Cyperus entrerianus (Deeprooted sedge, Woodrush flatsedge)		**Answer**	**Score**
1.01	Is the species highly domesticated?	n	0
1.02	Has the species become naturalised where grown?		
1.03	Does the species have weedy races?		
2.01	Species suited to FL climates (USDA hardiness zones; 0-low, 1-intermediate, 2-high)	2	
2.02	Quality of climate match data (0-low; 1-intermediate; 2-high)	2	
2.03	Broad climate suitability (environmental versatility)	y	1
2.04	Native or naturalized in regions with an average of 11-60 inches of annual precipitation	y	1
2.05	Does the species have a history of repeated introductions outside its natural range?	y	
3.01	Naturalized beyond native range	y	2
3.02	Garden/amenity/disturbance weed	y	2
3.03	Weed of agriculture	y	4
3.04	Environmental weed	y	4
3.05	Congeneric weed	y	2
4.01	Produces spines, thorns or burrs	n	0
4.02	Allelopathic	n	0
4.03	Parasitic	n	0
4.04	Unpalatable to grazing animals	y	1
4.05	Toxic to animals	n	0
4.06	Host for recognised pests and pathogens		
4.07	Causes allergies or is otherwise toxic to humans		
4.08	Creates a fire hazard in natural ecosystems		
4.09	Is a shade tolerant plant at some stage of its life cycle		
4.10	Grows on infertile soils (oligotrophic, limerock, or excessively draining soils). North & Central Zones: infertile soils; South Zone: shallow limerock or Histisols.	n	0
4.11	Climbing or smothering growth habit	n	0
4.12	Forms dense thickets	n	0
5.01	Aquatic	n	0
5.02	Grass	n	0
5.03	Nitrogen fixing woody plant	n	0
5.04	Geophyte	n	0
6.01	Evidence of substantial reproductive failure in native habitat	n	0
6.02	Produces viable seed	y	1
6.03	Hybridizes naturally	?	
6.04	Self-compatible or apomictic		
6.05	Requires specialist pollinators		
6.06	Reproduction by vegetative propagation	y	1
6.07	Minimum generative time (years)	2	0

7.01	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	y	1
7.02	Propagules dispersed intentionally by people	n	-1
7.03	Propagules likely to disperse as a produce contaminant	n	-1
7.04	Propagules adapted to wind dispersal	y	1
7.05	Propagules water dispersed	y	1
7.06	Propagules bird dispersed	?	
7.07	Propagules dispersed by other animals (externally)	y	1
7.08	Propagules dispersed by other animals (internally)		
8.01	Prolific seed production	y	1
8.02	Evidence that a persistent propagule bank is formed (>1 yr)	y	1
8.03	Well controlled by herbicides	y	-1
8.04	Tolerates, or benefits from, mutilation or cultivation		
8.05	Effective natural enemies present in U.S.		
	Total Score	**22**	
	Implemented Pacific Second Screening	**No**	
	Risk Assessment Results	**Reject**	

	Reference	Source data
1.01		No evidence of cultivation.
1.02		
1.03		
2.01	1. PERAL NAPPFAST Global Plant Hardiness (http://www.nappfast.org/Plant_hardiness/NAPPFAST%20Global%20zones/10-year%20climate/PLANT_HARDINESS_10YR%20lgnd.tif). 2. USDA, ARS, National Genetic Resources Program. Germplasm Resources Information Network - (GRIN) [Online Database]. National Germplasm Resources Laboratory, Beltsville, Maryland. URL: http://www.ars-grin.gov/cgi-bin/npgs/html/taxon.pl?15924 (02 June 2008).	**No computer analysis was performed**. 1. Global plant hardiness zones: Mexico, C. & S. America 7-12 (13?); USA 5-11. 2. Distributional range: Native to Northern America (Northern & Central Mexico); Southern America (Mesoamerica: Costa Rica, Nicaragua), Brazil, Boliva, Argentina, Paraguay, Uruguay. Naturalized: Northern America (SE & S-Central United States: Alabama, Florida, Georgia, Louisiana, Mississippi, Texas.
2.02		**No computer analysis was performed**. Native range is well known; refer to 2.01 source data.
