

Family: *Poaceae*

Taxon: *Muhlenbergia capillaris*

Synonym: *Agrostis setosa* Willd. ex Trin.
Muhlenbergia polypogon (DC.) Kunth
Podosemum agrostideum P. Beauv.
Podosemum capillare (Lam.) Desv
Stipa capillaris Lam.
Stipa cericea Michx. ex Raf.
Stipa diffusa Walter
Tosagris agrostidea P. Beauv.
Trichochloa capillaris (Lam.) DC.
Trichochloa polypogon DC.

Common Name: hairawn muhly
purple muhly grass
pink muhly

Questionnaire :	current 20090513	Assessor:	Chuck Chimera	Designation:	EVALUATE
Status:	Assessor Approved	Data Entry Person:	Chuck Chimera	WRA Score	5
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)		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		?
301	Naturalized beyond native range		y = 1*multiplier (see Appendix 2), n= question 205		n
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)		n
305	Congeneric weed		n=0, y = 1*multiplier (see Appendix 2)		y
401	Produces spines, thorns or burrs		y=1, n=0		n
402	Allelopathic		y=1, n=0		
403	Parasitic		y=1, n=0		n
404	Unpalatable to grazing animals		y=1, n=-1		n
405	Toxic to animals		y=1, n=0		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	
409	Is a shade tolerant plant at some stage of its life cycle	y=1, n=0	
410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)	y=1, n=0	y
411	Climbing or smothering growth habit	y=1, n=0	n
412	Forms dense thickets	y=1, n=0	y
501	Aquatic	y=5, n=0	n
502	Grass	y=1, n=0	y
503	Nitrogen fixing woody plant	y=1, n=0	n
504	Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)	y=1, n=0	n
601	Evidence of substantial reproductive failure in native habitat	y=1, n=0	
602	Produces viable seed	y=1, n=-1	y
603	Hybridizes naturally	y=1, n=-1	
604	Self-compatible or apomictic	y=1, n=-1	
605	Requires specialist pollinators	y=-1, n=0	n
606	Reproduction by vegetative fragmentation	y=1, n=-1	n
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	
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	
705	Propagules water dispersed	y=1, n=-1	n
706	Propagules bird dispersed	y=1, n=-1	n
707	Propagules dispersed by other animals (externally)	y=1, n=-1	y
708	Propagules survive passage through the gut	y=1, n=-1	
801	Prolific seed production (>1000/m2)	y=1, n=-1	
802	Evidence that a persistent propagule bank is formed (>1 yr)	y=1, n=-1	
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: EVALUATE

WRA Score **5**

Supporting Data:

