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.

Lygodium microphyllum (Old World climbing 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)	y	1
2.04	Native or naturalized in habitats with periodic inundation	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	0
3.02	Garden/amenity/disturbance weed	n	0
3.03	Weed of agriculture	n	0
3.04	Environmental weed	n	0
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		
4.07	Causes allergies or is otherwise toxic to humans	n	0
4.08	Creates a fire hazard in natural ecosystems	y	1
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)		
4.11	Climbing or smothering growth habit	y	1
4.12	Forms dense thickets	y	1
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		
6.02	Produces viable seed	y	1
6.03	Hybridizes naturally		
6.04	Self-compatible or apomictic	y	1
6.05	Requires specialist pollinators	n	0
6.06	Reproduction by vegetative fragmentation	y	1
6.07	Minimum generative time (years)	1	1
7.01	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)		
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	?	
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)	y	1
8.03	Well controlled by herbicides	y	-1
8.04	Tolerates, or benefits from, mutilation or cultivation	y	1
8.05	Effective natural enemies present in Florida, or east of the continental divide		
Total Score			15

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	8	yes
B	9	yes
C	18	yes
total	35	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	Pemberton and Ferriter (1998) Old World climbing fern (Lygodium microphyllum), a dangerous invasive weed in Florida. American Fern Journal 88: 165-175.	"The aboveground portion of the plant is killed by frost, but it can recover if the temperatures are not low enough to kill the roots."
2.02		
2.03	Ferriter, ed. (2001) *Lygodium* Management Plan for Florida. Florida Exotic Pest Plant Council's *Lygodium* Task Force.	"*L. microphyllum* has a very large native range, extending through much of the Old World tropics, spanning almost half of the world's circumference from 18°E in Senegal to 150°W in Tahiti between the latitudes of 29°S in Australia and 27°N in northeastern India (Alston 1959, Copeland 1994a, So 1994b, Holttum 1968)."
2.04	Ferriter, ed. (2001) *Lygodium* Management Plan for Florida. Florida Exotic Pest Plant Council's *Lygodium* Task Force.	"In its natural range, *L. microphyllum* is found in a variety of habitats including mesic forests, rain forest, and open swampy areas".
2.05	Pemberton and Ferriter (1998) Old World climbing fern (*Lygodium microphyllum*), a dangerous invasive weed in Florida. American Fern Journal 88: 165-175.	"*Lygodium microphyllum* has been cultivated as an ornamental plant for many years."
3.01	Pemberton, Goolsby, and Wright (2002) Old World climbing fern. Chp. 10 in Van Driesche et al. (eds.) Biological Control of Invasive Plants in the Eastern United States. USDA Forest Service Publication FHTET-2002-04.	"*Lygodium microphyllum* also is naturalized to a limited extent in Jamaica and Guyana."
3.02		no evidence
3.03		no evidence
3.04		no evidence
3.05	Pemberton, Goolsby, and Wright (2002) Old World climbing fern. Chp. 10 in Van Driesche et al. (eds.) Biological Control of Invasive Plants in	*L. japonicum* is invasive in the southeastern U.S.

	the Eastern United States. USDA Forest Service Publication FHTET-2002-04.	
4.01	Nauman (1993) Lygodiaceae C. Presl. In Flora of North America. Volume 2. Oxford University Press, New York. Pp. 114-116.	no description of these traits
4.02		no evidence
4.03	Nauman (1993) Lygodiaceae C. Presl. In Flora of North America. Volume 2. Oxford University Press, New York. Pp. 114-116.	no description of this
4.04		
4.05		no evidence
4.06		
4.07	Bruneton (1999) Toxic Plants: Dangerous to Humans and Animals. Lavoisier Publishing, Paris.	"Ferns are rarely harmful to humans"; "Allergies to ferns are very rare"
4.08	Weber (2003) Invasive Plant Species of the World. CABI Publishing.	"Tall infestations by this fern can be a fire hazard because the dry dead fronds are flammable and carry fires into the canopies of trees."
4.09	1. Pemberton, Goolsby, and Wright (2002) Old World climbing fern. Chp. 10 in Van Driesche et al. (eds.) Biological Control of Invasive Plants in the Eastern United States. USDA Forest Service Publication FHTET-2002-04. 2. Volin, Lott, Muss, and Owen (2004) Predicting rapid invasion of the Florida Everglades by Old World climbing fern (*Lygodium microphyllum*). Diversity and Distributions 10: 439-446.	1. "The plant can grow…either in full sun or shade." 2. "its ability to grow in a low-light understorey environment"
4.1		
4.11	Volin, Lott, Muss, and Owen (2004) Predicting rapid invasion of the Florida Everglades by Old World climbing fern (Lygodium microphyllum). Diversity and Distributions 10: 439-446.	"*L. microphyllum* is a vine-like fern that climbs on trees and shrubs"
4.12	Weber (2003) Invasive Plant Species of the World. CABI Publishing.	"the numerous fronds build thick mats that completely smother whole plant communities"
5.01		terrestrial
5.02	Weber (2003) Invasive Plant Species of the World. CABI Publishing.	Schizaeaceae
5.03	Weber (2003) Invasive Plant Species of the World. CABI Publishing.	Schizaeaceae
5.04	Duncan (1994) Ferns and Allied Plants of Victoria, Tasmania and South Australia. Melbourne University Press, Carlton, Victoria.	fern roots are usually fine and fibrous
6.01		
6.02	Volin, Lott, Muss, and Owen (2004) Predicting rapid invasion of the Florida Everglades by Old World climbing fern (*Lygodium microphyllum*). Diversity and Distributions 10: 439-446.	"spores have a high germination rate and the resulting gametophytes have an equally high rate of sporophyte production"
6.03		
6.04	Volin, Lott, Muss, and Owen (2004) Predicting rapid invasion of the Florida Everglades by Old World climbing fern (*Lygodium microphyllum*).	"The fern is able to reproduce by all three mating systems possible in homosporous ferns: intra- and

