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.

Leonotis nepetifolia (lion's ear)			
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	y	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	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	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	y?	1
6.04	Self-compatible or apomictic	y	1
6.05	Requires specialist pollinators	y	-1
6.06	Reproduction by vegetative fragmentation	n	-1
6.07	Minimum generative time (years)	1	1
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	n	-1
7.05	Propagules water dispersed	y	1
7.06	Propagules bird dispersed		
7.07	Propagules dispersed by other animals (externally)	?	
7.08	Propagules dispersed by other animals (internally)		
8.01	Prolific seed production	n	-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			14

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	6	yes
B	10	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	1. Lemmens and Bunyapraphatsara, eds. (2003) Plant Resources of South-East Asia. No. 12. Medicinal and poisonous plants 3. Backhuys Publishers, Leiden. 2. Gill and Conway (1979) Floral biology of *Leonotis nepetifolia* (L.) R. Br. (Labiatae). Proceedings of the Academy of Natural Sciences of Philadelphia 131: 244-256.	1. "*L. nepetifolia* is native to tropical Africa, but is introduced and naturalized in many tropical regions." 2. "*Leonotis nepetifolia* is native to the Old World tropics but now is widepsread in the tropics and subtropics of both hemispheres."
3.01	1. Lemmens and Bunyapraphatsara, eds. (2003) Plant Resources of South-East Asia. No. 12. Medicinal and poisonous plants 3. Backhuys Publishers, Leiden. 2. Wagner, Herbst, and Sohmer (1999) Manual of the flowering plants of Hawai'i. University of Hawai'i Press/Bishop Museum Press, Honolulu.	1. "*L. nepetifolia* is native to tropical Africa, but is introduced and naturalized in many tropical regions." 2. "Native to tropical Africa, widely naturalized; in Hawaii…now naturalized in low elevation, dry to occasionally wet, disturbed habitats"
3.02	1. Iwarsson and Harvey (2003) Monograph of the genus *Leonotis* (Pers.) R. Br. (Lamiaceae). Kew Bulletin 58: 597-645. 2. Lorenzi (2000) Plantas Daninhas do Brasil. Instituto Plantarum.	1. "Weed of waste-places and cultivated areas" 2. "This nuisance plant is fairly common throughout the country, generally infesting cultivated soils and vacant lots"
3.03	1. Parsons and Cuthbertson (2001) Noxious Weeds of Australia. CSIRO Publishing. 2. Lorenzi (2000) Plantas Daninhas do Brasil. Instituto Plantarum. 3. Holm (1979) A Geographical Atlas of World Weeds. John Wiley and Sons.	1. In South America, "lion's tail is often a serious weed of rice and sugarcane". 2. "it is especially troublesome in corn crops" 3. Considered a principal weed of agriculture in Cambodia.
3.04		no evidence
3.05	Holm (1979) A Geographical Atlas of World Weeds. John Wiley and Sons.	*L. mollissima* considered a common weed in Kenya.

4.01	Iwarsson and Harvey (2003) Monograph of the genus *Leonotis* (Pers.) R. Br. (Lamiaceae). Kew Bulletin 58: 597-645.	no description of these traits
4.02		no evidence
4.03	Iwarsson and Harvey (2003) Monograph of the genus *Leonotis* (Pers.) R. Br. (Lamiaceae). Kew Bulletin 58: 597-645.	no description of this
4.04		
4.05		no evidence
4.06		
4.07		no evidence
4.08		no evidence
4.09	Gill and Conway (1979) Floral biology of *Leonotis nepetifolia* (L.) R. Br. (Labiatae). Proceedings of the Academy of Natural Sciences of Philadelphia 131: 244-256.	"Unshaded plants in the open fields bore fewer flowers than those growing in shaded areas close to *Acacia* trees and secondary scrub growth."
4.1	1. Iwarsson and Harvey (2003) Monograph of the genus Leonotis (Pers.) R. Br. (Lamiaceae). Kew Bulletin 58: 597-645. 2. Lorenzi (2000) Plantas Daninhas do Brasil. Instituto Plantarum.	1. "on sandy soil" [*L. nepetifolia* var. *nepetifolia*] BUT 2. "It prefers fertile, well-drained soil"
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	1. Parsons and Cuthbertson (2001) Noxious Weeds of Australia. CSIRO Publishing. 2. Gill and Conway (1979) Floral biology of *Leonotis nepetifolia* (L.) R. Br. (Labiatae). Proceedings of the Academy of Natural Sciences of Philadelphia 131: 244-256.	1. "The dense thickets formed are a nuisance"; up to 2 m high 2. "In this region, *Leonotis nepetifolia* grows in dense large stands in maize fields left fallow for 1-2 years."
5.01		terrestrial
5.02	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.	Lamiaceae
5.03	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.	herbaceous Lamiaceae
5.04	Parsons and Cuthbertson (2001) Noxious Weeds of Australia. CSIRO Publishing.	Root "a thick, abruptly narrowing primary root with numerous laterals".
6.01		
6.02	Parsons and Cuthbertson (2001) Noxious Weeds of Australia. CSIRO Publishing.	"reproducing by seed"
6.03	Gill and Conway (1979) Floral biology of *Leonotis nepetifolia* (L.) R. Br. (Labiatae). Proceedings of the Academy of Natural Sciences of Philadelphia 131: 244-256.	"We did notice two apparent hybrid plants, *L. mollissima* X *L. nepetifolia*" in a locality where both species occurred.
6.04	Gill and Conway (1979) Floral biology of *Leonotis*	"*Leonotis nepetifolia* is self-compatible"

