Australia/New Zealand Weed Risk Assessment adapted for Florida.

Data used for analysis published in: Gordon, D.R., D.A. Onderdonk, A.M. Fox, R.K. Stocker, and C. Gantz. 2008. Predicting Invasive Plants in Florida using the Australian Weed Risk Assessment. Invasive Plant Science and Management 1: 178-195.

Nephrolepis cordifolia (sword fern)			
Question number	**Question**	**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 Florida's USDA climate 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)		
2.04	Native or naturalized in habitats with periodic inundation		
2.05	Does the species have a history of repeated introductions outside its natural range?	y	
3.01	Naturalized beyond native range	y	0
3.02	Garden/amenity/disturbance weed	y	0
3.03	Weed of agriculture	n	0
3.04	Environmental weed		
3.05	Congeneric weed	y	0
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		
4.05	Toxic to animals	n	0
4.06	Host for recognised pests and pathogens	n	0
4.07	Causes allergies or is otherwise toxic to humans	n	0
4.08	Creates a fire hazard in natural ecosystems	n	0
4.09	Is a shade tolerant plant at some stage of its life cycle	y	1
4.1	Grows on infertile soils (oligotrophic, limerock, or excessively draining soils)	y	1
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	y	1
6.01	Evidence of substantial reproductive failure in native habitat		
6.02	Produces viable seed	y	1
6.03	Hybridizes naturally	y?	1
6.04	Self-compatible or apomictic		
6.05	Requires specialist pollinators	n	0
6.06	Reproduction by vegetative fragmentation	y	1
6.07	Minimum generative time (years)		
7.01	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	y	1
7.02	Propagules dispersed intentionally by people	y	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	n	-1
7.06	Propagules bird dispersed	n	-1
7.07	Propagules dispersed by other animals (externally)		
7.08	Propagules dispersed by other animals (internally)	n	-1
8.01	Prolific seed production	y	1
8.02	Evidence that a persistent propagule bank is formed (>1 yr)		
8.03	Well controlled by herbicides	y	-1
8.04	Tolerates, or benefits from, mutilation or cultivation		
8.05	Effective natural enemies present in Florida, or east of the continental divide		
Total Score			11

Outcome	**Reject***

*Used secondary screen from: Daehler, C. C., J.L. Denslow, S. Ansari, and H. Kuo. 2004. A risk assessment system for screening out harmful invasive pest plants from Hawaii's and other Pacific islands. Conserv. Biol. 18: 360-368.

section	# questions answered	satisfy minimum?
A	5	yes
B	11	yes
C	17	yes
total	33	yes

Data collected 2006-2007

Question number	Reference	Source data
1.01		cultivated, but no evidence of selection for reduced weediness
1.02		
1.03		
2.01		
2.02		
2.03		
2.04		
2.05	Weber (2003) Invasive Plant Species of the World. CABI Publishing.	"The exact native range is obscure, and several cultivars have been developed that are widely used as ornamentals."
3.01	1. New Zealand Plant Conservation Network (2005) New Zealand Adventive Vascular Plant List. 2. Flora of North America, vol. 2 (http://www.efloras.org/florataxon.aspx?flora_id=1&taxon_id=233500798).	1. fully naturalized in New Zealand 2. "widely escaped from cultivation"
3.02	1. Weeds Australia (http://www.weeds.org.au/cgi-bin/weedident.cgi?tpl=plant.tpl&state=&s=1&ibra=cmc&card=H04). 2. Spencer (1995) Horticultural Flora of South-Eastern Australia, vol. 1. Ferns, Conifers and Their Allies. University of New South Wales Press.	1. "Sometimes a weed of gardens, bushland and cultivation." [in areas of Australia where it is not native and has naturalized] 2. "Widely cultivated outdoors and sometimes invasive."
3.03		no evidence
3.04		
3.05	Weber (2003) Invasive Plant Species of the World. CABI Publishing.	*N. multiflora* considered an environmental weed in the southeastern U.S. and in the Mascarene Islands (Indian Ocean).
4.01	de Winter and Amoroso, eds. (2003) Plant Resources of South-East Asia. No. 15(2). Cryptogams: Ferns and Fern Allies. Backhuys Publishers, Leiden.	no description of these traits
4.02		no evidence
4.03	de Winter and Amoroso, eds. (2003) Plant Resources of South-East Asia. No. 15(2). Cryptogams: Ferns and Fern Allies.	no description of this

