

Family: *Juncaceae*

Taxon: *Juncus effusus*

Synonym: *Juncus effusus* subsp. *hesperius* Piper
Juncus hesperius (Piper) Lint

Common Name: soft rush
Japanese mat rush
common rush
lamp rush

Questionnaire : current 20090513 **Assessor:** Assessor **Designation:** H(HPWRA)
Status: Assessor Approved **Data Entry Person:** Assessor **WRA Score** 21

101	Is the species highly domesticated?	y=-3, n=0	n
102	Has the species become naturalized where grown?	y=1, n=-1	
103	Does the species have weedy races?	y=1, n=-1	
201	Species suited to tropical or subtropical climate(s) - If island is primarily wet habitat, then substitute "wet tropical" for "tropical or subtropical"	(0-low; 1-intermediate; 2-high) (See Appendix 2)	Intermediate
202	Quality of climate match data	(0-low; 1-intermediate; 2-high) (See Appendix 2)	High
203	Broad climate suitability (environmental versatility)	y=1, n=0	y
204	Native or naturalized in regions with tropical or subtropical climates	y=1, n=0	y
205	Does the species have a history of repeated introductions outside its natural range?	y=-2, ?=-1, n=0	y
301	Naturalized beyond native range	y = 1*multiplier (see Appendix 2), n= question 205	y
302	Garden/amenity/disturbance weed	n=0, y = 1*multiplier (see Appendix 2)	n
303	Agricultural/forestry/horticultural weed	n=0, y = 2*multiplier (see Appendix 2)	n
304	Environmental weed	n=0, y = 2*multiplier (see Appendix 2)	y
305	Congeneric weed	n=0, y = 1*multiplier (see Appendix 2)	y
401	Produces spines, thorns or burrs	y=1, n=0	n
402	Allelopathic	y=1, n=0	
403	Parasitic	y=1, n=0	n
404	Unpalatable to grazing animals	y=1, n=-1	n
405	Toxic to animals	y=1, n=0	n
406	Host for recognized pests and pathogens	y=1, n=0	n
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	y=1, n=0	y
410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)	y=1, n=0	y

411	Climbing or smothering growth habit	y=1, n=0	n
412	Forms dense thickets	y=1, n=0	y
501	Aquatic	y=5, n=0	n
502	Grass	y=1, n=0	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	
704	Propagules adapted to wind dispersal	y=1, n=-1	y
705	Propagules water dispersed	y=1, n=-1	y
706	Propagules bird dispersed	y=1, n=-1	y
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)	y=-1, n=1	

Designation: H(HPWRA)

WRA Score 21

Supporting Data:

