Taxon: Bulbostylis capillaris (L.) Kunth ex C.B.Clarke **Family:** Cyperaceae

Common Name(s): densetuft hairsedge
threadleaf beakseed
tufted hair-sedge

Synonym(s): Scirpus capillaris L.

Assessor: Chuck Chimera **Status:** In Progress **End Date:** 17 Nov 2017

WRA Score: 9.0 **Designation:** H(HPWRA) **Rating:** High Risk

Keywords: Annual Sedge, Naturalized, Weedy, Wind-Pollinated, 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		
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		
403	Parasitic	y=1, n=0	n
404	Unpalatable to grazing animals		
405	Toxic to animals	y=1, n=0	n
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	y=1, n=0	n
409	Is a shade tolerant plant at some stage of its life cycle		

Qsn #	Question	Answer Option	Answer
410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)	y=1, n=0	n
411	Climbing or smothering growth habit	y=1, n=0	n
412	Forms dense thickets	y=1, n=0	n
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	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		
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)		
702	Propagules dispersed intentionally by people	y=1, n=-1	n
703	Propagules likely to disperse as a produce contaminant		
704	Propagules adapted to wind dispersal		
705	Propagules water dispersed	y=1, n=-1	y
706	Propagules bird dispersed		
707	Propagules dispersed by other animals (externally)	y=1, n=-1	n
708	Propagules survive passage through the gut		
801	Prolific seed production (>1000/m2)	y=1, n=-1	y
802	Evidence that a persistent propagule bank is formed (>1 yr)		
803	Well controlled by herbicides		
804	Tolerates, or benefits from, mutilation, cultivation, or fire		
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**
	Romand-Monnier, F. 2013. Bulbostylis capillaris. The IUCN Red List of Threatened Species 2013: e.T44392435A44495560. http://dx.doi.org/10.2305/IUCN.UK.2013-2.RLTS.T44392435A44495560.en. [Accessed 15 Nov 2017]	[No evidence of domestication] "Bulbostylis capillaris is a small, pale green annual tufted sedge, which has a very wide geographic distribution occurring throughout northern, central and southern America. The taxon is reported to be native from northern and Central America and to have been introduced in South America. Bulbostylis capillaris has also been introduced in Hawaii and reported from Asia, but it is unclear whether these reports refer to the native American taxon (Ball et al. 2001, Lomer 2008)."

102	**Has the species become naturalized where grown?**	
	Source(s)	**Notes**
	WRA Specialist. 2017. Personal Communication	NA

103	**Does the species have weedy races?**	
	Source(s)	**Notes**
	WRA Specialist. 2017. 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**
	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 from temperate to tropical North and South America"
	Romand-Monnier, F. 2013. Bulbostylis capillaris. The IUCN Red List of Threatened Species 2013: e.T44392435A44495560. http://dx.doi.org/10.2305/IUCN.UK.2013-2.RLTS.T44392435A44495560.en. [Accessed 15 Nov 2017]	"Native: Argentina; Belize; Canada (British Columbia, New Brunswick - Introduced, Nova Scotia - Introduced, Ontario, Québec); Colombia; Cuba; Dominica; Dominican Republic; El Salvador; French Guiana; Grenada; Guatemala; Guyana; Haiti; Honduras; Martinique; Mexico; Nicaragua; Puerto Rico; Saint Kitts and Nevis; Saint Lucia; Saint Vincent and the Grenadines; Suriname; Trinidad and Tobago; United States (Alabama, Arizona, Arkansas, California, Connecticut, Delaware, District of Columbia, Florida, Georgia, Hawaiian Is. - Introduced, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Michigan, Minnesota, Mississippi, Missouri, Montana, Nebraska, New Hampshire, New Jersey, New Mexico, New York, North Carolina, Ohio, Oklahoma, Oregon, Pennsylvania, Rhode Island, South Carolina, Tennessee, Texas, Vermont, Virginia, West Virginia, Wisconsin); Uruguay; Venezuela, Bolivarian Republic of"

Qsn #	Question	Answer
202	**Quality of climate match data**	**High**
	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.	

203	**Broad climate suitability (environmental versatility)**	**y**
	Source(s)	**Notes**
	Romand-Monnier, F. 2013. Bulbostylis capillaris. The IUCN Red List of Threatened Species 2013: e.T44392435A44495560. http://dx.doi.org/10.2305/IUCN.UK.2013-2.RLTS.T44392435A44495560.en. [Accessed 15 Nov 2017]	"The taxon is found in a large range of habitats, from sea level to 3,000 m asl, often in riparian sites. It is a weedy species that readily colonizes moist sandy, often disturbed sites, outside of its native habitat. The taxon is considered as a naturalised weed in several countries, where it has been introduced."
	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 native distribution & elevation range exceeds 1000 m, demonstrating environmental versatility] "Native from temperate to tropical North and South America; in Hawai'i naturalized in dry, grassy places with sandy soil, (0-) 100-1,780 m, on Hawai'i."