101	2004. Engstrom, B.. Muhlenbergia capillaris (Lamark) Trinius Hairgrass Conservation and Research Plan for New England. New England Wild Flower Society, Framingham, MA	[Is the species highly domesticated? No evidence] "Though the species name has been in regular use since 1824, there has been taxonomic confusion throughout the 20th century about what is included in the species. While as recently as 1989 the species included three varieties, the most current treatment of the genus has Muhlenbergia capillaris without any varieties, and two closely-related species taking the place of former varieties."
101	2010. Kirk, S./Belt, S.. Plant Fact Sheet for Hairawn Muhly (Muhlenbergia capillaris). USDA-Natural Resources Conservation Service, Norman A. Berg National Plant Materials Center, Beltsville, MD	[Is the species highly domesticated? No] "There are no recommended cultivars or selected materials at this time. Hairawn muhly is available from commercial nurseries specializing in native plants."
102	2012. WRA Specialist. Personal Communication.	NA
103	2012. WRA Specialist. Personal Communication.	NA
201	2002. Pfaff, S./Gonter, M.A./Maura, C.. Florida Native Seed Production Manual. USDA Natural Resources Conservation Service Plant Materials Center, Brooksville, FL	[Species suited to tropical or subtropical climate(s) 2-High] "A warm season perennial bunchgrass; plants 1 to 3 feet tall; seed stalks 2 to 5 feet tall, a very showy pink to purple color; adapted to the backside of dunes, cabbage palm hammocks, saline flats, marl prairies and marshy areas throughout Florida; some types also grow in sandhills."
201	2006. Quattrocchi, U.. CRC World Dictionary of Grasses: Common Names, Scientific Names, Eponyms, Synonyms, and Etymolog. CRC Press, Boca Raton, FL	[Species suited to tropical or subtropical climate(s) 2-High] "Southeastern U.S., Mexico, Guatemala."
202	2002. Pfaff, S./Gonter, M.A./Maura, C.. Florida Native Seed Production Manual. USDA Natural Resources Conservation Service Plant Materials Center, Brooksville, FL	[Quality of climate match data? 2-High]
203	1971. Hitchcock, A.S./Chase, A.. Manual of the grasses of the United States, Volume 2. Dover Publications, New York, NY	[Broad climate suitability (environmental versatility)? Presumably Yes. Broad native range and latitudinal distribution] "Rock or sandy woods, Massachusetts to Indiana and Kansas, south to Florida and Texas; West Indies, eastern Mexico."
203	2012. Floridata. Muhlenbergia capillaris [Accessed 27 Sep 2012]. http://www.floridata.com/ref/m/muhl_cap.cfm	[Broad climate suitability (environmental versatility)? Yes] "Hardiness: USDA Zones 5 - 10."
204	1971. Hitchcock, A.S./Chase, A.. Manual of the grasses of the United States, Volume 2. Dover Publications, New York, NY	[Native or naturalized in regions with tropical or subtropical climates? Yes] "Rock or sandy woods, Massachusetts to Indiana and Kansas, south to Florida and Texas; West Indies, eastern Mexico."
204	2003. Peterson, P.M.. Muhlenbergia. published in Barkworth et al. (eds.), Flora of North America vol. 25. http://herbarium.usu.edu/webmanual	[Native or naturalized in regions with tropical or subtropical climates? Yes] "In the southeastern United States, Muhlenbergia capillaris usually grows in rocky or clay soils in open woodlands and savannahs and on calcareous outcrops, at elevations of 0-500 m. In the northeastern states, it is also found on diabase and sandstone outcrops and ridges. Its native range includes the southeastern United States, Bahamas, and possibly various Caribbean islands. It is also grown as an ornamental."
204	2004. Engstrom, B.. Muhlenbergia capillaris (Lamark) Trinius Hairgrass Conservation and Research Plan for New England. New England Wild Flower Society, Framingham, MA	[Native or naturalized in regions with tropical or subtropical climates? Yes] "Outside the United States, Muhlenbergia capillaris occurs in the Bahamas and possibly other Caribbean islands (Peterson 2003). Kartesz and Meacham (2001) list the species as rare in Puerto Rico. The Missouri Botanical Garden Specimen Database (2004) includes records of Muhlenbergia capillaris specimens from the mountains of southern Mexico and adjacent Guatemala, as well as from the Yucatan peninsula."
205	2012. WRA Specialist. Personal Communication.	[Does the species have a history of repeated introductions outside its natural range? Questionable] Used as an ornamental within its native range, but information about its introduction elsewhere was not found.
301	2012. Randall, R.P.. A Global Compendium of Weeds. 2nd Edition. Department of Agriculture and Food, Western Australia	[Naturalized beyond native range? No evidence]
301	2012. Wagner, W.L./Herbst, D.R./Khan, N./Flynn, T.. Hawaiian Vascular Plant Updates: A Supplement to the Manual of the Flowering Plants of Hawai'i & Hawai'i's Ferns & Fern Allies. http://botany.si.edu/pacificislandbiodiversity/hawaiianflora/supplement.htm	[Naturalized beyond native range? No evidence]