101	2003. Weber, E.. Invasive Plant Species of the World. A Reference Guide to Environmental Weeds. CABI Publishing, Wallingford, UK	[Is the species highly domesticated? No] No evidence
102	2013. WRA Specialist. Personal Communication.	NA
103	2013. WRA Specialist. Personal Communication.	NA
201	1996. Balslev, H.. Juncaceae. Flora Neotropica. 68: 1-167.	[Species suited to tropical or subtropical climate(s) 2-High] "Juncus effusus is a cosmopolitan species, most common in the north temperate region but frequent at high elevations in the tropics and scattered in the south temperate region."
201	1999. Wagner, W.L./Herbst, D.R./Sohmer, S.H.. Manual of the flowering plants of Hawaii. Revised edition.. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	[Species suited to tropical or subtropical climate(s) 2-High] "Widely distributed in temperate regions of both hemispheres" [naturalized at higher elevations in tropical locations]
202	1999. Wagner, W.L./Herbst, D.R./Sohmer, S.H.. Manual of the flowering plants of Hawaii. Revised edition.. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	[Quality of climate match data 2-High]
203	2002. USDA NRCS. Plant Fact Sheet - Common Rush - Juncus effusus. USDA NRCS National Plant Data Center, plants.usda.gov/factsheet/pdf/fs_juef.pdf	[Broad climate suitability (environmental versatility)? Yes] "Soft rush is naturally found throughout the temperate and sub-tropical areas of North America, Europe, and Asia, with the exception of the arid and high altitude regions. It inhabits fresh to brackish marshes, swamps, ditches, and moist seasonal wetlands and meadows."
203	2013. Floridata. Juncus effusus. http://www.floridata.com/ref/j/junc_eff.cfm [Accessed 07 May 2013]	[Broad climate suitability (environmental versatility)? Yes] "Soft rush is a cosmopolitan species. It occurs in freshwater wetlands on all continents, even Australia and New Zealand. " ... "Hardiness: USDA Zones 4 - 10. In cold climates, soft rush dies to the ground and resprouts in spring with fresh green growth. In milder climates older stems turn brown and tend to accumulate, resulting in a less attractive plant."
204	1999. Wagner, W.L./Herbst, D.R./Sohmer, S.H.. Manual of the flowering plants of Hawaii. Revised edition.. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	[Native or naturalized in regions with tropical or subtropical climates? Yes] "...naturalized along margins of ponds and streams, in open boggy sites, and wet areas along trails, 1,000-2000 m"
205	2003. Weber, E.. Invasive Plant Species of the World. A Reference Guide to Environmental Weeds. CABI Publishing, Wallingford, UK	[Does the species have a history of repeated introductions outside its natural range? Yes] Widely introduced worldwide
301	1980. Healy, A.J./Edgar, E.. Flora of New Zealand Volume III: Adventive Cyperaceous, Petalous & Spathaceous Monocotyledons. P. D. Hasselberg, Government Printer, Wellington, New Zealand http://FloraSeries.LandcareResearch.co.nz	[Naturalized beyond native range? Yes] "In damp pasture and wet places".
301	1999. Wagner, W.L./Herbst, D.R./Sohmer, S.H.. Manual of the flowering plants of Hawaii. Revised edition.. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	[Naturalized beyond native range? Yes] "cultivated and naturalized along margins of ponds and streams, in open boggy sites, and wet areas along trails, 1,000-2000 m" [Hawaiian Islands]
301	2007. Imada, C.T.. New Hawaiian plant records for 2005–2006. Bishop Museum Occasional Papers. 96: 34-41.	[Naturalized beyond native range? Yes] "Juncus effusus L. New island record Previously reported as naturalized on Moloka'i, Maui, and Hawai'i (Wagner et al. 1999), bog rush is now recorded from O'ahu in a suitably boggy habitat for this obligate wetland species. Material examined. O'AHU: Wai'anae Mts, Mt Ka'ala, 1220 m, on edge of drainage depression, 22 Nov 2005, L.M. Crago, C. Imada & C. McGuire 2005-238."
301	2011. Richardson, F.J./Richardson, R.G./Shepherd, R.C.H.. Weeds of the South-East: An Identification Guide for Australia. Second Edition. RG and FJ Richardson, Victoria, Australia	[Naturalized beyond native range? Yes] "It occurs in cool, high rainfall areas, often at higher altitudes. [NSW, Vic, Tas, SA]"