	Diversity and Distributions 10: 439-446.	intergametophytic selfing and outcrossing."
6.05		fern
6.06	Weber (2003) Invasive Plant Species of the World. CABI Publishing.	short-creeping rhizomes
6.07	Lott, Volin, Pemberton, and Austin (2003) The reproductive biology of the invasive ferns *Lygodium microphyllum* and *L. japonicum* (Schizaeaceae): implications for invasive potential. American Journal of Botany 90: 1144-1152.	"Sexually mature gametophytes of *L. microphyllum* and *L. japonicum* were observed within 5 wk of germination. Once sexual maturity was reached, sporophyte production began and continued rapidly through week 12."
7.01		
7.02	Pemberton and Ferriter (1998) Old World climbing fern (*Lygodium microphyllum*), a dangerous invasive weed in Florida. American Fern Journal 88: 165-175.	"*Lygodium microphyllum* has been cultivated as an ornamental plant for many years."
7.03		no evidence
7.04	Pemberton, Goolsby, and Wright (2002) Old World climbing fern. Chp. 10 in Van Driesche et al. (eds.) Biological Control of Invasive Plants in the Eastern United States. USDA Forest Service Publication FHTET-2002-04.	"The fern spreads…over long distances by wind-borne spores"
7.05	Ferriter, ed. (2001) *Lygodium* Management Plan for Florida. Florida Exotic Pest Plant Council's *Lygodium* Task Force.	"Water and wind of storm events may help disperse millions of tiny spores over long distances, although little is known about *Lygodium* dispersal mechanisms."
7.06		unlikely for spores
7.07		
7.08		unlikely for spores
8.01	1. Pemberton, Goolsby, and Wright (2002) Old World climbing fern. Chp. 10 in Van Driesche et al. (eds.) Biological Control of Invasive Plants in the Eastern United States. USDA Forest Service Publication FHTET-2002-04. 2. Volin, Lott, Muss, and Owen (2004) Predicting rapid invasion of the Florida Everglades by Old World climbing fern (*Lygodium microphyllum*). Diversity and Distributions 10: 439-446.	1. "The fern produces large numbers of spores; more than 800 spores/m3/hour were trapped" 2. "Each fertile leaflet could...potentially produce 28,600 spores"
8.02	Ferriter, ed. (2001) *Lygodium* Management Plan for Florida. Florida Exotic Pest Plant Council's *Lygodium* Task Force.	"Spores of the *Lygodium* genus have very thick walls, giving these propagules long environmental viability."
8.03	1. Ferriter, ed. (2001) *Lygodium* Management Plan for Florida. Florida Exotic Pest Plant Council's *Lygodium* Task Force. 2. Pemberton and Ferriter (1998) Old World climbing fern (*Lygodium microphyllum*), a dangerous invasive weed in Florida. American Fern Journal 88: 165-175.	1. "Excellent control of *L. microphyllum* has been observed where Rodeo was applied at a rate of 8.8 l/ha (7.5 pt/acre)." BUT 2. "No effective method of control for the plant exists."

8.04	Ferriter, ed. (2001) *Lygodium* Management Plan for Florida. Florida Exotic Pest Plant Council's *Lygodium* Task Force.	"*L. microphyllum* is tolerant of fire"
8.05		