302	2012. Randall, R.P.. A Global Compendium of Weeds. 2nd Edition. Department of Agriculture and Food, Western Australia	[Garden/amenity/disturbance weed? No evidence]
303	2012. Randall, R.P.. A Global Compendium of Weeds. 2nd Edition. Department of Agriculture and Food, Western Australia	[Agricultural/forestry/horticultural weed? No evidence]
304	2012. Randall, R.P.. A Global Compendium of Weeds. 2nd Edition. Department of Agriculture and Food, Western Australia	[Environmental weed? No evidence]
305	2007. Sikkema, P.H./Kramer, C./Vyn, J.D./Kells, J.J./Hillger, D.E./Soltani, N.. Control of <i>Muhlenbergia frondosa</i> (wirestem muhly) with post-emergence sulfonylurea herbicides in maize (<i>Zea mays</i>). <i>Crop Protection</i> . 26: 1585-1588.	[Congeneric weed? Yes] " <i>Muhlenbergia frondosa</i> (Poiret) Fernald (wirestem muhly) is a warm-season perennial grass native to North America, known to infest the Midwest and Northeast areas of the United States, as well as Southwestern Ontario, Canada. <i>M. frondosa</i> invasions were thought to be agriculturally insignificant until the 1950s. Infestations in new areas have increased since the 1980s (Salzman et al., 1997). Reproduction is by both seed and rhizomes. Each plant is capable of producing as many as 140,000 seeds (Doll et al., 1986). Spread of <i>M. frondosa</i> can result from cultivation pulling the rhizomes apart and dispersing them from the original plant."
401	1971. Hitchcock, A.S./Chase, A.. Manual of the grasses of the United States, Volume 2. Dover Publications, New York, NY	[Produces spines, thorns or burrs? No] "Perennial in tufts; culms rather slender, erect, 60 to 100 cm. tall; sheaths scaberulous, at least toward the summit, and with auricles mostly 3 to 5 mm. long; blades elongate, flat or involute, 1 to 4 mm. wide, those of the innovations narrower, involute; panicles purple, oblong, diffuse, one-third to half the entire height of the culm, the branches capillary, flexuous, the branchlets and pedicels finally spreading..."
402	2012. WRA Specialist. Personal Communication.	[Allelopathic? Unknown]
403	1971. Hitchcock, A.S./Chase, A.. Manual of the grasses of the United States, Volume 2. Dover Publications, New York, NY	[Parasitic? No evidence]
404	1980. Holder, G.L./Johnson, M.K./Bake, J.L.. Cattle Grazing and Management of Dusky Seaside Sparrow Habitat. <i>Wildlife Society Bulletin</i> . 8(2): 105-109.	[Unpalatable to grazing animals? No] "From observation, the species most readily eaten by cattle were salt grass, knotroot bristle grass (<i>Setaria geniculata</i>), panic grass (<i>Panicum boscii</i>), needle-head panic grass (<i>P. acicularia</i>), bahia-grass (<i>Paspalum notatum</i>), paspalum (<i>Paspalum</i> spp.), gulf hairawn muhly (<i>Muhlenbergia capillaris</i>), and climbing hempweed (<i>Mikania scandens</i>). None of these plants were absent from, or less abundant on, grazed compared to ungrazed areas."
404	2006. Harrison, M.. Groundcovers for the South. Pineapple Press Inc., Sarasota, FL	[Unpalatable to grazing animals? No] "Muhly grass provides food, shelter, cover, and nest-building material for birds. It also provides food for grazing animals, nectar for pollinating insects, and seeds for ground-level foragers."
405	2006. Harrison, M.. Groundcovers for the South. Pineapple Press Inc., Sarasota, FL	[Toxic to animals? No evidence] "Muhly grass provides food, shelter, cover, and nest-building material for birds. It also provides food for grazing animals, nectar for pollinating insects, and seeds for ground-level foragers."
406	1999. Gilman, E.F.. <i>Muhlenbergia capillaris</i> Muhly Grass. Fact Sheet FPS415. University of Florida IFAS Extension, Gainesville, FL http://edis.ifas.ufl.edu/fp415	[Host for recognized pests and pathogens? No] "There are no known pests or problems."
406	2002. Pfaff, S./Gonter, M.A./Maura, C.. Florida Native Seed Production Manual. USDA Natural Resources Conservation Service Plant Materials Center, Brooksville, FL	[Host for recognized pests and pathogens? Aphids are widespread, generalist pests] "Blooms can become heavily infested with aphids during the early stages of seed development, especially in the milk stage. The amount of damage they cause is unknown and insecticides have yet to be tested. Large numbers of beneficial insects, such as ladybug beetles, have also been observed. Increasing their numbers may be a natural means of biological control."
406	2012. Shoot Gardening. <i>Muhlenbergia capillaris</i> (Hairawn muhly) [Accessed 28 Sep 2012]. http://www.shootgardening.co.uk/plant/muhlenbergia-capillaris	[Host for recognized pests and pathogens? No] "Pests: Generally pest-free. Diseases: Generally disease-free."
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 evidence]
407	2012. Pollen Library. Allergens and Plants Research by Location. IMS Health Inc., http://www.pollenlibrary.com/	[Causes allergies or is otherwise toxic to humans? No evidence]