301	2012. Frohlich, D./Lau, A.. New plant records for the Hawaiian Islands 2010–2011. Bishop Museum Occasional Papers. 113:: 27-54.	[Naturalized beyond native range? Yes] "Juncus effusus, which has the common name Japanese mat rush, is believed to have been brought to Hawai'i in the early 1900s to be used as a source of matting material (Wagner et al. 1999). It is widely naturalized on the islands of Oahu, Molokai, Maui, and Hawai'i, and now on Kauai, where it was collected in Kōke'e State Park. Material examined. KAUA'I: Kōke'e State Park, between Pihea trail and Pihea peak. Metrosideros-dominated wet forest with Cheirodendron, Vaccinium, Sadleria, and Clermontia. Erect herb; stems glossy green, whitish green at base; spikelets whitish. Pith appears to be solid, 21 May 2008, T. Flynn 7395."
302	2003. Weber, E.. Invasive Plant Species of the World. A Reference Guide to Environmental Weeds. CABI Publishing, Wallingford, UK	[Garden/amenity/disturbance weed? No] "The species is a troublesome weed of pastures and also invades native communities."
303	2009. Rana, N./Sellers, B.A.. Soft Rush (Juncus effusus) Control in Florida Pastures. Weed Technology. 23(2): 321-323.	[Agricultural/forestry/horticultural weed? No] "This weed species is not considered a major weed problem in pastures. However, soft rush can become problematic in poorly drained pastures, resulting in limited grazing areas for cattle."
304	2003. Motoooka, P./Castro, L./Nelson, D./Nagai, G./Ching, L.. Weeds of Hawaii's Pastures and Natural Areas: An Identification and Management Guide. CTAHR, UH Manoa, Honolulu, HI http://www.ctahr.hawaii.edu/invweed/weedsHi.html	[Environmental weed? Yes] "Displaces natives in wet forests and bogs"
304	2003. Weber, E.. Invasive Plant Species of the World. A Reference Guide to Environmental Weeds. CABI Publishing, Wallingford, UK	[Environmental weed? Yes] "The species is a troublesome weed of pastures and also invades native communities. The plant forms dense patches that suppress native species by shading them out, and becomes dominant over large areas. Single tussocks collate into a continuous cover over time"
305	1998. Medeiros, A.C./Loope, L.L./Chimera, C.G.. Flowering Plants and Gymnosperms of Haleakala National Park. Technical Report 120. Pacific Cooperative Studies Unit, Honolulu, HI	[[Congeneric weed? Yes] "Juncus planifolius" ... "An aggressive herb that in recent years has invaded and come to dominate disturbed bog turf at Big and Mid-Camp Bogs on the northeast rift of the Park. In addition, it is found around Palikea Camp and along Palikea Stream at 3700 feet, and along the central pali at 4500 feet. It is especially persistent in disturbed sites such as fencelines, trails and areas of high pig activity. First collected in Hawaiian Islands on Hawai'i at Kilauea in 1941 on road shoulders (G.E. Olson s.n., BISH). First collected on Maui along forestry road in Waikamoi in 1964 (M.R. Crosby & W.R. Anderson 18 12, BISH)."
305	2003. Weber, E.. Invasive Plant Species of the World. A Reference Guide to Environmental Weeds. CABI Publishing, Wallingford, UK	[Congeneric weed? Yes] Juncus acutus and J. aciculatus are described as significant environmental weeds
401	1999. Wagner, W.L./Herbst, D.R./Sohmer, S.H.. Manual of the flowering plants of Hawaii. Revised edition.. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	[Produces spines, thorns or burrs? No] "Perennial herbs, rhizomes stout, covered with overlapping scales, roots thick; stems crowded along rhizome, reddish brown to purple at base, striate, terete, 4-8 dm long, pith solid. Leaves basal, scale-like, bladeless, sheaths dark reddish brown to purple at base, paler toward apex."
402	2000. Ervin, G.N./Wetzel, R.G.. Allelochemical autotoxicity in the emergent wetland macrophyte Juncus effusus (Juncaceae). American Journal of Botany. 87(6): 853-860.	[Allelopathic? Potentially Yes] "Bioassays for allelochemical toxicity of aboveground Juncus effusus tissues were conducted with seeds and seedlings of Eleocharis obtusa and Scirpus cyperinus, two emergent sedge species (Cyperaceae) found sympatric with J. effusus, and with seeds and seedlings of J. effusus itself to evaluate potential autotoxicity." ... "Although the extracts induced no significant reduction in growth of E. obtusa or S. cyperinus, biomass-specific chlorophyll a concentration was significantly reduced in E. obtusa seedlings. In contrast, seedlings of J. effusus exhibited significant reductions of biomass and chlorophyll a concentrations, and seedling shoot development was retarded in response to leachate exposure. Results of the present study suggest that J. effusus seedlings possess autotoxic sensitivity to extracts of dead, aboveground tissues of adult plants."
403	1999. Wagner, W.L./Herbst, D.R./Sohmer, S.H.. Manual of the flowering plants of Hawaii. Revised edition.. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	"Perennial herbs..." [Juncaceae]
404	2002. USDA NRCS. Plant Fact Sheet - Common Rush - Juncus effusus. USDA NRCS National Plant Data Center, plants.usda.gov/factsheet/pdf/fs_juef.pdf	[Unpalatable to grazing animals? No] "The seed and vegetative parts of soft rush are utilized by waterfowl, muskrats, non-game birds, moose and domestic livestock for food or cover."
404	2003. Weber, E.. Invasive Plant Species of the World. A Reference Guide to Environmental Weeds. CABI Publishing, Wallingford, UK	[Unpalatable to grazing animals? No] "Continuous grazing can eliminate the plant from pastures"
404	2007. DiTomaso, J.. Weeds of California and Other Western States, Volume 2. UCANR Publications, Oakland, CA	[Unpalatable to grazing animals? No] "Confining goats to infested pasture areas can eventually eliminate soft rush..."