2.03	1. Köppen-Geiger climate map (http://www.hydrol-earth-syst-sci.net/11/1633/2007/hess-11-1633-2007.pdf). 2. Refer to all references in question 2.01.	1. Distribution in the native and cultivated ranges is very widespread and occurs in more than 3 climatic groups.
2.04	1. Globalis (http://globalis.gvu.unu.edu/ [Accessed: 9/9/2010]).	1. Native Distribution (depending on location): Argentina: 0-1000 mm (0-39 in), Boliva: 100-3000 mm (4-118 in), Brazil: 400-5000 mm (16-197 in), Costa Rica: 1400-3000 (55-118 in), Mexico: 600-2000 mm (24-79 in), Nicaragua: 1000-3000 mm (39-118 in), Paraguay: 400-1400 mm (16-55 in), Uruguay: 1000 mm (39 in); Naturalized Distribution: Alabama: 1000-1400 mm (39-55 in), Florida: 600-1400 mm (24-55 in), Louisiana: 1000-1400 mm (39-55 in), Texas: 600-1400 mm (24-55 in), Mississippi: 1000-1400 mm (39-55 in).
2.05	1. Rosen, D. Native Habitat at Risk Non-Native Weed Takes Root. http://www.hcp4.net/Parks/lccp/pdf/DeeprootedParkscape06.pdf. Accessed: 9/14/2010. 2.a-b. Carter, R. & C.T. Bryson. 1996. *Cyperus entrerianus* : A Little Known Aggressive Sedge in the Southeastern United States. *Weed Technology* , 10(1): 232-235. 3. Rosen, D.J. et al. 2006. The Recent Spread of *Cyperus entrerianus* (Cyperaceae) in the Southeastern United States and its Invasive Potential in Bottomland Hardwood Forests. *Southeastern Naturalist* , 5(2): 333-344.	1. Deeprooted sedge likely found its way to the U.S. as a contaminate in rice seeds or on livestock. 2.a. Apparently, it was introduced into the southeastern United States from temperate South America or Mexico. 2.b. Although its vector is unknown, the distribution and abundance of *C. entrerianus* in the rice (*Orvza sativa* L.) belt of eastern Texas and southwestern Louisiana suggest an initial point introduction there, perhaps as a rice seed contaminant or by migratory birds. 3. Results presented herein and observations of its life-history characteristics indicate *C. entrerianus* is a Type 8 colonizer. Type 8 colonizers are “quintessential invaders” with the following attributes: non-endemic, introduced via long-distance dispersal, and having a great impact on their new ecosystem.

3.01	1. USDA, ARS, National Genetic Resources Program. Germplasm Resources Information Network - (GRIN) [Online Database]. National Germplasm Resources Laboratory, Beltsville, Maryland. URL: http://www.ars-grin.gov/cgi-bin/npgs/html/taxon.pl?15924 (02 June 2008).	1. Naturalized: Northern America (SE & South-Central United States: Alabama, Florida, Georgia, Louisiana, Mississippi, Texas.
3.02	1. Rosen, D.J. et al. 2003. Deeprooted Sedge: An Overlooked Aggressive Weed in the Southeastern United States. http://nas.er.usgs.gov/taxgroup/plants/docs/sedge%20flyer3-31-03.pdf. Accessed: 9/14/2010. 2. Anonymous. 2007. Cyperus entrerianus Boeckl. (Deep-rooted sedge). http://www.texasinvasives.org/invasives_database/. Accessed: 7/23/2010. 3.a-b. Carter, R. & C.T. Bryson. 1996. *Cyperus entrerianus* : A Little Known Aggressive Sedge in the Southeastern United States. Weed Technology, 10(1): 232-235.	1. Flooding, construction equipment, mowing, and soil moving activities, especially along highways, all spread its tiny seeds, resulting in infestations in new areas. Without widespread control it will likely continue to spread rapidly, infesting agricultural, urban, forested, riparian, and other natural areas. 2. Continues to spread especially along roadsides via mowing, flooding, and soil and equipment movement. 3.a. Observed severe infestations of this weed in ditches, pastures, and fallow fields in southwestern Louisiana and southeastern Texas. 3.b. At several locations, *C. entrerianus* was observed as a primary invader of disturbed soil at construction sites, new road construction, land fills, and dredge spoil area.