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.	"Native from temperate to tropical North and South America; in Hawai'i naturalized in dry, grassy places with sandy soil, (0-) 100-1,780 m, on Hawai'i. First collected in 1911 (Forbes 392.H, BISH).-"

205	**Does the species have a history of repeated introductions outside its natural 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 naturalized in dry, grassy places with sandy soil, (0-) 100-1,780 m, on Hawai'i."
	Romand-Monnier, F. 2013. Bulbostylis capillaris. The IUCN Red List of Threatened Species 2013: e.T44392435A44495560. http://dx.doi.org/10.2305/IUCN.UK.2013-2.RLTS.T44392435A44495560.en. [Accessed 15 Nov 2017]	"Introduced: Bolivia, Plurinational States of; Brazil; Ecuador; Paraguay; Peru"

Qsn #	Question	Answer
301	**Naturalized beyond native range**	**y**
	Source(s)	**Notes**
	Oldham, M. J., & Zinck, M. (1997). New and noteworthy records from the vascular flora of Nova Scotia. The Canadian Field Naturalist, 111(3), 393-398	"Bulbostylis capillaris is apparently adventive in Nova Scotia, where it grows along railway tracks and roadsides. This sedge was first collected in Nova Scotia at Halifax in 1967, but was not reported..."
	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 from temperate to tropical North and South America; in Hawai'i naturalized in dry, grassy places with sandy soil, (0-) 100-1,780 m, on Hawai'i. First collected in 1911 (Forbes 392.H, BISH).-"

302	Garden/amenity/disturbance weed	y
	Source(s)	**Notes**
	Wheatman, S. 2017. Hawaii Island resident. Pers. Comm. 12 November	"It's a fairly attractive small sedge when it's green, but not so when it browns off. It's common in various parts of Ocean View, and I've been gradually eliminating it from my property - along with most introduced species - to provide more habitat for natives. I've pulled hundreds if not thousands, and after 5 years of this I'm finally at the point where I only find them occasionally. But they are persistent."
	Romand-Monnier, F. 2013. Bulbostylis capillaris. The IUCN Red List of Threatened Species 2013: e.T44392435A44495560. http://dx.doi.org/10.2305/IUCN.UK.2013-2.RLTS.T44392435A44495560.en. [Accessed 15 Nov 2017]	"The taxon is ruderal in habit and readily colonise moist sandy, often disturbed sites (e.g., common along roadsides and railways), outside its native range."
	Bryson, C. T., & Carter, R. 2008. The significance of Cyperaceae as weeds. Pp. 15-101. in Naczi, R.F.C. & Ford, B.A. (eds). Sedges, uses, diversity, and systematic of the Cyperaceae, Missouri Botanical Garden Press, St. Louis, MO	[Weed of disturbed sites] "Bulbostylis barbata (Rottb.) C. B. Clarke and B. capillaris (L.) C. B. Clarke are occasionally weeds of sandy soil in flowerbeds and poorly managed turf in the southeastern U.S.A." ... "Bulbostylis capillaris and B. ciliatifolia (Elliott) Fernald are common weeds of sandy fallow fields, roadsides, and on gravel and cinders of railroad right-of-ways (Kral, 1971; Godfrey & Wooten, 1979)." ... "B. capillaris is reported as a weed in Brazil (Kissmann, 1997)."

303	Agricultural/forestry/horticultural weed	
	Source(s)	**Notes**
	Joseph, J.K. and Dube, S.D. (1995). Crop Weeds of Kumaon. Technical Bulletin: 8 (2/95), Indian Council of Agricultural Research, Almora	"Bulbostylis capillaris ... Very common weed of kharif field crops. Prefers sandy soil." [Present in fields. Impacts unspecified]
	Lallana, V. H. (2005). Lista de malezas del cultivo de arroz en Entre Ríos, Argentina. Ecosistemas, 14(2): 162-167	"Tabla 2. Lista de especies de malezas en campos de cultivo de arroz, ordenadas alfabéticamente." [Table 2. List of weed species in rice fields, arranged alphabetically. Includes Bulbostylis cappillaris. Impacts unspecified]
	Johsi, M., & Gretzmacher, R. (1999). Species composition and dominance of weeds in the rice-wheat cropping system of Kabhre District, Nepal. Nepal Journal of Science and Technology, 1(1): 19-26	"Table 2. Species composition and dominance of rice weeds in Kabhre district o Nepal, 1994-95" [Bulbostylis capillaris included in a list of rice weed. Impacts unspecified]