405	2003. Weber, E.. Invasive Plant Species of the World. A Reference Guide to Environmental Weeds. CABI Publishing, Wallingford, UK	[Toxic to animals? No] "Continuous grazing can eliminate the plant from pastures" [No evidence that plant is toxic to grazing animals]
405	2008. Wagstaff, D.J.. International poisonous plants checklist: an evidence-based reference. CRC Press, Boca Raton, FL	[Toxic to animals? No] No evidence
406	2013. Missouri Botanical Gardens. Juncus effusus. http://www.missouribotanicalgarden.org/gardens-gardening/your-garden/plant-finder/plant-details/kc/c262/juncus-effusus.aspx [Accessed 07 May 2013]	[Host for recognized pests and pathogens? No] "Problems - No serious insect or disease problems. Rust, leaf spot and stem rots may occur"
407	2008. Wagstaff, D.J.. International poisonous plants checklist: an evidence-based reference. CRC Press, Boca Raton, FL	[Causes allergies or is otherwise toxic to humans? No] No evidence
408	1999. Wagner, W.L./Herbst, D.R./Sohmer, S.H.. Manual of the flowering plants of Hawaii. Revised edition.. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	[Creates a fire hazard in natural ecosystems? No] "cultivated and naturalized along margins of ponds and streams, in open boggy sites, and wet areas along trails, 1,000-2000 m" [No evidence, and unlikely given habitat]
409	2002. USDA NRCS. Plant Fact Sheet - Common Rush - Juncus effusus. USDA NRCS National Plant Data Center, plants.usda.gov/factsheet/pdf/fs_juef.pdf	[Is a shade tolerant plant at some stage of its life cycle?] "Soft rush is tolerant of diverse site conditions, but thrives in direct sun, finely textured soils, salinity less than 14ppt., pH from 4.0 to 6.0, and shallow water (less than 6 inches)."
409	2003. McCorry, M.J./Renou, F.. Ecology and management of Juncus effusus (soft rush) on cutaway peatlands. Forest Ecosystem Research Group Report Number 69. University College Dublin, Dublin	[Is a shade tolerant plant at some stage of its life cycle? Yes] "It is usually found in open habitats although J. effusus is one of the most tolerant to shade in the Juncus genus and can be luxuriant in partial shade, with less frequent flowering in heavier shade (Richards and Clapham, 1941b)."
410	2002. USDA NRCS. Plant Fact Sheet - Common Rush - Juncus effusus. USDA NRCS National Plant Data Center, plants.usda.gov/factsheet/pdf/fs_juef.pdf	[Tolerates a wide range of soil conditions?] "Soft rush is tolerant of diverse site conditions, but thrives in direct sun, finely textured soils, salinity less than 14ppt., pH from 4.0 to 6.0, and shallow water (less than 6 inches)."
410	2003. McCorry, M.J./Renou, F.. Ecology and management of Juncus effusus (soft rush) on cutaway peatlands. Forest Ecosystem Research Group Report Number 69. University College Dublin, Dublin	[Tolerates a wide range of soil conditions ? Yes] "J. effusus is tolerant of a wide range of ecological conditions. It may be abundant or locally dominant in a range of damp or waterlogged habitats including wet meadows, moorland and woodland, and on a wide range of soils, particularly where the water-table fluctuates (Richards and Clapham, 1941b)." ... "J. effusus is particularly widespread on the more acidic soils (Grime et al. 1990). It is distributed over a range of pH values to as low as pH 3.5, but is less common above pH 7 on basic soils. Richards and Clapham (1941) noted that it was characteristic on base deficient mineral soils and on thin peat where the roots can reach mineral layers or non-calcareous flush water."
411	1999. Wagner, W.L./Herbst, D.R./Sohmer, S.H.. Manual of the flowering plants of Hawaii. Revised edition.. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	[Climbing or smothering growth habit? No] "Perennial herbs, rhizomes stout,..."
412	2003. Weber, E.. Invasive Plant Species of the World. A Reference Guide to Environmental Weeds. CABI Publishing, Wallingford, UK	[Forms dense thickets? Yes] "The plant forms dense patches that suppress native species by shading them out, and becomes dominant over large areas. Single tussocks collate into a continuous cover over time"
501	2003. Weber, E.. Invasive Plant Species of the World. A Reference Guide to Environmental Weeds. CABI Publishing, Wallingford, UK	[Aquatic? No, but invades aquatic habitats] "Freshwater wetlands, wet grassland. Where native, this plant is found in wet ground, cypress swamps, shores of ponds, marshes, bogs, riparian habitats, and damp woods. It grows mostly on acid soils."
502	1999. Wagner, W.L./Herbst, D.R./Sohmer, S.H.. Manual of the flowering plants of Hawaii. Revised edition.. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	[Grass? No] Juncaceae
503	1999. Wagner, W.L./Herbst, D.R./Sohmer, S.H.. Manual of the flowering plants of Hawaii. Revised edition.. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	[Nitrogen fixing woody plant? No] Juncaceae
504	1999. Wagner, W.L./Herbst, D.R./Sohmer, S.H.. Manual of the flowering plants of Hawaii. Revised edition.. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	[Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers) No] "Perennial herbs, rhizomes stout, covered with overlapping scales, roots thick; stems crowded along rhizome, reddish brown to purple at base, striate, terete, 4-8 dm long, pith solid."