408	2004. Engstrom, B.. Muhlenbergia capillaris (Lamark) Trinius Hairgrass Conservation and Research Plan for New England. New England Wild Flower Society, Framingham, MA	[Creates a fire hazard in natural ecosystems? Potentially Yes] "Based on the preceding biological and habitat information, Muhlenbergia capillaris can be characterized as an upland, woodland or prairie/savannah species. Furthermore, as a grass, its growth pattern is such that it annually produces dead leaves and fruiting stems that translate into fine fuels. Fine fuels can quickly dry out and burn. Both its dry habitat in conjunction with its production of fine fuels, make it a species likely adapted for fire. Three studies involving prescribed burns suggest it is a fire adapted species."
408	2008. Zouhar, K./Smith, J.K./Sutherland, S./Brooks, M.L.. Wildland fire in ecosystems: fire and nonnative invasive plants. Gen. Tech. Rep. RMRS-GTR-42-vol. 6. USDA Forest Service, Rocky Mountain Research Station, Ogden, UT	[Creates a fire hazard in natural ecosystems? Potentially Yes] "Repeated fires may have potential for controlling melaleuca; however, fuel loads may be insufficient to carry fire in consecutive years. Some wet grasslands might be capable of providing sufficient fuel for a second fire within 2 or 3 years after the first fire. Nearly all melaleuca seedlings were killed in a second fire 2 years after a wildfire in a wet grassland dominated by muhly grass (Muhlenbergia capillaris) (Belles and others 1999)."
409	2004. Engstrom, B.. Muhlenbergia capillaris (Lamark) Trinius Hairgrass Conservation and Research Plan for New England. New England Wild Flower Society, Framingham, MA	[Is a shade tolerant plant at some stage of its life cycle? Probably No] "Shading by woody plants is another potential threat to these sun-loving plants."
409	2006. Burrell, C. C./Marinelli, J./Harper-Lore, B.. Native alternatives to invasive plants. Brooklyn Botanic Garden, Brooklyn, NY	[Is a shade tolerant plant at some stage of its life cycle? Possibly] "This grass is drought tolerant but cannot take waterlogging."
409	2012. Floridata. Muhlenbergia capillaris [Accessed 27 Sep 2012]. http://www.floridata.com/ref/m/muhl_cap.cfm	[Is a shade tolerant plant at some stage of its life cycle? Possibly] "Light: Full sun to light shade."
410	2010. Kirk, S./Belt, S.. Plant Fact Sheet for Hairawn Muhly (Muhlenbergia capillaris). USDA-Natural Resources Conservation Service, Norman A. Berg National Plant Materials Center, Beltsville, MD	[Tolerates a wide range of soil conditions ? Yes] "Hairawn muhly prefers neutral to slightly acidic soils but can tolerate many soil types. It has a low tolerance for high pH soils and a high tolerance for salinity."
410	2012. Floridata. Muhlenbergia capillaris [Accessed 27 Sep 2012]. http://www.floridata.com/ref/m/muhl_cap.cfm	[Tolerates a wide range of soil conditions? Yes] "Gulf muhlygrass tolerates a wide variety of soil conditions from moist to dry, acidic to alkaline, and sandy to marly. Established plantings will not need supplemental watering, but the grass will get larger with liberal irrigation. "
411	1971. Hitchcock, A.S./Chase, A.. Manual of the grasses of the United States, Volume 2. Dover Publications, New York, NY	[Climbing or smothering growth habit? No] "Perennial in tufts; culms rather slender, erect, 60 to 100 cm. tall; sheaths scaberulous, at least toward the summit, and with auricles mostly 3 to 5 mm. long; blades elongate, flat or involute, 1 to 4 mm. wide, those of the innovations narrower, involute; panicles purple, oblong, diffuse, one-third to half the entire height of the culm, the branches capillary, flexuous, the branchlets and pedicels finally spreading..."
412	2012. Floridata. Muhlenbergia capillaris [Accessed 27 Sep 2012]. http://www.floridata.com/ref/m/muhl_cap.cfm	[Forms dense thickets? Yes] "Gulf muhlygrass occurs in eastern North America from Kansas to Massachusetts and south to Florida, Texas and Mexico, and in the West Indies. It can occur as an isolated plant or in dense stands where it is the only grass."
501	1971. Hitchcock, A.S./Chase, A.. Manual of the grasses of the United States, Volume 2. Dover Publications, New York, NY	[Aquatic? No] "Rock or sandy woods, Massachusetts to Indiana and Kansas, south to Florida and Texas; West Indies, eastern Mexico."
502	1971. Hitchcock, A.S./Chase, A.. Manual of the grasses of the United States, Volume 2. Dover Publications, New York, NY	[Grass? Yes]
503	1971. Hitchcock, A.S./Chase, A.. Manual of the grasses of the United States, Volume 2. Dover Publications, New York, NY	[Nitrogen fixing woody plant? No] Poaceae
504	1971. Hitchcock, A.S./Chase, A.. Manual of the grasses of the United States, Volume 2. Dover Publications, New York, NY	[Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)? No] "Perennial in tufts; culms rather slender, erect, 60 to 100 cm. tall; sheaths scaberulous, at least toward the summit, and with auricles mostly 3 to 5 mm. long; blades elongate, flat or involute, 1 to 4 mm. wide, those of the innovations narrower, involute; panicles purple, oblong, diffuse, one-third to half the entire height of the culm, the branches capillary, flexuous, the branchlets and pedicels finally spreading..."
601	2010. Kirk, S./Belt, S.. Plant Fact Sheet for Hairawn Muhly (Muhlenbergia capillaris). USDA-Natural Resources Conservation Service, Norman A. Berg National Plant Materials Center, Beltsville, MD	[Evidence of substantial reproductive failure in native habitat? Possibly in parts of the native range] "Hairawn muhly is listed as an endangered species in Connecticut, Indiana, Maryland, and New Jersey; as extirpated in Pennsylvania; and as presumed extirpated in Ohio."