304	Environmental weed	n

Qsn #	Question	Answer
	Source(s)	**Notes**
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	No evidence to date

305	Congeneric weed	y
	Source(s)	**Notes**
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	"Bulbostylis abortive ... Weed of: Cereals" ... "Bulbostylis barbata ... Weed of: Bananas, Cereals, Orchards & Plantations" ... "Bulbostylis densa ... Weed of: Cereals" ... "Bulbostylis metralis ... Weed of: Cereals"
	USDA. 2014. Weed Risk Assessment for Bulbostylis hispidula (Vahl) R. W. Haines - Beard of the lion. United States Department of Agriculture Animal and Plant Health Inspection Service, Raleigh, NC	"Bulbostylis hispidula is primarily an agricultural weed that can be quite common in some cropping systems, with coverage values of 5-25 percent (Gantoli et al., 2013; Keller et al., 2012). It is reported as a weed of wed rice (Brink, 2011; Goetghebeur and Coudijzer, 1985), corn (Chikoyea et al., 2004; FAO, 2014), lupin (SaaymanduToit, 2003), sugarcane (Fadayomi and Abayomi, 1988), groundnuts (Ashrif, 1967), and grasslands (Häfliger, 1982). In combination with other weeds it is reported to reduce corn yield by up to 58 percent (Keller et al., 2012). This species is managed in crops in Africa and several commercial herbicides in South Africa have been registered for its control (Bromilow, 2010; Wells et al., 1986). Given the abundance of B. hispidula in some fields, manual labor required for weeding probably lowers crop value. Bulbostylis hispidula is reported to be unpalatable (Wells et al., 1986) and is grazed when nothing else is available (Simpson and Inglis, 2001). We found no evidence that this species harms natural systems."
	Bryson, C. T., & Carter, R. 2008. The significance of Cyperaceae as weeds. Pp. 15-101. in Naczi, R.F.C. & Ford, B.A. (eds). Sedges, uses, diversity, and systematic of the Cyperaceae, Missouri Botanical Garden Press, St. Louis, MO	"Bulbostylis is a genus of ca. 100 species, occurring mostly in dry or periodically dry, sunny, sandy uplands and savannas in warm temperate and tropical regions worldwide (Kral, 2002c). Nine species are listed as weeds in Appendix 2; however, none is a major weed. Bulbostylis barbata (Rottb.) C. B. Clarke and B. capillaris (L.) C. B. Clarke are occasionally weeds of sandy soil in flowerbeds and poorly managed turf in the southeastern U.S.A. In late summer and fall in the Coastal Plain of the southeastern U.S.A., B. barbata can be a conspicuous feature of the landscape when en masse its reddish brown inflorescences appear in sandy cultivated fields (Kral, 1971). Bulbostylis capillaris and B. ciliatifolia (Elliott) Fernald are common weeds of sandy fallow fields, roadsides, and on gravel and cinders of railroad right-of-ways (Kral, 1971; Godfrey & Wooten, 1979). All three species often grow in sandy soil in flowerbeds and lawns or through cracks in sidewalks and parking lots. Bulbostylis barbata is reported as a weed of cultivated lands in Taiwan (Lin, 1968), and B. capillaris is reported as a weed in Brazil (Kissmann, 1997)."
	Verloove, F., Laguna Lumbreras, E., & Ferrer Gallego, P. P. (2014). Some potentially weedy Cyperaceae new to Spain. Flora Mediterranea, 24, 197-205	"Bulbostylis thouarsii ... B. thouarsii is a major weed in Sri Lanka (Holm & al. 1979). It is particularly common in paddy fields (Prasad & Singh 2002; see also Soerjani & al. 1987 and Moody 1989). It is, however, better known as B. puberula, a superfluous name (see Veldkamp & Verloove 2014)."

401	Produces spines, thorns or burrs	n

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.	[No evidence] "Annuals with fibrous roots; culms tufted, capillary, 5-30 cm tall, 0.2-0.5 mm in diameter."

