plain, broadleaf cattail occurs at the edge of oxbow lakes, where fire is not common [29]. It is likely that fire regimes in broadleaf cattail marshes and stands are dictated by surrounding upland vegetation. If nearby vegetation is highly flammable and conditions are dry, fire is likely in broadleaf cattail vegetation [65]."

409	Is a shade tolerant plant at some stage of its life cycle	n
	Source(s)	Notes
	Kudish, M. 1992. Adirondack upland flora: an ecological perspective. The Chauncy Press, Saranac, NY	"Broadleaf cattail is shade intolerant"
	Bonnewell, V., Koukkari, W. L., & Pratt, D. C. (1983). Light, oxygen, and temperature requirements for <i>Typha latifolia</i> seed germination. Canadian Journal of Botany, 61(5), 1330-1336	"full light conditions are most conducive to seed germination"

Qsn #	Question	Answer
	Gucker, C. L. 2008. <i>Typha latifolia</i> . In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory. https://www.fs.fed.us/database/feis/plants/graminoid/typlat/all.html . [Accessed 4 Jun 2018]	"Shade tolerance: Broadleaf cattail is shade intolerant [116], and full light conditions are most conducive to seed germination [19,191]. A review reported that shade levels of 40%, 60%, and 90% reduced broadleaf cattail growth by 60%, 80%, and 90%, respectively, when compared to full sun. Broadleaf cattail often died after 30 months in 90% shade [102]. Broadleaf cattail seedling height was lower in 33% full sun than in full sun conditions when grown from seed collected from North Bay Park in Michigan. After 84 days in the greenhouse, seedlings averaged a little over 24 inches (60 cm) under shade cloth and a little over 33 inches (85 cm) in full sun [224]."

410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)	y
	Source(s)	Notes
	Gucker, C. L. 2008. <i>Typha latifolia</i> . In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory. https://www.fs.fed.us/database/feis/plants/graminoid/typlat/all.html . [Accessed 4 Jun 2018]	"Soils: Broadleaf cattail tolerates many soil textures, nutrient levels, moisture regimes, and pH levels. Descriptions of soil types as well and flooding, drought, and salinity tolerances are described below."

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.	"Plants usually coarse and stout; stems 1- 3 m long. Leaves 12-16 per vegetative stem, pale green, nearly flat, 8-20 mm wide, sheath open to base, the scarious upper margins tapering or rarely truncate."

412	Forms dense thickets	y
	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.	"often forming large dense colonies"
	Grace, J. B., & Harrison, J. S. 1986. The biology of Canadian weeds. 73. <i>Typha latifolia</i> L., <i>Typha angustifolia</i> L. and <i>Typha x glauca</i> Godr. Canadian Journal of Plant Science. 66: 361-379	" <i>Typha latifolia</i> can be found in all types of wetland or aquatic communities, ranging from early to late successional stages. It can occur in large, dense monospecific stands or as scattered individuals or clumps in stands of mixed vegetation. It is a dominant species in many marshes (sometimes referred to as "Typha marshes") and is common along lakeshores, pond margins and in roadside ditches."

501	Aquatic	y
	Source(s)	Notes
	Gucker, C. L. 2008. <i>Typha latifolia</i> . In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory. https://www.fs.fed.us/database/feis/plants/graminoid/typlat/all.html . [Accessed 4 Jun 2018]	"Broadleaf cattail is an aquatic or semiaquatic emergent perennial."

Qsn #	Question	Answer
	Grace, J. B., & Harrison, J. S. 1986. The biology of Canadian weeds. 73. <i>Typha latifolia</i> L., <i>Typha angustifolia</i> L. and <i>Typha x glauca</i> Godr. Canadian Journal of Plant Science. 66: 361-379	" <i>Typha latifolia</i> can be found in all types of wetland or aquatic communities, ranging from early to late successional stages."

502	Grass	n
	Source(s)	Notes
	USDA, ARS, Germplasm Resources Information Network. 2018. National Plant Germplasm System [Online Database]. http://www.ars-grin.gov/npgs/index.html . [Accessed 4 Jun 2018]	Family: Typhaceae Tribe: Typhaceae

503	Nitrogen fixing woody plant	n
	Source(s)	Notes
	USDA, ARS, Germplasm Resources Information Network. 2018. National Plant Germplasm System [Online Database]. http://www.ars-grin.gov/npgs/index.html . [Accessed 4 Jun 2018]	Family: Typhaceae Tribe: Typhaceae