602	1971. Hitchcock, A.S./Chase, A.. Manual of the grasses of the United States, Volume 2. Dover Publications, New York, NY	[Produces viable seed? Yes] "viable seed production varies widely between ecotypes"
602	2010. Kirk, S./Belt, S.. Plant Fact Sheet for Hairawn Muhly (<i>Muhlenbergia capillaris</i>). USDA-Natural Resources Conservation Service, Norman A. Berg National Plant Materials Center, Beltsville, MD	[Produces viable seed? Yes] "Seeds should be collected from plants in late fall and air-dried for five to ten days. Collect seeds during the warmest and driest time of day using a comb to avoid disturbing the appearance of the plant."
602	2012. Floridata. <i>Muhlenbergia capillaris</i> [Accessed 27 Sep 2012]. http://www.floridata.com/ref/m/muhl_cap.cfm	[Produces viable seed? Yes] "Propagation: Gulf muhlygrass is easy to start from seed. Existing clumps can be divided to start new plants."
603	2003. Peterson, P.M.. <i>Muhlenbergia</i> . published in Barkworth et al. (eds.), <i>Flora of North America</i> vol. 25. http://herbarium.usu.edu/webmanual	[Hybridizes naturally? Unknown] No evidence
604	2004. Engstrom, B.. <i>Muhlenbergia capillaris</i> (Lamark) Trinius Hairgrass Conservation and Research Plan for New England. New England Wild Flower Society, Framingham, MA	[Self-compatible or apomictic? Unknown] "With such few plants persisting, inbreeding depression and genetic drift are other potential threats to the species' viability in the region. While no genetic studies have been done on <i>Muhlenbergia capillaris</i> , genetic studies and theory suggest that selection may work against self-pollinated individuals and homozygotes derived from selfing in small populations of outcrossing species (Neel et al. 2001)."
605	1994. Zomlefer, W.B.. <i>Guide to Flowering Plant Families</i> . The University of North Carolina Press, Chapel Hill & London	[Requires specialist pollinators? No] "The reduced flowers are anemophilous..."
605	2004. Engstrom, B.. <i>Muhlenbergia capillaris</i> (Lamark) Trinius Hairgrass Conservation and Research Plan for New England. New England Wild Flower Society, Framingham, MA	[Requires specialist pollinators? No] "As with many cespitose grasses, <i>Muhlenbergia capillaris</i> reproduces primarily via seed. Pollination is assumed to be by wind."
606	2004. Engstrom, B.. <i>Muhlenbergia capillaris</i> (Lamark) Trinius Hairgrass Conservation and Research Plan for New England. New England Wild Flower Society, Framingham, MA	[Reproduction by vegetative fragmentation? No] " <i>Muhlenbergia capillaris</i> is a perennial grass that forms dense clumps (Peterson 2003). Since it is neither rhizomatous nor stoloniferous, the species must reproduce via seed."
606	2010. Kirk, S./Belt, S.. Plant Fact Sheet for Hairawn Muhly (<i>Muhlenbergia capillaris</i>). USDA-Natural Resources Conservation Service, Norman A. Berg National Plant Materials Center, Beltsville, MD	[Reproduction by vegetative fragmentation? No] "Hairawn muhly clumps but does not spread through above or underground stems (stolons or rhizomes)."
607	2011. My Gardener Says.... Waiting For Muhly [Accessed 28 Sep 2012]. http://mygardenersays.wordpress.com/category/muhlenbergia-capillaris/	[Minimum generative time (years)? 2+] "It will take another 2-3 years to reach maturity and real be show-stoppers."
607	2012. Shoot Gardening. <i>Muhlenbergia capillaris</i> (Hairawn muhly) [Accessed 28 Sep 2012]. http://www.shootgardening.co.uk/plant/muhlenbergia-capillaris	[Minimum generative time (years)? 2+] "2-5 years to maturity"
701	2012. Floridata. <i>Muhlenbergia capillaris</i> [Accessed 27 Sep 2012]. http://www.floridata.com/ref/m/muhl_cap.cfm	[Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)? Potentially] "Muhlygrass is recommended for road shoulders and medians."
702	2010. Kirk, S./Belt, S.. Plant Fact Sheet for Hairawn Muhly (<i>Muhlenbergia capillaris</i>). USDA-Natural Resources Conservation Service, Norman A. Berg National Plant Materials Center, Beltsville, MD	[Propagules dispersed intentionally by people? Yes] "Uses Conservation: Hairawn muhly is a hardy and drought-tolerant native ornamental grass that can be used for land reclamation. It is also useful as a fine fuel for understory burn management programs. Landscaping and wildlife: Hairawn muhly produces striking pink and purple blooms in the fall. It requires little maintenance and is excellent for meadow gardens and as a general garden plant. Hairawn muhly is known to attract beneficial insects such as ladybug beetles (<i>Coccinella</i> spp.). The clumping habit of hairawn muhly makes it excellent for use as wildlife cover."
703	2006. Harrison, M.. <i>Groundcovers for the South</i> . Pineapple Press Inc., Sarasota, FL	[Propagules likely to disperse as a produce contaminant? Possibly if used in floral arrangements] "Muhly grass is frequently used as a reclamation plant in natural areas, and also in cut flowers, borders, roadside plantings, and meadows."