402	Allelopathic	
	Source(s)	**Notes**
	WRA Specialist. 2017. Personal Communication	Unknown

403	Parasitic	n
	Source(s)	**Notes**
	USDA, ARS, Germplasm Resources Information Network. 2017. National Plant Germplasm System [Online Database]. http://www.ars-grin.gov/npgs/index.html. [Accessed 15 Nov 2017]	Cyperaceae. No evidence

404	Unpalatable to grazing animals	
	Source(s)	**Notes**
	Baldwin, P. H. (1947). Foods of the Hawaiian goose. The Condor, 49(3), 108-120	"Bulbostylis capdllaris ... Use: Found in droppings from Kau Desert. A minute plant. Mainly seeds utilized." [Seeds palatable to geese]
	Mueller-Dombois, D., and G. Spatz. 1975. The influence of feral goats on the lowland vegetation in Hawaii Volcanoes National Park. Phytocoenologia 3: 1-29	[Bulbostylis capillaris persists in the presence of goats, suggesting possible unpalatability] "Three sedges also occurred in both inside and outside vegetations. Of these, Bulbostvlis capillaris is an annual (like Eragrostis tenella) while Cyperus brevifolius and Cyperus compressus are perennial stoloniferous creepers (like Cynodon dactvlon). Thus, the sedge life forms show the same pattern as the grasses with the exception that no bunch forming sedge had arrived in the exclosure." ... "Except for seasonal fluctuations, the sedges remained stable outside the exclosure. Both, the annual Bulbostylis and the perennial creeper Cyperus brevifolius showed their maximum quantity in the early' part of the \.Jet season, in December 1971."

405	Toxic to animals	n
	Source(s)	**Notes**
	Baldwin, P. H. (1947). Foods of the Hawaiian goose. The Condor, 49(3), 108-120	"Bulbostylis capdllaris ... Use: Found in droppings from Kau Desert. A minute plant. Mainly seeds utilized."
	Quattrocchi, U. 2012. CRC World Dictionary of Medicinal and Poisonous Plants: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology. CRC Press, Boca Raton, FL	No evidence
	Wagstaff, D.J. 2008. International poisonous plants checklist: an evidence-based reference. CRC Press, Boca Raton, FL	No evidence

Qsn #	Question	Answer
	Cornell University. 2017. Plants Poisonous to Livestock and other Animals. http://poisonousplants.ansci.cornell.edu/index.html. [Accessed 16 Nov 2017]	No records in database

406	Host for recognized pests and pathogens	
	Source(s)	**Notes**
	Piepenbring, M. (2002). Diversity, taxonomy, and ecology of plant parasitic smut fungi in Bolivia. Ecología en Bolivia, 37(1), 49-58	"Check list for smut fungi in Bolivia ... Moreaua bulbostylidis M. Piepenbr. on Bulbostylis capillaris (L.) C. B. Clarke; leg. This is a new species described recently from Bolivia (Piepenbring 2000)."
	WRA Specialist. 2017. Personal Communication	Unknown

407	Causes allergies or is otherwise toxic to humans	n
	Source(s)	**Notes**
	Quattrocchi, U. 2012. CRC World Dictionary of Medicinal and Poisonous Plants: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology. CRC Press, Boca Raton, FL	No evidence
	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	n
	Source(s)	**Notes**
	Kush, J. S., Meldahl, R. S., & Boyer, W. D. (2000). Understory plant community response to season of burn in natural longleaf pine forests. Tall Timbers Fire Ecology Conference 21: 33-39	[No evidence that Bulbostylis capillaris increased fire risk] "A season of bum study was initiated in 1973 on the Escambia Experimental Forest, near Brewton, Alabama."
	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.	[Occurs in fire prone areas, but several studies report that Bulbostylis capillaris does not increase significantly to fuel load or fire risk] "in Hawai'i naturalized in dry, grassy places with sandy soil, (0-) 100-1,780 m, on Hawai'i."
	Tunison, J. T., Loh, R. L., & Leialoha, J. A. K. (1995). Fire effects in the submontane seasonal zone, Hawai'i Volcanoes National Park. Technical Report 97. Cooperative National Park Resources Studies Unit, University of Hawaii, Manoa, Honolulu, HI	[Study showed that Bulbostylis capillaris did not contribute to fuel load or increase significantly following fire] "Alien grasses that promote fire invaded the submontane seasonal zone of Hawai' i Volcanoes National Park starting in the 1960s. These grasses recover rapidly from fire, maintain a high dead-tolive biomass ratio, and bum at high relative humidities. Since 1970, the invasion of fire-promoting grasses has increased fire frequency 10-fold and fire size over 1000-fold. We monitored plant cover and density after 1 I fires in 16 sites throughout the range of the submontane seasonal zone. These fires occurred between 1972 and 1992, and were sampled 1-2 1 years after fire. Fire significantly reduced native vegetation, almost entirely represented in the submontane seasonal zone by native trees and shrubs."