3.03	1. Rosen, D. Native Habitat at Risk Non-Native Weed Takes Root. http://www.hcp4.net/Parks/lccp/pdf/DeeprootedParkscape06.pdf. Accessed: 9/14/2010. 2. Rosen, D.J. et al. 2003. Deeprooted Sedge: An Overlooked Aggressive Weed in the Southeastern United States. http://nas.er.usgs.gov/taxgroup/plants/docs/sedge%20flyer3-31-03.pdf. Accessed: 9/14/2010. 3. Anonymous. 2007. *Cyperus entrerianus* Boeckl. (Deep-rooted sedge). http://www.texasinvasives.org/invasives_database/. Accessed: 7/23/2010. 4. Carter, R. & C.T. Bryson. 1996. *Cyperus entrerianus* : A Little Known Aggressive Sedge in the Southeastern United States. Weed Technology, 10(1): 232-235. 5. Rosen, D.J. et al. 2006. The Recent Spread of *Cyperus entrerianus* (Cyperaceae) in the Southeastern United States and its Invasive Potential in Bottomland Hardwood Forests. *Southeastern Naturalist* , 5(2): 333-344.	1. The weed could also negatively impact farming communities as well. The seeds are distributed from field to field on farm equipment and even on the feet of cattle. 2. Flooding, construction equipment, mowing, and soil moving activities, especially along highways, all spread its tiny seeds, resulting in infestations in new areas. Without widespread control it will likely continue to spread rapidly, infesting agricultural, urban, forested, riparian, and other natural areas. 3. A potential pest to rice agriculture. 4. Observed severe infestations of this weed pastures and fallow fields in southwestern Louisiana and southeastern Texas. 5. Over the past decade, we have observed the continuous spread of *C. entrerianus* , and its adverse affect in agricultural areas.

3.04	1. Rosen, D. Native Habitat at Risk Non-Native Weed Takes Root. http://www.hcp4.net/Parks/lccp/pdf/DeeprootedParkscape06.pdf. Accessed: 9/14/2010. 2. Rosen, D.J. et al. 2003. Deeprooted Sedge: An Overlooked Aggressive Weed in the Southeastern United States. http://nas.er.usgs.gov/taxgroup/plants/docs/sedge%20flyer3-31-03.pdf. Accessed: 9/14/2010. 3. Anonymous. 2007. *Cyperus entrerianus* Boeckl. (Deep-rooted sedge). http://www.texasinvasives.org/invasives_database/. Accessed: 7/23/2010. 4.a-c. Rosen, D.J. et al. 2006. The Recent Spread of *Cyperus entrerianus* (Cyperaceae) in the Southeastern United States and its Invasive Potential in Bottomland Hardwood Forests. *Southeastern Naturalist* , 5(2): 333-344.	1. It's so tenacious that it's choking out native plant species. This loss in habitat threatens to carry up the food chain. If we lose the native plant habitat, we can expect insect diversity to decrease. That, in turn, will affect the food source for local and migratory songbirds. If this weed spreads as it has been, we could eventually see a loss in wildlife. 2. Flooding, construction equipment, mowing, and soil moving activities, especially along highways, all spread its tiny seeds, resulting in infestations in new areas. Without widespread control it will likely continue to spread rapidly, infesting agricultural, urban, forested, riparian, and other natural areas. 3. Rapidly spreading from disturbed to natural areas. Once established, it outcompetes native grasses and sedges, threatening local plant biodiversity. Alters habitat for the endangered Attwater's prairie chicken. 4.a. Over the past decade, the authors have observed *C. entrerianus* in a variety of disturbed and native habitats, forming monotypic stands to the exclusion of native flora. 4.b. Over the past decade, we have observed the continuous spread of *C. entrerianus* , and its adverse affect in natural plant communities. 4.c. *C. entrerianus* has been increasingly observed in relatively undisturbed, natural habitats, including bottomland forests, riparian forests over deep sands, tall-grass prairies, and coastal grasslands dominated by *Spartina spartinae* (Trin.) Merr. ex A. S. Hitchc.