704	2003. Peterson, P.M.. Muhlenbergia. published in Barkworth et al. (eds.), Flora of North America vol. 25. http://herbarium.usu.edu/webmanual	[Propagules adapted to wind dispersal? Unknown] "Panicles 15-50(60) cm long, 5-30(41) cm wide, longer than wide, diffuse; primary branches 2-20 cm, capillary, diverging 30-100° from the rachises, naked basally, lower branches with 5-20 spikelets; pedicels 10-40(50) mm, longer than the spikelets, capillary, flexible. Spikelets 3-5 mm, usually purple, occasionally green, brown, or stramineous. Glumes subequal, (0.3)1-1.5(2) mm, usually less than 1/2 as long as the lemmas, glabrous; lower glumes 1 veined, usually unawned, rarely awned, awns 1-3 mm; upper glumes 1-veined, rarely 3 veined, acute to acuminate, often erose, usually unawned, rarely awned, awns 1-3(5) mm; lemmas 3-5 mm, lanceolate, not shiny, calluses shortly pubescent, apices scabrous, acuminate, sometimes with 2 setaceous teeth, teeth to 1 mm, unawned or awned, awns 2-13(18) mm, clearly demarcated from the lemma bodies; paleas 2-4.5 mm, lanceolate, acuminate, usually unawned; anthers 1.5-2 mm, purple. Caryopses 2-2.5 mm, narrowly elliptic, brownish." [No specific information was found in the available literature.]
705	1971. Hitchcock, A.S./Chase, A.. Manual of the grasses of the United States, Volume 2. Dover Publications, New York, NY	[Propagules water dispersed? No evidence] "Rock or sandy woods, Massachusetts to Indiana and Kansas, south to Florida and Texas; West Indies, eastern Mexico." [Distribution suggests no]
706	2004. Engstrom, B.. Muhlenbergia capillaris (Lamark) Trinius Hairgrass Conservation and Research Plan for New England. New England Wild Flower Society, Framingham, MA	[Propagules bird dispersed? No] "Although no direct references were found on the subject, seed dispersal for Muhlenbergia capillaris is likely via large mammals. The long awn on the lemma would appear to easily catch in the fur of a large mammal, especially those with longer hair, such as canids or sheep." [Possibly dispersed externally by adhering to feathers, but no evidence of internal dispersal by birds]
707	2004. Engstrom, B.. Muhlenbergia capillaris (Lamark) Trinius Hairgrass Conservation and Research Plan for New England. New England Wild Flower Society, Framingham, MA	[Propagules dispersed by other animals (externally)? Presumably Yes] "Although no direct references were found on the subject, seed dispersal for Muhlenbergia capillaris is likely via large mammals. The long awn on the lemma would appear to easily catch in the fur of a large mammal, especially those with longer hair, such as canids or sheep."
708	1980. Holder, G.L./Johnson, M.K./Bake, J.L.. Cattle Grazing and Management of Dusky Seaside Sparrow Habitat. Wildlife Society Bulletin. 8(2): 105-109.	[Propagules survive passage through the gut? Unknown if seeds are consumed when being grazed by animals, or if they retain viability after gut passage] "From observation, the species most readily eaten by cattle were salt grass, knotroot bristle grass (<i>Setaria geniculata</i>), panic grass (<i>Panicum boscii</i>), needle-head panic grass (<i>P. acicularia</i>), bahia-grass (<i>Paspalum notatum</i>), paspalum (<i>Paspalum</i> spp.), gulf hairawn muhly (<i>Muhlenbergia capillaris</i>),..."