504	2010. Gordon, D.R./Mitterdorfer, B./Pheloung, P.C. et al.. Guidance for addressing the Australian Weed Risk Assessment questions. <i>Plant Protection Quarterly</i> . 25(2): 56-74.	[Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)? No] "This question is specifically to deal with plants that have specialized organs and should not include plants merely with rhizomes/stolons"
601	2003. Weber, E.. <i>Invasive Plant Species of the World. A Reference Guide to Environmental Weeds</i> . CABI Publishing, Wallingford, UK	[Evidence of substantial reproductive failure in native habitat? No] Widespread native and naturalized distribution
602	1999. Wagner, W.L./Herbst, D.R./Sohmer, S.H.. <i>Manual of the flowering plants of Hawaii</i> . Revised edition.. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	[Produces viable seed Yes] "Seeds pale brown, ca. 0.5 mm long, ca. 3 times longer than wide"
602	2002. USDA NRCS. Plant Fact Sheet - Common Rush - <i>Juncus effusus</i> . USDA NRCS National Plant Data Center, plants.usda.gov/factsheet/pdf/fs_juef.pdf	[Produces viable seed? Yes] "Juncus effusus can be easily grown from seed or vegetative divisions, but seed dispersal is the primary means of natural reproduction. For germination to occur seed must be in contact with moist soil, receive direct sunlight, and over-winter on the soil surface. As long as moist conditions can be sustained and early competition reduced, seedlings will develop the following spring."
602	2012. Michalski, S.G./Durka, W.. Identification and characterization of microsatellite loci in the rush <i>Juncus effusus</i> (Juncaceae). <i>American Journal of Botany</i> . 99(2): e53-e55.	[Produces viable seed? Yes] "Generative reproduction is accomplished by the production of tiny seeds with high potential for long-distance dispersal."
603	1996. Balslev, H.. Juncaceae. <i>Flora Neotropica</i> . 68: 1-167.	[Hybridizes naturally? Yes] "Juncus conglomeratus and J. effusus are closely related and have been much confused. Krisa (1962) suggested that in Czechoslovakia they are mere extremes of one 'conspecies' connected by a whole series of morphological types. Agnew (1968), however, concluded that in the British Isles they are clearly morphologically and phenologically separable but that they do form hybrids, especially at higher elevations where the phenological separation is less distinct."
604	2012. Michalski, S.G./Durka, W.. Identification and characterization of microsatellite loci in the rush <i>Juncus effusus</i> (Juncaceae). <i>American Journal of Botany</i> . 99(2): e53-e55.	[Self-compatible or apomictic? Yes] "Juncus effusus is self-compatible and, like most other Juncus species, putatively predominantly selfing (Buchenau, 1892)."
605	2001. Gill, R.M.A./Beardall, V.. The impact of deer on woodlands: the effects of browsing and seed dispersal on vegetation structure and composition. <i>Forestry</i> . 74(3): 209-218.	[Requires specialist pollinators? No] "The flowers are inconspicuous in compact clusters to 4 inches long. The flowers emerge and mature from March to September, peaking in July. Pollination typically occurs by wind, but occasionally it is by insects."
606	2003. McCorry, M.J./Renou, F.. Ecology and management of <i>Juncus effusus</i> (soft rush) on cutaway peatlands. Forest Ecosystem Research Group Report Number 69. University College Dublin, Dublin	[Reproduction by vegetative fragmentation? Yes] "J. effusus is capable of vegetative reproduction and can form extensive clonal patches due to the growth of rhizomes (Richards and Clapham, 1941b; Grime et al., 1990)."
606	2009. Rana, N./Sellers, B.A.. Soft Rush (<i>Juncus effusus</i>) Control in Florida Pastures. <i>Weed Technology</i> . 23(2): 321-323.	[Reproduction by vegetative fragmentation? Yes] "The establishment of soft-rush plants in grazed areas may be due to its biology. Soft rush has a hemicryptophyte growth form with a tussock-like structure. Dense mounds of culms grow laterally and expand outward in a circular fashion through vegetative rhizome growth (Richards and Clapham 1941). This growth pattern results in individual tussocks having both live and dead shoots present throughout the growing season (Wetzel and Howe 1999)."
606	2013. <i>Floridata</i> . <i>Juncus effusus</i> . http://www.floridata.com/ref/j/junc_eff.cfm [Accessed 07 May 2013]	[Reproduction by vegetative fragmentation> Yes] "Soft rush is often planted along the margins of ponds, canals or ditches where its tendency to spread is a good thing. It can be planted in water as deep as 3 in (7.6 cm), or in damp soils that may or may not get flooded occasionally. To keep a planting under control, sow in a submerged container so the rhizomes cannot spread."
607	2003. McCorry, M.J./Renou, F.. Ecology and management of <i>Juncus effusus</i> (soft rush) on cutaway peatlands. Forest Ecosystem Research Group Report Number 69. University College Dublin, Dublin	[Minimum generative time (years)? 2] "J. effusus usually flowers in the second year and probably sets seed every year (Lazenby, 1955b)."
701	1996. Balslev, H.. Juncaceae. <i>Flora Neotropica</i> . 68: 1-167.	[Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)? Yes] "It grows in pastures, along roads, and in ditches and other places under human influence"
701	2003. McCorry, M.J./Renou, F.. Ecology and management of <i>Juncus effusus</i> (soft rush) on cutaway peatlands. Forest Ecosystem Research Group Report Number 69. University College Dublin, Dublin	[Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)? Yes] "Seeds may also be dispersed by machinery and by adhering to animals, aided by the stickiness of the seed coat. Thompson and Grime (1979) found seeds of J. effusus frequently at sites where it was not represented in the established vegetation, suggesting effective dispersal of seeds."