3.05	1. Carter, R. & C.T. Bryson. 1996. *Cyperus entrerianus* : A Little Known Aggressive Sedge in the Southeastern United States. *Weed Technology* , 10(1): 232-235.	1. Four of the world's worst weeds are in the genus *Cyperus* . These are the smallflower umbrella sedge (*C. difformis* L.), yellow nutsedge (*C. esculentus* L.), riceflatsedge (*C. iria* L.), and the world's worst weed, purple nutsedge (*C. rotundus* L.).
4.01		
4.02	1. Carter, R. et al. 2006. Invasive Sedges: Impending Problems. PowerPoint Presentation. http://www.valdosta.edu/~rcarter/2006.SWSS.195.Invasive%20Sedges.pdf. Accessed: 9/16/2010.	Allelopathy is a characteristic of sedges promoting invasiveness.
4.03		
4.04		Very harsh and course plant tissue.
4.05	1. Houston Advanced Research Center. Date unknown. *The Quiet Invasion: A Guid to Invasive Species of the Galveston Bay Area* . http://www.galvbayinvasives.org/Guide/Species/CyperusEntrerianus. Accessed: 9/14/2010	1. Not known to be toxic.
4.06		
4.07		

4.08		
4.09	1. Rosen, D.J. et al. 2006. The Recent Spread of *Cyperus entrerianus* (Cyperaceae) in the Southeastern United States and its Invasive Potential in Bottomland Hardwood Forests. *Southeastern Naturalist* , 5(2): 333-344. 2. Rosen, David. "RE: C. entrerianus clarification." Message to Aimee L. Cooper. 10/27/2010. E-mail.	1.a. Apparent shade tolerance. 1.b. Yes, from seeding to mature plant. Observed growing in the below closed canopies of coastel forests in SE Texas.
4.10	1. Anonymous. 2007. *Cyperus entrerianus* Boeckl. (Deep-rooted sedge). http://www.texasinvasives.org/invasives_database/. Accessed: 7/23/2010. 2. Carter, R. & C.T. Bryson. 1996. *Cyperus entrerianus* : A Little Known Aggressive Sedge in the Southeastern United States. Weed Technology, 10(1): 232-235.	1. Tolerant to various soil textures (sands to clays). 2. *Cyperus entrerianus* is typically found in poorly drained, mucky, loamy or clayey soils.
4.11		*Cyperus entrerianus* is in the sedge family, Cyperaceae.
4.12	1. Anonymous. 2007. *Cyperus entrerianus* Boeckl. (Deep-rooted sedge). http://www.texasinvasives.org/invasives_database/. Accessed: 7/23/2010. 2. King, J.R. et al. 2009. Seed bank response by the exotic invasive deep-rooted sedge (*Cyperus entrerianus*) to prescribed fire in Texas coastal prairie. Abstract.	By definition, a thicket is a dense growth of shrubbery or small trees. *C. entrerianus* is neither a shrub nor a tree. With that said, 1. *C. entrerinanus* will form monospecific stands in ditches, coastal prairies, low flatwoodsm and fallow rice fields. 2. Forms dense monocultures.
5.01	1. Carter, R. & C.T. Bryson. 1996. *Cyperus entrerianus* : A Little Known Aggressive Sedge in the Southeastern United States. Weed Technology, 10(1): 232-235.	*Cyperus entrerianus* is in the sedge family, Cyperaceae.
5.02	1. Carter, R. & C.T. Bryson. 1996. *Cyperus entrerianus* : A Little Known Aggressive Sedge in the Southeastern United States. Weed Technology, 10(1): 232-235.	*Cyperus entrerianus* is in the sedge family, Cyperaceae.
5.03	1. Carter, R. & C.T. Bryson. 1996. *Cyperus entrerianus* : A Little Known Aggressive Sedge in the Southeastern United States. Weed Technology, 10(1): 232-235.	*Cyperus entrerianus* is in the sedge family, Cyperaceae.
5.04	1. Carter, R. & C.T. Bryson. 1996. *Cyperus entrerianus* : A Little Known Aggressive Sedge in the Southeastern United States. Weed Technology, 10(1): 232-235.	*Cyperus entrerianus* is in the sedge family, Cyperaceae.