801	2002. Pfaff, S./Gonter, M.A./Maura, C.. Florida Native Seed Production Manual. USDA Natural Resources Conservation Service Plant Materials Center, Brooksville, FL	[Prolific seed production (>1000/m ²)? Unknown] "SPECIES DESCRIPTION: A warm season perennial bunchgrass; plants 1 to 3 feet tall; seed stalks 2 to 5 feet tall, a very showy pink to purple color; adapted to the backside of dunes, cabbage palm hammocks, saline flats, marl prairies and marshy areas throughout Florida; some types also grow in sandhills. Vegetatively, very similar to wiregrass, and useful for wildlife cover and fine fuels for understory burn management programs. AVERAGE SEED/LB (KG): 2,522,000/lb (5,560,000/kg) (bearded)."
802	1995. Looney, P.B./Gibson, D.J.. The relationship between the soil seed bank and above-ground vegetation of a coastal barrier island. Journal of Vegetation Science v. 6: 825-836.	[Evidence that a persistent propagule bank is formed (>1 yr)? Possibly No] "At the community scale of analysis, overall similarity between the seed bank and the above ground vegetation was 0.36 (Jaccard's index), with no difference between vegetation types, but a higher similarity in the autumn than compared with the following spring (Table 2). This suggests that much of the seed bank was not persistent and that the seed bank became depleted over winter. 19 species were more abundant in the autumn seed bank than in the following spring, and several more were absent (e.g. <i>Spartina patens</i> , <i>Polygonella gracilis</i> and <i>Muhlenbergia capillaris</i> were absent from spring samples)."
803	2007. Willis, J.B./Beam, J.B./Barker, W.L./Askew, S.D. and J. Scott McElroy. Selective Nimblewill (<i>Muhlenbergia schreberi</i>) Control in Cool-Season Turfgrass. Weed Technology. 21: 886-889.	[Well controlled by herbicides? Probably Yes] "However, it was concluded that isoxaflutole and mesotrione at appropriate rates and applied in sequence selectively control nimblewill without harming desirable turf." [Related species effectively controlled with herbicides]
804	1967. Porter, Jr., C.L.. Composition and Productivity of a Subtropical Prairie. Ecology. 48(6): 937-942.	[Tolerates, or benefits from, mutilation, cultivation, or fire? Yes] "By contrast, <i>Muhlenbergia</i> is apparently not adversely affected by drought, thrives under flooded conditions, and has been observed on several occasions to be the first species to recover following fires."
804	2002. Main, M.B./Barry, M.J.. Influence of Season of Fire on Flowering of Wet Prairie Grasses in South Florida, USA. Wetlands. 22(2): 430-434.	[Tolerates, or benefits from, mutilation, cultivation, or fire? Yes] "Early growing season (May) fire promoted a strong flowering response by <i>P. monostachyum</i> , <i>S. rhizomatum</i> , and <i>M. capillaris</i> during the first post fire season of flowering. The positive effect, however, of growing season fire on flowering of these native grasses was short-lived. Flowering decreased dramatically among all species during the second and third years post-fire at sites burned during May."