504	Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)	n
	Source(s)	Notes
	Grace, J. B., & Harrison, J. S. 1986. The biology of Canadian weeds. 73. <i>Typha latifolia</i> L., <i>Typha angustifolia</i> L. and <i>Typha x glauca</i> Godr. Canadian Journal of Plant Science. 66: 361-379	" <i>Typha latifolia</i> is an erect, rhizomatous perennial with flowers borne in cylindrical spikes on a stout stem 1-3 m tall" [Spreads by rhizomes. See Question 6.06]

601	Evidence of substantial reproductive failure in native habitat	n
	Source(s)	Notes
	Lansdown, R.V. 2017. <i>Typha latifolia</i> . The IUCN Red List of Threatened Species 2017: e.T164165A84300723. http://dx.doi.org/10.2305/IUCN.UK.2017-1.RLTS.T164165A84300723.en . [Accessed 5 Jun 2018]	"Red List Category & Criteria: Least Concern" ... "Justification: This species has a very large distribution, has been widely introduced and is tolerant of polluted waters."
	Gucker, C. L. 2008. <i>Typha latifolia</i> . In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory. https://www.fs.fed.us/database/feis/plants/graminoid/typlat/all.html . [Accessed 4 Jun 2018]	[No evidence. Wide distribution] "Broadleaf cattail is a cosmopolitan species found in North America, Mexico, Great Britain, Eurasia, India, Africa, New Zealand, and Australia."

602	Produces viable seed	y
	Source(s)	Notes

Qsn #	Question	Answer
	Gucker, C. L. 2008. <i>Typha latifolia</i> . In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory. https://www.fs.fed.us/database/feis/plants/graminoid/typlat/all.html . [Accessed 5 Jun 2018]	"Broadleaf cattail regenerates vegetatively through rhizome sprouts and sexually through seed germination"
	Grace, J. B., & Harrison, J. S. 1986. The biology of Canadian weeds. 73. <i>Typha latifolia</i> L., <i>Typha angustifolia</i> L. and <i>Typha x glauca</i> Godr. Canadian Journal of Plant Science. 66: 361-379	"Seed production and dispersal - The small single-seeded fruits are produced in great numbers with estimates for a single inflorescence ranging from 20 000 to 700 000 (Prunster 1941; Marsh 1962; Yeo 1964)." ... "Seeds retain viability for long periods when conditions are not suitable for germination (Crocker 1938; Bedish 1967; van der Valk and Davis 1976)."

603	Hybridizes naturally	y
	Source(s)	Notes
	Gucker, C. L. 2008. <i>Typha latifolia</i> . In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory. https://www.fs.fed.us/database/feis/plants/graminoid/typlat/all.html . [Accessed 5 Jun 2018]	"Hybrids: Broadleaf cattail hybridizes with both other North American cattail species, narrow leaved cattail (<i>T. angustifolia</i>) and southern cattail (<i>T. domingensis</i>), where distributions overlap. Hybrid swarms of all 3 species have been identified in central California. <i>T. x glauca</i> has been used to describe both broadleaf cattail x narrow-leaved cattail and broadleaf cattail x southern cattail hybrids"
	Grace, J. B., & Harrison, J. S. 1986. The biology of Canadian weeds. 73. <i>Typha latifolia</i> L., <i>Typha angustifolia</i> L. and <i>Typha x glauca</i> Godr. Canadian Journal of Plant Science. 66: 361-379	" <i>Typha angustifolia</i> is restricted in its overall North American distribution to southeastern Canada, along the Atlantic coast southward to South Carolina and through the Midwest and north-central Great Plains to the Rocky Mountains. Isolated populations, often forming hybrid swarms with <i>T. latifolia</i> , occur in central and northern California (Smith 1967)."

604	Self-compatible or apomictic	y
	Source(s)	Notes
	Grace, J. B., & Harrison, J. S. 1986. The biology of Canadian weeds. 73. <i>Typha latifolia</i> L., <i>Typha angustifolia</i> L. and <i>Typha x glauca</i> Godr. Canadian Journal of Plant Science. 66: 361-379	"Bagging studies have shown <i>Typha</i> to be highly self-fertile but without apomixis (personal observations)."
	Gucker, C. L. 2008. <i>Typha latifolia</i> . In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory. https://www.fs.fed.us/database/feis/plants/graminoid/typlat/all.html . [Accessed 5 Jun 2018]	"Researchers indicate that self pollination and clonal growth have increased the genetic homogeneity of stands while increasing genetic differences between sites."