6.01		

6.02	1.a-b. Carter, R. & C.T. Bryson. 1996. *Cyperus entrerianus* : A Little Known Aggressive Sedge in the Southeastern United States. *Weed Technology* , 10(1): 232-235. 2.a-b. Rosen, D.J. et al. 2006. The Recent Spread of *Cyperus entrerianus* (Cyperaceae) in the Southeastern United States and its Invasive Potential in Bottomland Hardwood Forests. *Southeastern Naturalist* , 5(2): 333-344.	1.a. *Cyperus entrerianus* reproduces sexually by seeds. 1.b. Preliminary seed germination studies indicate moderate to high seed viability levels (55 to 95%). 2.a. Our field observations of *Cyperus entrerianus* over the last decade indicate that its tiny seeds are readily dispersed, establishing new populations in a variety of habitats that increase in spatial extent and invade new areas. 2.b. High reproductive output (i.e., prolific seed production, high seed viability, and spring and fall flowering events).
6.03	1. Carter, R. 1990. *Cyperus entrerianus* (Cyperaceae), an overlooked species in temperate North America. *SIDA* , 14(1): 69-77. 2. Rosen, David. "RE: C. entrerianus clarification." Message to Aimee L. Cooper. 10/27/2010. E-mail.	1. The aggerssive nature and robust size of plants of *C. entrerianus* from southeastern United States might well be due to heterosis. These characteristics suggest introgression between *C. entrerianus* and *C. surinamensis* , which frequently occur together in southeasten United States. 2. No experimental/scientific data, but most likely given its sympatric distribution with closely related native species.
6.04		No evidence.
6.05		No evidence.
6.06	1. Anonymous. 2007. *Cyperus entrerianus* Boeckl. (Deep-rooted sedge). http://www.texasinvasives.org/invasives_database/. Accessed: 7/23/2010. 2. Carter, R. & C.T. Bryson. 1996. *Cyperus entrerianus* : A Little Known Aggressive Sedge in the Southeastern United States. *Weed Technology* , 10(1): 232-235.	1. Reproduces vegetatively via fragmentation and budding of rhizomes. 2. *Cyperus entrerianus* reproduces asexually by fragmentation of rhizomes upon which buds have developed
6.07	1. Rosen, David. "RE: C. entrerianus clarification." Message to Aimee L. Cooper. 10/27/2010. E-mail.	1. "Not sure, but probably seedling to seed producing adult by the end of the second year. Check Carter, R. & C.T. Bryson. 1996. *Cyperus entrerianus* : A Little Known Aggressive Sedge in the Southeastern United States. Weed Technology, 10(1): 232-235."
7.01	1. Rosen, D. Native Habitat at Risk Non-Native Weed Takes Root. http://www.hcp4.net/Parks/lccp/pdf/DeeprootedParkscape06.pdf. Accessed: 9/14/2010. 2. Anonymous. 2007. *Cyperus entrerianus* Boeckl. (Deep-rooted sedge). http://www.texasinvasives.org/invasives_database/. Accessed: 7/23/2010. 3. Bryson, C.T. et al. No date. Control/Suppression of Deeprooted Sedge. http://www.invasive.org/eastern/other/contol-deeprootedsedge.pdf. Accessed: 9/14/2010.	1. The seeds are distributed from field to field on farm equipment, road construction equipment, equipment used for roadside mowing, and even on the feet of cattle. 2. Continues to spread especially along roadsides via mowing, flooding, and soil and equipment movement. 3. Any equipment used around deeprooted sedge should be cleaned before moving, including vehic les, ATV, camping or backpacking equipment, etc. Good sanitation practices will play a big key part in preventing the spread of deeprooted sedge.
7.02		No evidence.

7.03	1. Anonymous. 2007. *Cyperus entrerianus* Boeckl. (Deep-rooted sedge). http://www.texasinvasives.org/invasives_database/. Accessed: 7/23/2010. 2. Rosen, David. "RE: C. entrerianus clarification." Message to Aimee L. Cooper. 10/27/2010. E-mail.	1. Most likely introduced via rice agriculture. 2. "I don't think so. I've seen it in proximity to rice culture, but no other commercial crops."