Qsn #	Question	Answer
	Hughes, F., Vitousek, P., & Tunison, T. (1991). Alien Grass Invasion and Fire In the Seasonal Submontane Zone of Hawai'i. Ecology, 72(2), 743-747	[Study showed that Bulbostylis capillaris did not contribute to fuel load or increase significantly following fire] "We examined the effects of grass-fueled fires on spe- cies composition and structure in the seasonal sub- montane ecosystem, emphasizing relative differences in postfire response of the vegetation as a means of evaluating the impact of the grass/fire cycle on a pre- viously intact native ecosystem. Both short and longer term responses were measured to document the im- mediate impacts of fire and to determine how long the successional patterns seen immediately after fire can persist." ... "TABLE 1. Cover of native and alien species (%) in the seasonal submontane zone of Hawai'i Volcanoes National Park."

409	Is a shade tolerant plant at some stage of its life cycle	
	Source(s)	**Notes**
	Evergreen. 2017. Native Plant Database - Plant Detail: Bulbostylis capillaris capillaris. https://nativeplants.evergreen.ca. [Accessed 17 Nov 2017]	"Light Requirements: Sun, Partial Shade"
	Gargiullo, M.B. 2007. A Guide to Native Plants of the New York City Region. New York City Department of Parks and Recreation, New York, NY	"Plants for Open Habitats, Full Sun" [Includes Bulbostylis capillaris]
	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.	[Occurs in high light environments] "in Hawai'i naturalized in dry, grassy places with sandy soil"

410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)	n
	Source(s)	**Notes**
	Jepson Flora Project (eds.). 2017. Jepson eFlora, http://ucjeps.berkeley.edu/IJM.html. [Accessed 17 Nov 2017]	"Bulbostylis capillaris ... Ecology: Open damp/dry sandy-gravelly soil"
	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 naturalized in dry, grassy places with sandy soil"
	Evergreen. 2017. Native Plant Database - Plant Detail: Bulbostylis capillaris capillaris. https://nativeplants.evergreen.ca. [Accessed 17 Nov 2017]	"Soil Requirements: Sand"

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.	"Annuals with fibrous roots; culms tufted, capillary, 5-30 cm tall, 0.2-0.5 mm in diameter."

412	Forms dense thickets	n

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.	[No evidence] "in Hawai'i naturalized in dry, grassy places with sandy soil"
	Flora of North America Editorial Committee. 2002. Flora of North America: Volume 23: Magnoliophyta: Commelinidae (in Part): Cyperaceae. Oxford University Press, Oxford, UK	[No evidence] "Sandy savanna, prairie, arenaceous outcrops, sandy or gravelly waste areas; 0–3000 m"

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.	"in Hawai'i naturalized in dry, grassy places with sandy soil, (0-) 100-1,780 m, on Hawai'i"
	Romand-Monnier, F. 2013. Bulbostylis capillaris. The IUCN Red List of Threatened Species 2013: e.T44392435A44495560. http://dx.doi.org/10.2305/IUCN.UK.2013-2.RLTS.T44392435A44495560.en. [Accessed 15 Nov 2017]	"This species grows in a very wide range of habitats from sea level to 3,000 m. The taxon is often found in sandy savanna, prairie, meadow, grassy clearings, arenaceous outcrops, sandy or gravelly waste areas. It prefers wet sites and often grows in riparian areas." ... "Systems: Terrestrial"

502	Grass	n
	Source(s)	**Notes**
	USDA, ARS, Germplasm Resources Information Network. 2017. National Plant Germplasm System [Online Database]. http://www.ars-grin.gov/npgs/index.html. [Accessed 15 Nov 2017]	Family: Cyperaceae Subfamily: Cyperoideae Tribe: Abildgaardieae

503	Nitrogen fixing woody plant	n
	Source(s)	**Notes**
	USDA, ARS, Germplasm Resources Information Network. 2017. National Plant Germplasm System [Online Database]. http://www.ars-grin.gov/npgs/index.html. [Accessed 15 Nov 2017]	Family: Cyperaceae Subfamily: Cyperoideae Tribe: Abildgaardieae

504	Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)	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.	"Annuals with fibrous roots; culms tufted, capillary, 5-30 cm tall, 0.2-0.5 mm in diameter. Leaves 1/3-1/4, the length of the culm, blades capillary, 2-10 cm long, 0.3- 0.6 mm wide, inrolled, sparsely pubescent to glabrate; sheaths reddish brown, membranous, pilose on oblique margins of orifice."

601	Evidence of substantial reproductive failure in native habitat	n

Qsn #	Question	Answer
	Source(s)	**Notes**
	Romand-Monnier, F. 2013. Bulbostylis capillaris. The IUCN Red List of Threatened Species 2013: e.T44392435A44495560. http://dx.doi.org/10.2305/IUCN.UK.2013-2.RLTS.T44392435A44495560.en. [Accessed 15 Nov 2017]	"Given the huge geographic range, the ruderal, pioneering habit, the frequency and abundance and the fact that it is a naturalized weed in large parts of its range a rating of Least Concern has been applied to this species."