702	2013. WRA Specialist. Personal Communication.	[Propagules dispersed intentionally by people? Yes] Cultivated for landscaping and water gardens
703	2013. WRA Specialist. Personal Communication.	[Propagules likely to disperse as a produce contaminant? Unknown] Possible, given large numbers of long-lived, readily dispersed seeds produced
704	2002. USDA NRCS. Plant Fact Sheet - Common Rush - <i>Juncus effusus</i> . USDA NRCS National Plant Data Center, plants.usda.gov/factsheet/pdf/fs_juef.pdf	[Propagules adapted to wind dispersal? Yes] "Due to the small size and tacky outer coating, the seed of <i>Juncus effusus</i> can be disseminated by wind, water or animals."
704	2003. McCorry, M.J./Renou, F.. Ecology and management of <i>Juncus effusus</i> (soft rush) on cutaway peatlands. Forest Ecosystem Research Group Report Number 69. University College Dublin, Dublin	[Propagules adapted to wind dispersal? Yes] "Seeds are dispersed naturally mainly by wind and probably also by floodwaters. Dispersal of seed by wind usually occurs in dry weather and the lateral spread of seed by the wind may be restricted to 1.3 m from the parent plant (Agnew, 1961)."
705	2002. USDA NRCS. Plant Fact Sheet - Common Rush - <i>Juncus effusus</i> . USDA NRCS National Plant Data Center, plants.usda.gov/factsheet/pdf/fs_juef.pdf	[Propagules water dispersed? Yes] "Due to the small size and tacky outer coating, the seed of <i>Juncus effusus</i> can be disseminated by wind, water or animals."
705	2003. McCorry, M.J./Renou, F.. Ecology and management of <i>Juncus effusus</i> (soft rush) on cutaway peatlands. Forest Ecosystem Research Group Report Number 69. University College Dublin, Dublin	[Propagules water dispersed? Yes] "Dry rush seed also floats on water so surface run-off is likely to contribute to its spread (McCarthy, 1971)."
706	2008. Soons, M.B./Van Der Vlugt, C./Van Lith, B./Heil, G.W./Klaassen, M.. Small seed size increases the potential for dispersal of wetland plants by ducks. <i>Journal of Ecology</i> . 96: 619–627.	[Propagules bird dispersed? Yes] "This study demonstrates the mechanism underlying successful endozoochorous dispersal of wetland plant seeds by mallards: small seed size promotes rapid, and hence intact and viable, passage through the mallard gut. Mallards can disperse wetland plant seeds of all but the largest-seeded species successfully in relatively large numbers (up to 32% of ingested seeds) over long distances (up to thousands of kilometres) and are therefore important dispersal vectors." ... "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	1955. Lazenby, A.. Germination and Establishment of <i>Juncus Effusus</i> L.: The Effect of Different Companion Species and of Variation in Soil and Fertility Conditions. <i>Journal of Ecology</i> . 43(1): 103-119.	[Propagules dispersed by other animals (externally)? Yes] "The seeds are covered with a mucilaginous coating which becomes sticky when wet, and in this condition can adhere to the coats of animals. In this way the seeds can be dispersed."