	nepetifolia (L.) R. Br. (Labiatae). Proceedings of the Academy of Natural Sciences of Philadelphia 131: 244-256.	
6.05	1. Gill and Conway (1979) Floral biology of *Leonotis nepetifolia* (L.) R. Br. (Labiatae). Proceedings of the Academy of Natural Sciences of Philadelphia 131: 244-256. 2. Iwarsson and Harvey (2003) Monograph of the genus *Leonotis* (Pers.) R. Br. (Lamiaceae). Kew Bulletin 58: 597-645.	1. Sunbirds are the principal pollinators of *L. nepetifolia*. The "light yellow pollen is often deposited on the forehead of a sunbird as it probes the flower." 2. "Although the flowers are known to be visited by a variety of insects, the predominant pollinators are sunbirds (*Nectariniidae*)."
6.06	Parsons and Cuthbertson (2001) Noxious Weeds of Australia. CSIRO Publishing.	"Spread is solely by seed"
6.07	1. Parsons and Cuthbertson (2001) Noxious Weeds of Australia. CSIRO Publishing. 2. Gill and Conway (1979) Floral biology of *Leonotis nepetifolia* (L.) R. Br. (Labiatae). Proceedings of the Academy of Natural Sciences of Philadelphia 131: 244-256.	1. An annual; in Australia, this species usually germinates in October-December, flowers in March, and matures in May and June. 2. Plants usually live 3-4 months.
7.01	Parsons and Cuthbertson (2001) Noxious Weeds of Australia. CSIRO Publishing.	"Seed also is moved in mud adhering to stock, machinery and other vehicles and some are spread during road grading."
7.02	1. Parsons and Cuthbertson (2001) Noxious Weeds of Australia. CSIRO Publishing. 2. Iwarsson and Harvey (2003) Monograph of the genus *Leonotis* (Pers.) R. Br. (Lamiaceae). Kew Bulletin 58: 597-645.	1. Probably introduced into Australia as an ornamental. 2. *L. nepetifolia* is cultivated throughout the world.
7.03		no evidence
7.04	Parsons and Cuthbertson (2001) Noxious Weeds of Australia. CSIRO Publishing.	Seed "has no special adaptations to aid dispersal".
7.05	Parsons and Cuthbertson (2001) Noxious Weeds of Australia. CSIRO Publishing.	"Seeds shaken out of the mature fruit are readily moved in water as is indicated by the numerous riverbank colonies of the weed."
7.06		
7.07	Parsons and Cuthbertson (2001) Noxious Weeds of Australia. CSIRO Publishing.	"Seed also is moved in mud adhering to stock" [a minor means of dispersal?]
7.08		
8.01	1. Parsons and Cuthbertson (2001) Noxious Weeds of Australia. CSIRO Publishing. 2. Gill and Conway (1979) Floral biology of *Leonotis nepetifolia* (L.) R. Br. (Labiatae). Proceedings of the Academy of Natural Sciences of Philadelphia 131: 244-256.	1. "prolific seeding habits"; four 1-seeded nutlets per capsule 2. "Maximum flower densities reached were 250-300 flowers per square meter." [250-300 flowers x 4 seeds per fruit = 1,000-1,200 seeds per square meter - does not meet minimum requirement for annuals of 5,000 seeds per square meter]
8.02	Lal and Ambasht (1982) Ecological studies on seed germination of Leonotis nepetifolia (L.) Ait. f. in relation to environmental factors, with emphasis on fluoride polluted soils. Geo-Eco-	"Fresh seeds were dormant due to the presence of a water soluble inhibitor in the seed coat. Dormancy ended naturally on dry storage for six months

	Trop 6: 229-237.	at 15-35 degrees C" [not in soil, and only for 6 months]
8.03	Parsons and Cuthbertson (2001) Noxious Weeds of Australia. CSIRO Publishing.	"Where cultivation is not practicable, herbicides give good control. Spray plants in the vegetative stage before flowering with amine 2,4-D to run-off and repeat when new seedlings appear."
8.04		
8.05		