602	Produces viable seed	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.	"Achenes obovoid-deltoid, 0.8-1 mm long, transversely rugulose with several vertical rows of transversely oblong cells, apex rounded, the angles obtuse, the sides pale or yellowish brown."
	Joseph, J.K. and Dube, S.D. (1995). Crop Weeds of Kumaon. Technical Bulletin: 8 (2/95), Indian Council of Agricultural Research, Almora	"Bulbostylis capillaris ... Emergence in June-July, flowering in Aug.-Sept. and propagation by seeds."

603	Hybridizes naturally	
	Source(s)	**Notes**
	WRA Specialist. 2017. Personal Communication	Unknown

604	Self-compatible or apomictic	
	Source(s)	**Notes**
	Ramírez, N. (2005). Plant sexual systems, dichogamy, and herkogamy in the Venezuelan Central Plain. Flora-Morphology, Distribution, Functional Ecology of Plants, 200(1), 30-48	[Unknown. Protogyny and herkogamy may prevent selfing] "Appendix A Sexual system, dichogamy, herkogamy, and dispersal syndrome for 210 plant species in the Venezuelan Central Plain" [Bulbostylis capillaris: Sexual system = andromonoecy; Temporal variation in sex expression = protogyny; Herkogamy = herkogamy; Dispersal syndrome = granivore]

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.	"Inflorescences open with 1-3 capillary rays up to 2 cm long or subcapitate; involucral bracts 2-3, filiform, shorter than to twice as long as the inflorescence; spikelets 2-7, narrowly ovoid to ellipsoid, 3-4 mm long, ca. 1.5 mm wide, apex acute; glumes dark reddish brown, membranous, ovate, ca. 1.5 mm long, ca. 1 mm wide, apex subacute or shallowly emarginate, finely puberulent to glabrate, the mid nerve prominent, yellowish green, otherwise nerveless; style base depressed-conical or depressed-globose, small."
	Ramírez, N. (2004). Ecology of pollination in a tropical Venezuelan savanna. Plant Ecology, 173(2), 171-189	"Table AI. Plant species, Life form, habitat, and pollination modes of 164 plant species of a Venezuelan Central Plain" [Bulbostylis capillaris Kunth - Pollination System = Wind]

Qsn #	Question	Answer
	Kubitzki, K. (ed.). 1998. The Families and genera of vascular plants. Volume IV. Flowering plants, Monocotyledons: Alismatanae and Commelinanae (except Gramineae). Springer-Verlag, Berlin, Heidelberg, New York	"The Cyperaceae are clearly adapted to anemophily, as is evidenced by their small, inconspicuous flowers and hidden or reduced perianth, the long stigmatic branches, the filaments elongating considerably during anthesis, and anthers shedding abundant pollen."

606	Reproduction by vegetative fragmentation	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.	"Annuals with fibrous roots; culms tufted, capillary, 5-30 cm tall, 0.2-0.5 mm in diameter." [Annual. No evidence of vegetative spread]
	Joseph, J.K. and Dube, S.D. (1995). Crop Weeds of Kumaon. Technical Bulletin: 8 (2/95), Indian Council of Agricultural Research, Almora	"Bulbostylis capillaris ... Emergence in June-July, flowering in Aug.-Sept. and propagation by seeds."

607	Minimum generative time (years)	1
	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.	"Annuals with fibrous roots; culms tufted, capillary, 5-30 cm tall, 0.2-0.5 mm in diameter."

701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	
	Source(s)	**Notes**
	Romand-Monnier, F. 2013. Bulbostylis capillaris. The IUCN Red List of Threatened Species 2013: e.T44392435A44495560. http://dx.doi.org/10.2305/IUCN.UK.2013-2.RLTS.T44392435A44495560.en. [Accessed]	"The taxon is ruderal in habit and readily colonise moist sandy, often disturbed sites (e.g., common along roadsides and railways), outside its native range." [Possibly. Although achenes lack means of external attachment, occurrence in heavily trafficked areas suggests possible movement on vehicles, footwear, or equipment]

702	Propagules dispersed intentionally by people	n
	Source(s)	**Notes**
	Staples, G.W. & Herbst, D.R. 2005. A Tropical Garden Flora - Plants Cultivated in the Hawaiian Islands and Other Tropical Places. Bishop Museum Press, Honolulu, HI	[No evidence of intentional introduction or cultivation]
	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 of intentional introduction or cultivation] "in Hawai'i naturalized in dry, grassy places with sandy soil, (0-) 100-1,780 m, on Hawai'i. First collected in 1911 (Forbes 392.H, BISH)."