707	2003. McCorry, M.J./Renou, F.. Ecology and management of <i>Juncus effusus</i> (soft rush) on cutaway peatlands. Forest Ecosystem Research Group Report Number 69. University College Dublin, Dublin	[Propagules dispersed by other animals (externally)? Yes] "Seeds may also be dispersed by machinery and by adhering to animals, aided by the stickiness of the seed coat."
708	2001. Gill, R.M.A./Beardall, V.. The impact of deer on woodlands: the effects of browsing and seed dispersal on vegetation structure and composition. <i>Forestry</i> . 74(3): 209-218.	[Propagules survive passage through the gut? Yes] "Table 3: Plant species (present in the British Isles) which have been shown to germinate from dung of red (<i>Cervus elaphus</i>) and fallow (<i>Dama dama</i>) deer (Malo and Suarez, 1995; Welch, 1985)" [<i>Juncus effusus</i> germinates from Red deer dung]
801	1996. Bakker, J.P./Poschlod, P./Strykstra, R.J./Bekker, R.M./Thompson, K.. Seed banks and seed dispersal: important topics in restoration ecology. <i>Acta Botanica Neerlandica</i> . 45(4): 461-490.	[Prolific seed production (>1000/m ²)? Yes] "Table 3. Species ranked after highest average density per metres squared" [[<i>Juncus effusus</i> - Lowest density = 2444; Highest density = 97032; Average density = 41522]
801	2002. USDA NRCS. Plant Fact Sheet - Common Rush - <i>Juncus effusus</i> . USDA NRCS National Plant Data Center, plants.usda.gov/factsheet/pdf/fs_juef.pdf	[Prolific seed production (>1000/m ²)? Yes] "A three celled obovoid capsule develops after fertilization, which contains many small (.02 to .025 inch long) straw colored seeds. There are an estimated 18,000,000 seeds per pound."
801	2003. McCorry, M.J./Renou, F.. Ecology and management of <i>Juncus effusus</i> (soft rush) on cutaway peatlands. Forest Ecosystem Research Group Report Number 69. University College Dublin, Dublin	[Prolific seed production (>1000/m ²)? Yes] "The plant produces copious amounts of seed with potentially 8,500 seeds produced per fertile shoot per annum (McCarthy, 1971). A figure of 8 million seeds per square yard per season on an "average piece of rushy land" has been suggested (Moore and Burr, 1948). Ervin and Wetzell (2001) calculated that 4 million seeds were produced per square metre."
802	1996. Bakker, J.P./Poschlod, P./Strykstra, R.J./Bekker, R.M./Thompson, K.. Seed banks and seed dispersal: important topics in restoration ecology. <i>Acta Botanica Neerlandica</i> . 45(4): 461-490.	[Evidence that a persistent propagule bank is formed (>1 yr)? Yes] "Table 4. Top 30 species ranked after their maximum longevity (method N, data from soil samples of field sites; method B, data from burial experiments)" [<i>Juncus effusus</i> seeds have been documented to persist in soil samples for >73 years]