804	2004. Engstrom, B.. Muhlenbergia capillaris (Lamark) Trinius Hairgrass Conservation and Research Plan for New England. New England Wild Flower Society, Framingham, MA	[Tolerates, or benefits from, mutilation, cultivation, or fire? Yes] "Burning, especially in the early spring versus dormant season, has been shown to greatly increase flower stem production in a closely-related species. Fire also appears to facilitate population growth." ... "As with many upland grasses, Muhlenbergia capillaris reacts favorably to fires, both in flower stalk production and in regeneration (Bittner and West 1994, Snyder 2003)."
804	2010. Kirk, S./Belt, S.. Plant Fact Sheet for Hairawn Muhly (Muhlenbergia capillaries). USDA-Natural Resources Conservation Service, Norman A. Berg National Plant Materials Center, Beltsville, MD	[Tolerates, or benefits from, mutilation, cultivation, or fire? Yes] "Burn or mow hairawn muhly stands in late winter to remove old residue."
805	2012. WRA Specialist. Personal Communication.	[Effective natural enemies present locally (e.g. introduced biocontrol agents)? Unknown] No native Muhlenbergia present in Hawaiian Islands, and no reports of pests or pathogens from Muhlenbergia mexicana or M. microsperma, the two species currently naturalized in the Hawaiian Islands

Summary of Risk Traits

High Risk / Undesirable Traits

- Broad climate suitability and wide natural range
- Adaptable to tropical climates
- Related species have become invasive
- Tolerates many soil conditions (and potentially able to exploit many different habitat types)
- Tolerates fire and could increase fire risks
- Can form almost pure ground cover in native range (could exclude other species)
- Reproduces by seeds which may be dispersed externally on the fur of animals

Low Risk / Desirable Traits

- No records of naturalization or invasiveness reported
- Non-toxic
- Landscaping and ornamental value
- Genus *Muhlenbergia* susceptible to herbicides