	Backhuys Publishers, Leiden.	
4.04		
4.05		no evidence
4.06	de Winter and Amoroso, eds. (2003) Plant Resources of South-East Asia. No. 15(2). Cryptogams: Ferns and Fern Allies. Backhuys Publishers, Leiden.	"In general, *Nephrolepis* is quite disease and pest resistant."
4.07	1. de Winter and Amoroso, eds. (2003) Plant Resources of South-East Asia. No. 15(2). Cryptogams: Ferns and Fern Allies. Backhuys Publishers, Leiden. 2. Vasudeva (1999) Economic importance of pteridophytes. Indian Fern Journal 16: 130-152.	1. "In India and tropical America the tubers of *N. cordifolia* are eaten." 2. Young leaves of *N. cordifolia* are cooked as vegetables in parts of India.
4.08		no evidence
4.09	Weber (2003) Invasive Plant Species of the World. CABI Publishing.	"The fern grows best in shady conditions."
4.1	Flora of North America, vol. 2 (http://www.efloras.org/florataxon.aspx?flora_id=1&taxon_id=233500798).	grows on limestone ledges, cliffs, rocks
4.11	USDA, NRCS. 2005. The PLANTS Database, Version 3.5 (http://plants.usda.gov). Data compiled from various sources by Mark W. Skinner. National Plant Data Center, Baton Rouge, LA 70874-4490 USA.	growth habit: forb/herb
4.12	Langeland and Burks, eds. (1998) Identification and Biology of Nonnative Plants in Florida's Natural Areas. University of Florida.	"tending to form dense stands that displace native ground cover" [but only up to 1 m tall]
5.01	Weber (2003) Invasive Plant Species of the World. CABI Publishing.	"This fern grows either as a terrestrial plant or as an epiphyte on trees."
5.02	1. USDA, NRCS. 2005. The PLANTS Database, Version 3.5 (http://plants.usda.gov). Data compiled from various sources by Mark W. Skinner. National Plant Data Center, Baton Rouge, LA 70874-4490 USA. 2. Weber (2003) Invasive Plant Species of the World. CABI Publishing.	1. Dryopteridaceae 2. Nephrolepidaceae
5.03	1. USDA, NRCS. 2005. The PLANTS Database, Version 3.5 (http://plants.usda.gov). Data compiled from various sources by Mark W. Skinner. National Plant Data Center, Baton Rouge, LA 70874-4490 USA. 2. Weber (2003) Invasive Plant Species of the World. CABI Publishing.	1. Dryopteridaceae 2. Nephrolepidaceae [and herbaceous]
5.04	de Winter and Amoroso, eds. (2003) Plant Resources of South-East Asia. No. 15(2). Cryptogams: Ferns and Fern Allies. Backhuys Publishers, Leiden.	"often bearing scaly tubers"; "*N. cordifolia* can be propagated by tubers"
6.01		
6.02	de Winter and Amoroso, eds. (2003) Plant	"*Nephrolepis* can be propagated by spores"

	Resources of South-East Asia. No. 15(2). Cryptogams: Ferns and Fern Allies. Backhuys Publishers, Leiden.	
6.03	Hovenkamp and Miyamoto (2005) A conspectus of the native and naturalized species of *Nephrolepis* (Nephrolepidaceae) in the world. Blumea 50: 279-322.	*N. cordifolia* is a putative parent of three hybrid species.
6.04		
6.05		fern
6.06	de Winter and Amoroso, eds. (2003) Plant Resources of South-East Asia. No. 15(2). Cryptogams: Ferns and Fern Allies. Backhuys Publishers, Leiden.	"*Nephrolepis* can be propagated by…rhizome or stolon runner plantlets"
6.07		
7.01	Langeland (2005) Natural area weeds: distinguishing native and non-native "Boston ferns" and "sword ferns" (*Nephrolepis* spp.). University of Floirda, IFAS Extension, SS-AGR-22 (http://edis.ifas.ufl.edu/pdffiles/AG/AG12000.pdf).	"Spread by…accidental movement of stolons, tubers, and rhizomes, particularly by dumping of yard refuse."
7.02	Weber (2003) Invasive Plant Species of the World. CABI Publishing.	"several cultivars have been developed that are widely used as ornamentals"
7.03		no evidence
7.04	Duncan (1994) Ferns and Allied Plants of Victoria, Tasmania and South Australia. Melbourne University Press, Carlton, Victoria.	"The numerous tiny, one-celled spores are easily carried by the wind and afford a very efficient method of distribution." [ferns in general]
7.05		no evidence
7.06		unlikely for spores
7.07		
7.08		unlikely for spores
8.01		fern
8.02		
8.03	Langeland (2005) Natural area weeds: distinguishing native and non-native "Boston ferns" and "sword ferns" (*Nephrolepis* spp.). University of Floirda, IFAS Extension, SS-AGR-22 (http://edis.ifas.ufl.edu/pdffiles/AG/AG12000.pdf).	"Plants can be killed with herbicide products that contain the active ingredient glyphosate. A foliar application of a product that contains 41.0% glyphosate diluted to 1.5% v/v of product provides control. Follow-up applications are necessary."
8.04		
8.05		