703	Propagules likely to disperse as a produce contaminant	
	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 naturalized in dry, grassy places with sandy soil, (0-) 100-1,780 m, on Hawai'i." [Could possibly be moved in hay or fodder if occurring in cattle pastures]

Qsn #	Question	Answer
	Australian Government Department of Agriculture and Water Resources. 2017. Seed contaminants and tolerance tables. http://www.agriculture.gov.au/import/goods/plant-products/seeds-for-sowing/contaminants-tolerance. [Accessed 17 Nov 2017]	"Seeds with a nil tolerance include: ... Any species listed in the table below when being imported into the defined state. Note: For all other states and territories these species are permitted entry as contaminants." [Includes Bulbostylis capillaris. Although no evidence of contamination is reported, this suggests that the possibility exists]

704	Propagules adapted to wind dispersal	
	Source(s)	**Notes**
	Kubitzki, K. (ed.). 1998. The Families and genera of vascular plants. Volume IV. Flowering plants, Monocotyledons: Alismatanae and Commelinanae (except Gramineae). Springer-Verlag, Berlin, Heidelberg, New York	[Bulbostylis capillaris lacks such structures] 'Wind: in species of several genera the ripe fruit is surrounded by long bristles, formed either by elongated filaments (Androtrichum, Machaerina) or by perianth hairs (Afrotrilepis, Eriophorum, Scirpus), and the latter hairs may be conspicuously plumose (Carpha, Costularia)."
	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.	[Small size may allow for movement by wind, but achenes lack structures that would facilitate wind dispersal] "Achenes obovoid-deltoid, 0.8-1 mm long, transversely rugulose with several vertical rows of transversely oblong cells, apex rounded, the angles obtuse, the sides pale or yellowish brown."

705	Propagules water dispersed	y
	Source(s)	**Notes**
	Rolon, A. S., Homem, H. F., & Maltchik, L. (2010). Aquatic macrophytes in natural and managed wetlands of Rio Grande do Sul State, Southern Brazil. Acta Limnologica Brasiliensia, 22(2), 133-146	"Among the frequent species in the rice field systems, the outstanding species are Bulbostylis capillaris, Limnobium laevigatum, Ludwigia peploides, Luziola peruviana, Salvinia herzogii and Salvinia minima." ... "During uncultivated period (fallow phases), flooded and dry rice fields showed differences regarding the macrophyte composition, some hydrophytes (Azolla filiculoides, Salvinia minima, Ricciocarpus natans, Spirodella intermedia and Lemna valdiviana) characterized the flooded rice fields and some amphibian species (Bulbostylis capillaris, Centella asiatica, Hydrocotyle ranunculoides and Panicum spp.) discriminated the dry rice fields."
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	"Bulbostylis capillaris ... Dispersed by: Humans, Water"
	Souza, E. B. D., Ferreira, F. A., & Pott, A. (2016). Effects of flooding and its temporal variation on seedling recruitment from the soil seed bank of a Neotropical floodplain. Acta Botanica Brasilica, 30(4), 560-568	"Table S1. List of species and respective life cycles (LC), biological types (BT), and abundance of seedlings emerged from the soil seed bank sampled in the Pantanal wetland in treatments non-flooded (NF) and post-flooded (PF)." [Bulbostylis capillaris occurs in both non-flooded and post-flooded habitats]
	Romand-Monnier, F. 2013. Bulbostylis capillaris. The IUCN Red List of Threatened Species 2013: e.T44392435A44495560. http://dx.doi.org/10.2305/IUCN.UK.2013-2.RLTS.T44392435A44495560.en. [Accessed 15 Nov 2017]	"The taxon is found in a large range of habitats, from sea level to 3,000 m asl, often in riparian sites."
	Maia, F. C., Medeiros, R. B. D., Pillar, V. D. P., & Focht, T. (2004). Soil seed bank variation patterns according to environmental factors in a natural grassland. Revista Brasileira de Sementes, 26(2), 126-137	"Therefore, as well as in the vegetation, seed banks of the Eleocharis sp., Bulbostylis capillaris and Centella asiatica species are associated with wetter habitats (permanently wet areas) and lowlands ..."