605	Requires specialist pollinators	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.	"Flowers wind-pollinated and protogynous"

Qsn #	Question	Answer
	Grace, J. B., & Harrison, J. S. 1986. The biology of Canadian weeds. 73. <i>Typha latifolia</i> L., <i>Typha angustifolia</i> L. and <i>Typha x glauca</i> Godr. Canadian Journal of Plant Science. 66: 361-379	"The inflorescences of <i>Typha</i> are wind pollinated and bear copious pollen."

606	Reproduction by vegetative fragmentation	y
	Source(s)	Notes
	Grace, J. B., & Harrison, J. S. 1986. The biology of Canadian weeds. 73. <i>Typha latifolia</i> L., <i>Typha angustifolia</i> L. and <i>Typha x glauca</i> Godr. Canadian Journal of Plant Science. 66: 361-379	"In <i>T. latifolia</i> , flowering leads to the death of the entire ramet resulting in a clonal system that dies " at the back" while it grows outward (Grace and Wetzel 1981 a)."
	Gucker, C. L. 2008. <i>Typha latifolia</i> . In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory. https://www.fs.fed.us/database/feis/plants/graminoid/typlat/all.html . [Accessed 5 Jun 2018]	"Vegetative regeneration: Rhizome growth is important to broadleaf cattail regeneration. Rhizome dispersal may occur when portions of a clone are separated by wind, water, ice, or animals [6]. Dispersal is also likely through tillage and substrate movement [47]."

607	Minimum generative time (years)	2
	Source(s)	Notes
	Gucker, C. L. 2008. <i>Typha latifolia</i> . In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory. https://www.fs.fed.us/database/feis/plants/graminoid/typlat/all.html . [Accessed 5 Jun 2018]	"In controlled conditions, broadleaf cattail grown from seed produced flowers early in the second year of growth."

701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	y
	Source(s)	Notes
	Apfelbaum, S. I. (1985). Cattail (<i>Typha</i> spp.) management. Natural Areas Journal 5(3): 9-17	"Dispersal can occur by seeds, rhizomes, corms, and by the movement of parts of colonies torn by wind, water, ice, or animals."
	Gucker, C. L. 2008. <i>Typha latifolia</i> . In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory. https://www.fs.fed.us/database/feis/plants/graminoid/typlat/all.html . [Accessed]	"Seed dispersal: Broadleaf cattail seeds are transported by wind, water, and substrate movement."... "Seeds are also dispersed through soil movement when mud clings to animals or people [47]."
	DiTomaso, J. & Healy, E. A. (2003). Aquatic and Riparian Weeds of the West. UCANR Publications, Oakland, CA	"Seeds are also dispersed through soil movement when mud clings to animals or people...Dispersal is also likely through tillage and substrate movement"

Qsn #	Question	Answer
702	Propagules dispersed intentionally by people	y
	Source(s)	Notes
	Darke, R. 2007. The Encyclopedia of Grasses for Livable Landscapes. Timber Press, Portland, OR	Ornamental
	Holmes, R. 1997. Taylor's Guide to Ornamental Grasses. Houghton Mifflin Harcourt, New York	Ornamental uses

703	Propagules likely to disperse as a produce contaminant	n
	Source(s)	Notes
	Gucker, C. L. 2008. <i>Typha latifolia</i> . In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory. https://www.fs.fed.us/database/feis/plants/graminoid/typlat/all.html . [Accessed 5 Jun 2018]	[No evidence] "Seed dispersal: Broadleaf cattail seeds are transported by wind, water, and substrate movement."... "Seeds are also dispersed through soil movement when mud clings to animals or people [47]. Seeds may also be transported with portions of broadleaf cattail clones that are torn by wind, water, ice, or animals [6]. Often seeds remain attached to spikes through the winter and are dispersed in the spring, and in some cases seeds fail to disperse. Apfelbaum [6] observed submerged cattail spikes with hundreds of nearby seedlings."

704	Propagules adapted to wind dispersal	y
	Source(s)	Notes
	Gucker, C. L. 2008. <i>Typha latifolia</i> . In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory. https://www.fs.fed.us/database/feis/plants/graminoid/typlat/all.html . [Accessed 5 Jun 2018]	"Seed dispersal: Broadleaf cattail seeds are transported by wind, water, and substrate movement. Achenes have numerous long slender hairs at the base that allow fruits to float on water and blow in the wind [172], and some report that achenes split or burst when they contact water [92,98]."

705	Propagules water dispersed	y
	Source(s)	Notes
	Gucker, C. L. 2008. <i>Typha latifolia</i> . In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory. https://www.fs.fed.us/database/feis/plants/graminoid/typlat/all.html . [Accessed 5 Jun 2018]	"Fertilized flowers produce single-seeded, nutlike achenes up to 1.5 mm long [122,227]. Long slender hairs at the base allow for wind and water transport of the "eventually dehiscent" seeds...Broadleaf cattail seeds are transported by wind, water, and substrate movement. Achenes have numerous long slender hairs at the base that allow fruits to float on water and blow in the wind" ... "Rhizome dispersal may occur when portions of a clone are separated by wind, water, ice, or animals [6]."