7.04	1. Rosen, David. "RE: C. entrerianus clarification." Message to Aimee L. Cooper. 10/27/2010. E-mail.	1. "Yes, seeds are "dust-like" and easily wind dispersed but the distance probably depends on wind velocity."
7.05	1. Anonymous. 2007. Cyperus entrerianus Boeckl. (Deep-rooted sedge). http://www.texasinvasives.org/invasives_database/. Accessed: 7/23/2010.	1. Seeds are readily transported by water.
7.06	1. Carter, R. & C.T. Bryson. 1996. *Cyperus entrerianus* : A Little Known Aggressive Sedge in the Southeastern United States. *Weed Technology* , 10(1): 232-235. 2. Carter, R. 1990. *Cyperus entrerianus* (Cyperaceae), an overlooked species in temperate North America. *SIDA* , 14(1): 69-77. 3. Rosen, David. "RE: C. entrerianus clarification." Message to Aimee L. Cooper. 10/27/2010. E-mail.	1. Although its vector is unknown, the distribution and abundance of *C. entrerianus* in the rice (*Orvza sativa* L.) belt of eastern Texas and southwestern Louisiana suggest an initial point introduction there, perhaps as a rice seed contaminant or by migratory birds. 2. If the introduction of *C. entrerianus* is not an artifact of human activity, then it seems reasonable to assume that it might have been introduced by migrating water fowl. 3. "Most likely dispersed externally in mud on the feet of migratory waterfowl and other wetland birds."
7.07	1. Rosen, D. Native Habitat at Risk Non-Native Weed Takes Root. http://www.hcp4.net/Parks/lccp/pdf/DeeprootedParkscape06.pdf. Accessed: 9/14/2010.	1. The seeds are distributed from field to field on the feet of cattle.
7.08		
8.01	1. Carter, R. & C.T. Bryson. 1996. *Cyperus entrerianus* : A Little Known Aggressive Sedge in the Southeastern United States. *Weed Technology* , 10(1): 232-235. 2. Rosen, D.J. et al. 2006. The Recent Spread of *Cyperus entrerianus* (Cyperaceae) in the Southeastern United States and its Invasive Potential in Bottomland Hardwood Forests. *Southeastern Naturalist* , 5(2): 333-344. 3. Bryson, C.T. & Carter, R. 2004. Biology of Pathways for Invasive Weeds. *Weed Technology* , 18: 1216-1220.	1. *C. entrerianus* is a prolific seed producer, with an estimated average of 18,000 seeds per culm (range 7,300 to 32 400). Culm number ranges from several up to 100, typically with 10 to 20. 2. High reproductive output (i.e., prolific seed production). 3. Deeprooted sedge (*Cyperus entrerianus* Boeck.) populations are estimated to produce up to 1 to 2 million seed annually.

8.02	1. King, J.R. et al. 2009. Seed bank response by the exotic invasive deep-rooted sedge (Cyperus entrerianus) to prescribed fire in Texas coastal prairie. Presentation abstract: 4th International Fire Ecology and Management Congress: Fire as a Global Process.	1. There were few differences in numbers of deep-rooted sedge seedlings between pre-burn and post-burn samples; watering regime exerted a greater effect on seedling emergence than prescribed fire. Nearly 10 times more deep-rooted sedge seedlings were recorded in moist (both pre- and post-burn) than flooded (both pre- and post-burn) treatments. Prescribed fire (during winter) did not effectively reduce deep-rooted sedge seed banks, and in fact may have improved conditions for seed germination. Fires moving through deep-rooted sedge stands reached extreme temperatures, but lethal temperatures did not penetrate soil surfaces. Winter prescribed fires do not kill enough seeds to reduce seed banks, and moist soil conditions may actually enhance germination and promote deep-rooted sedge expansion, even in areas where it is currently absent.
8.03	1. Anonymous. 2007. Cyperus entrerianus Boeckl. (Deep-rooted sedge). http://www.texasinvasives.org/invasives_database/. Accessed: 7/23/2010.	1. Glyphosate is expected to achieve 98% control when applied at a rate of 2 quarts/acre. Use a 2% solution on individuals.
8.04		
8.05		