Qsn #	Question	Answer
706	**Propagules bird dispersed**	
	Source(s)	**Notes**
	Baldwin, P. H. (1947). Foods of the Hawaiian goose. The Condor, 49(3), 108-120	"Bulbostylis capdllaris ... Use: Found in droppings from Kau Desert. A minute plant. Mainly seeds utilized." [Unknown if viable seeds are dispersed by nene geese]

707	**Propagules dispersed by other animals (externally)**	**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.	"Achenes obovoid-deltoid, 0.8-1 mm long, transversely rugulose with several vertical rows of transversely oblong cells, apex rounded, the angles obtuse, the sides pale or yellowish brown." [Small size may allow for adherence to animals, but otherwise lacks means of external attachment]

708	**Propagules survive passage through the gut**	
	Source(s)	**Notes**
	Baldwin, P. H. (1947). Foods of the Hawaiian goose. The Condor, 49(3), 108-120	"Bulbostylis capdllaris ... Use: Found in droppings from Kau Desert. A minute plant. Mainly seeds utilized." [Unknown if viable seeds are dispersed by nene geese]

801	**Prolific seed production (>1000/m2)**	**y**
	Source(s)	**Notes**
	Vieira, M. D. S. (2013). Banco de sementes em campos da planície costeira do Rio Grande do Sul sob diferentes manejos. The Federal University of Rio Grande do Sul, Porto Alegre, Brazil	"Annex 2. Seed bank density per m² per area during spring and autumn seasons of the four study areas with different land use history in São Lourenco de Sul, RS, Brazil. Given are mean values for each area." [Bulbostylis capillaris - produces 1120 seeds per m² in Grazed grassland during the spring]

802	**Evidence that a persistent propagule bank is formed (>1 yr)**	
	Source(s)	**Notes**
	Royal Botanic Gardens Kew. (2017) Seed Information Database (SID). Version 7.1. Available from: http://data.kew.org/sid/. [Accessed 16 Nov 2017]	"Storage Behaviour: No data available for species. Of 6 known taxa of genus Bulbostylis, 100.00% Orthodox(p/?)"
	Maia, F. C., Medeiros, R. B. D., Pillar, V. D. P., & Focht, T. (2004). Soil seed bank variation patterns according to environmental factors in a natural grassland. Revista Brasileira de Sementes, 26(2), 126-137	[Present in seed bank. Longevity unspecified] "Therefore, as well as in the vegetation, seed banks of the Eleocharis sp., Bulbostylis capillaris and Centella asiatica species are associated with wetter habitats (permanently wet areas) and lowlands ..."

803	**Well controlled by herbicides**	
	Source(s)	**Notes**

Qsn #	Question	Answer
	Wettasinghe, D. T. AND Rajandran, N. S. (1969). Evaluation of herbicides for weed control in mature tea-1 -Effect on weed species. Tea Q. 40(4): 160-163	[Possibly Yes. Herbicides effective on other Bulbostulis species] "Eleven other herbicides (with diuron as a standard) were further evaluated for herbicidal activity in a field experiment. Lenacil, linuron and diuron displayed extreme herbicidal activity over a wide range of species including the paraquat-resistant Paspalum conjugation and Borreria spp. CP 44939, fluometuron, atrazine, desmetrync and neburon were effective against Borreria spp., but not against Paspalum conjugatum. Atratone, chloroxuron and prometryne gave good control of Paspalum conjugatum, but did not control Borreria spp. effectively. Propachlor was ineffective against both Paspalum conjugatum and Borreria spp., but gave good control of Cyperus tenuiculmis. All chemicals tested effectively controlled Cleome burmanni, Ageratum conyzoides and Bulbostylis puberula."

804	**Tolerates, or benefits from, mutilation, cultivation, or fire**	
	Source(s)	**Notes**
	Wheatman, S. 2017. Hawaii Island resident. Pers. Comm. 12 November	"I've pulled hundreds if not thousands, and after 5 years of this I'm finally at the point where I only find them occasionally. But they are persistent." [Pulling may be effective over time. Presumably recruiting from seed bank. Unknown if mowing or removal of above ground biomass would effectively control plants]

805	**Effective natural enemies present locally (e.g. introduced biocontrol agents)**	
	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 naturalized in dry, grassy places with sandy soil, (0-) 100-1,780 m, on Hawai'i."

Summary of Risk Traits:

High Risk / Undesirable Traits
• Broad natural distribution, & elevation range exceeds 1000 m, demonstrating environmental versatility
• Thrives in tropical climates
• Naturalized in Hawaiian Islands (Hawaii Island)
• Disturbance-adapted weed, often a weed found in cereal crops (impacts unspecified)
• Other Bulbostylis species are invasive
• May be unpalatable
• Reproduces by seeds
• Reaches maturity in 1 growing season (annual)
• Small seeds dispersed by water & possibly other means
• Capable of prolific seed production
• Forms a seed bank (longevity unknown)

Low Risk Traits
• Despite reports of weediness, impacts generally unspecified (possibly suggesting minor importance)
• Unarmed (no spines, thorns, or burrs)
• Non-toxic
• Not reported to spread vegetatively