706	Propagules bird dispersed	
	Source(s)	Notes
	Mitich, L. M. (2000). Common cattail, <i>Typha latifolia</i> L. Weed Technology, 14(2), 446-450	"Common cattail seeds are so small as not to be overly attractive to birds. On occasion, sandpipers and teal eat the seeds, and geese the underground stems." [Birds act as seed predators rather than dispersers]

Qsn #	Question	Answer
	Soons, M., Van der Vlugt, C., Van Lith, B., Heil, G., & Klaassen, M. (2008). Small Seed Size Increases the Potential for Dispersal of Wetland Plants by Ducks. <i>Journal of Ecology</i> , 96(4), 619-627	"Retrieved seeds of <i>J. effusus</i> , <i>L. salicaria</i> and <i>T. latifolia</i> that could not be sieved and counted due to their small size were also present in the faeces as demonstrated by their germination from the faeces samples in the germination experiment."

707	Propagules dispersed by other animals (externally)	y
	Source(s)	Notes
	DiTomaso, J. & Healy, E. A. (2003). <i>Aquatic and Riparian Weeds of the West</i> . UCANR Publications, Oakland, CA	"Seeds are also dispersed through soil movement when mud clings to animals or people"
	Apfelbaum, S. I. (1985). Cattail (<i>Typha</i> spp.) management. <i>Natural Areas Journal</i> 5(3): 9-17	"Seeds may also be transported with portions of broadleaf cattail clones that are torn by wind, water, ice, or animals"
	Krattinger, K. (1975). Genetic mobility in <i>Typha</i> . <i>Aquatic Botany</i> , 1, 57-70	"The pointed seeds can become embedded in the skin of fishes, resulting in further transport. "

708	Propagules survive passage through the gut	y
	Source(s)	Notes
	Soons, M., Van der Vlugt, C., Van Lith, B., Heil, G., & Klaassen, M. (2008). Small Seed Size Increases the Potential for Dispersal of Wetland Plants by Ducks. <i>Journal of Ecology</i> , 96(4), 619-627	"Retrieved seeds of <i>J. effusus</i> , <i>L. salicaria</i> and <i>T. latifolia</i> that could not be sieved and counted due to their small size were also present in the faeces as demonstrated by their germination from the faeces samples in the germination experiment."

801	Prolific seed production (>1000/m ²)	y
	Source(s)	Notes
	Gucker, C. L. 2008. <i>Typha latifolia</i> . In: <i>Fire Effects Information System</i> , [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory. https://www.fs.fed.us/database/feis/plants/graminoid/typlat/all.html . [Accessed 5 Jun 2018]	"From 10 spikes that averaged 7 inches (18 cm) long, an average of over 222,000 seeds/spike was produced...The greatest number of broadleaf cattail seedlings (15,060/m ²) emerged from the top 0.8 inch (2 cm) of soil collected in March from vegetation dominated by calamus (<i>Acorus calamus</i>) and broadleaf cattail. Soils collected in June from the same depth and vegetation type had 2,340/m ² broadleaf cattail seedlings emerge. There were 5,060/m ² and 2,150/m ² broadleaf cattail seedlings in the top 0.8 inch of soils collected in March and June, respectively, in shrublands dominated by red maple (<i>Acer rubrum</i>), silky dogwood (<i>Cornus amomum</i>), and alder (<i>Alnus</i> spp.). Broadleaf cattail seedling emergence decreased with increasing soil depths, and no seedlings emerged from soil samples taken from depths greater than 5.9 inches (15 cm). More seedlings emerged on unprotected sites (53,000/m ²) than on sites with seed rain excluded (38,700/m ²). Although differences were not significant ($P>0.05$) [126], they suggest a persistent seed bank."
	Grace, J. B., & Harrison, J. S. 1986. The biology of Canadian weeds. 73. <i>Typha latifolia</i> L., <i>Typha angustifolia</i> L. and <i>Typha x glauca</i> Godr. <i>Canadian Journal of Plant Science</i> . 66: 361-379	"Seed production and dispersal - The small single-seeded fruits are produced in great numbers with estimates for a single inflorescence ranging from 20 000 to 700 000 (Prunster 1941; Marsh 1962; Yeo 1964)."