802	2002. USDA NRCS. Plant Fact Sheet - Common Rush - <i>Juncus effusus</i> . USDA NRCS National Plant Data Center, plants.usda.gov/factsheet/pdf/fs_juef.pdf	[Evidence that a persistent propagule bank is formed (>1 yr)? Yes] "After shatter, seeds may remain viable for greater than 60 years if over-topped with sediments."
803	2003. Motooka, P./Castro, L./Nelson, D./Nagai, G./Ching, L.. Weeds of Hawaii's Pastures and Natural Areas: An Identification and Management Guide. CTAHR, UH Manoa, Honolulu, HI http://www.ctahr.hawaii.edu/invweed/weedsHi.html	[Well controlled by herbicides?] "Difficult because of thick rhizomes and roots. Susceptible to glyphosate at 1-1.5% product applied to foliage (Hank Oppenheimer, Maui Pine"
803	2009. Rana, N./Sellers, B.A.. Soft Rush (<i>Juncus effusus</i>) Control in Florida Pastures. Weed Technology. 23(2): 321-323.	[Well controlled by herbicides? Yes] "...effective control of soft rush can be obtained with the use of 2,4-D amine or products that contain 2,4-D amine."
804	2003. Weber, E.. Invasive Plant Species of the World. A Reference Guide to Environmental Weeds. CABI Publishing, Wallingford, UK	[Tolerates, or benefits from, mutilation, cultivation, or fire? Yes] "Cutting at ground level reduces the vigour but a follow-up programme is necessary to treat regrowth and seedlings."
805	1999. Wagner, W.L./Herbst, D.R./Sohmer, S.H.. Manual of the flowering plants of Hawaii. Revised edition.. University of Hawai'i Press and Bishop Museum Press, Honolulu, HI.	[Effective natural enemies present locally (e.g. introduced biocontrol agents)? Unknown] "cultivated and naturalized along margins of ponds and streams, in open boggy sites, and wet areas along trails, 1,000-2000 m" [Probably No]

Summary of Risk Traits

High Risk / Undesirable Traits

- Widely naturalized
- Thrives in temperate and higher elevation tropical climates
- Environmental weed, competing with native vegetation
- Possibly allelopathic
- Forms dense thickets
- Shade tolerant Tolerates many soil conditions (and potentially able to exploit many different habitat types)
- Spreads vegetatively by rhizomes
- Reaches maturity in 2 years
- Produced large numbers of seeds
- Seeds easily dispersed by wind, water, and adhering to animals, and machinery
- Seeds can persist in the soil for decades

Low Risk / Desirable Traits

- Unarmed (no spines, thorns or burrs)
- Palatable to animals
- Provides food and habitat for wildlife (e.g. waterbirds)
- Non-toxic
- Landscaping and ornamental value
- Herbicides can provide effective control