802	Evidence that a persistent propagule bank is formed (>1 yr)	y
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Qsn #	Question	Answer
	Source(s)	Notes
	Gucker, C. L. 2008. <i>Typha latifolia</i> . In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory. https://www.fs.fed.us/database/feis/plants/graminoid/typlat/all.html . [Accessed 5 Jun 2018]	"Seed banking: Broadleaf cattail produces a persistent seed bank. Although there are no reports of how long broadleaf cattail seed remains viable in the soil, its emergence from soils in late-seral forests that have long been unsuitable broadleaf cattail habitat suggests long-term persistence or long-distance dispersal. In Washington, a small percentage of field-collected broadleaf cattail seed germinated after being stored in a freshwater canal for 60 months [33]. While dense broadleaf cattail seedlings often emerged from sites where broadleaf cattail was important [126,210], there were exceptions [48,210]. Most of the studies below used the emergence method to determine the density of broadleaf cattail seed in the soil. This method requires, but rarely assures, that ideal broadleaf cattail germination conditions are provided."

803	Well controlled by herbicides	y
	Source(s)	Notes
	Weber, E. 2003. Invasive Plant Species of the World. A Reference Guide to Environmental Weeds. CABI Publishing, Wallingford, UK	"A number of herbicides are used for chemical control, e.g. glyphosate, amitrole, dalapon, 2,4-D, or TCA. Success depends on time of application and density of infestations."
	Grace, J. B., & Harrison, J. S. 1986. The biology of Canadian weeds. 73. <i>Typha latifolia</i> L., <i>Typha angustifolia</i> L. and <i>Typha x glauca</i> Godr. Canadian Journal of Plant Science. 66: 361-379	"Sculthorpe (1967) listed several herbicides as potentially useful in controlling emergent aquatic plants including 2,4-D, monuron, dalapon, MCP A, and TCA. According to his report, the best form for application is either injection into the soil or foliar application using translocatable substances. Of the latter type, dalapon has been shown to control <i>Typha</i> when applied at rates of 1.1-44.8 kg ha ⁻¹ . More recently, Corns and Gupta (1971) have tested a variety of soil and foliar herbicides on <i>T. latifolia</i> . In general, they found soil applications to be effective only in the absence of standing water and, therefore, recommend foliar application. The most effective foliar sprays were amitrole, dalapon, and Tandex. Tests on 2,4-D found that annual applications were needed to control <i>T. latifolia</i> and they suggested that in some regions, more than one application may be required. Field tests suggested no hazardous side effects from using 2,4-D, dalapon, or amitrole. Studies using paraquat to control submersed vegetation have reported unintentional damage to <i>T. latifolia</i> , though not to other shoreline plants (Way et al. 1971)."

804	Tolerates, or benefits from, mutilation, cultivation, or fire	y
	Source(s)	Notes
	Gucker, C. L. 2008. <i>Typha latifolia</i> . In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory. https://www.fs.fed.us/database/feis/plants/graminoid/typlat/all.html . [Accessed 5 Jun 2018]	"When established broadleaf cattail stands burn, plants sprout from the rhizome almost immediately after fire [11,193]. Even severely burned sites may differ from unburned sites in litter amounts as early as 1 year after fire [11]."

805	Effective natural enemies present locally (e.g. introduced biocontrol agents)	
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Qsn #	Question	Answer
	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] "in Hawai'i sparingly naturalized in low elevation, marshy sites, at least along the Wailua River, Kaua'i, and in the Salt Lake and Pearl Harbor areas, O'ahu, and perhaps also on Hawai'i."

Summary of Risk Traits:

High Risk / Undesirable Traits

- Broad climate suitability & environmental versatility
- Grows from temperate to tropical climates
- Naturalized on Kauai, Oahu, & Hawaii (Hawaiian Islands) & elsewhere
- A disturbance weed that impacts agriculture & aquatic resources
- Potential environmental weed
- Other *Typha* species are invasive
- Reports of potential toxicity to animals & humans (conflicting accounts)
- Tolerates many soil types
- Capable of forming dense monocultures in aquatic habitats
- Reproduces by seeds & vegetatively by rhizomes
- Hybridizes with other *Typha* species
- Self-fertile
- Reaches maturity in 2 years (from seed)
- Seeds dispersed by wind, water, soil movement & external attachment to animals & equipment
- Intentionally planted by people
- Seeds survive gut passage (ducks)
- Prolific seed production
- Forms a persistent seed bank
- Able to resprout after fire

Low Risk Traits

- Unarmed (no spines, thorns, or burrs)
- Palatable to animals & provides shelter for water birds
- Ornamental
- Herbicides provide effective control