

Taxon: <i>Blechnum brasiliense</i>	Family: Blechnaceae
Common Name(s): red Brazilian tree fern red dwarf tree fern	Synonym(s): <i>Blechnum corcovadense</i> Raddi <i>Blechnum fluminense</i> Vell. <i>Blechnum nigrosquamatum</i> Gilbert <i>Blechnum nitidum</i> C. Presl

Assessor: Assessor	Status: Assessor Approved	End Date: 14 May 2014
WRA Score: 6.0	Designation: EVALUATE	Rating: Evaluate

Keywords: Tropical Fern, Ornamental, Trunk Offshoots, Wind-Dispersed, Spores

Qsn #	Question	Answer Option	Answer
101	Is the species highly domesticated?	y=-3, n=0	n
102	Has the species become naturalized where grown?		
103	Does the species have weedy races?		
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)		
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	y
301	Naturalized beyond native range		
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		
403	Parasitic	y=1, n=0	n
404	Unpalatable to grazing animals		
405	Toxic to animals	y=1, n=0	n
406	Host for recognized pests and pathogens		
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	n

Qsn #	Question	Answer Option	Answer
409	Is a shade tolerant plant at some stage of its life cycle		
410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)	y=1, n=0	n
411	Climbing or smothering growth habit	y=1, n=0	n
412	Forms dense thickets	y=1, n=0	n
501	Aquatic	y=5, n=0	n
502	Grass	y=1, n=0	n
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	n
602	Produces viable seed	y=1, n=-1	y
603	Hybridizes naturally		
604	Self-compatible or apomictic		
605	Requires specialist pollinators	y=-1, n=0	n
606	Reproduction by vegetative fragmentation	y=1, n=-1	y
607	Minimum generative time (years)		
701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)		
702	Propagules dispersed intentionally by people	y=1, n=-1	y
703	Propagules likely to disperse as a produce contaminant		
704	Propagules adapted to wind dispersal	y=1, n=-1	y
705	Propagules water dispersed		
706	Propagules bird dispersed	y=1, n=-1	n
707	Propagules dispersed by other animals (externally)		
708	Propagules survive passage through the gut	y=1, n=-1	n
801	Prolific seed production (>1000/m ²)	y=1, n=-1	y
802	Evidence that a persistent propagule bank is formed (>1 yr)		
803	Well controlled by herbicides		
804	Tolerates, or benefits from, mutilation, cultivation, or fire		
805	Effective natural enemies present locally (e.g. introduced biocontrol agents)		

Supporting Data:

Qsn #	Question	Answer
101	Is the species highly domesticated?	n
	Source(s)	Notes
	Olsen, S. 2007. Encyclopedia of Garden Ferns. Timber Press, Portland, Oregon	No evidence

102	Has the species become naturalized where grown?	
	Source(s)	Notes
	WRA Specialist. 2014. Personal Communication	NA

103	Does the species have weedy races?	
	Source(s)	Notes
	WRA Specialist. 2014. Personal Communication	NA

201	Species suited to tropical or subtropical climate(s) - If island is primarily wet habitat, then substitute "wet tropical" for "tropical or subtropical"	High
	Source(s)	Notes
	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/ . [Accessed 12 May 2014]	"Native: SOUTHERN AMERICA Mesoamerica: Guatemala Northern South America: Venezuela Brazil: Brazil Western South America: Bolivia; Colombia; Ecuador; Peru Southern South America: Argentina; Paraguay; Uruguay"

202	Quality of climate match data	High
	Source(s)	Notes
	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/ . [Accessed]	

Qsn #	Question	Answer
203	Broad climate suitability (environmental versatility)	
	Source(s)	Notes
	Tryon, R. M. & R. G. Stolze. 1993. Pteridophyta of Peru Part V. 18. Aspleniaceae–21. Polypodiaceae. Fieldiana, Botany, New Series No. 32: 1-190	"Terrestrial, mountain forests, 1200-1600 m, San Martin." [Unknown. May be able to grow over a broad elevation range in the Hawaiian Islands]
	Olsen, S. 2007. Encyclopedia of Garden Ferns. Timber Press, Portland, Oregon	"Zones 9 and 10, or greenhouse."
	Tropicos.org. 2014. Tropicos [Online Database]. Missouri Botanical Garden. http://www.tropicos.org/ . [Accessed 12 May 2014]	Possibly demonstrates environmental versatility. Collected at an elevation range of over 1000 m, but at latitudes comparable to the Hawaiian Islands, only collected from ca. 300-700 m elevation

204	Native or naturalized in regions with tropical or subtropical climates	y
	Source(s)	Notes
	Stolze, R. G. 1981. Ferns and fern allies of Guatemala. Part II. Polypodiaceae. Fieldiana, Botany, New Series No. 6: 1–522	"Apparently known in Central America only from a single Guatemalan collection: swampy thickets, Montana Castilla, 3 mi. southeast of Quezaltepeque, alt. 1,200-1,500 m., Depto. Chiquimula (Steyermark 31347, 1939). Colombia; Brazil; Peru; Bolivia; Argentina; Paraguay; Uruguay. " ... "The species is aptly named, as it is far more abundant in Brazil than anywhere else. It is found as far north as Colombia but heretofore has not been found in the West Indies, or in Central America except for the one Steyermark specimen collected in Chiquimula in 1939. This is curious, in that the plants are large and conspicuous and not likely to be overlooked even by general collectors. It should not be confused with any other Guatemalan species."

205	Does the species have a history of repeated introductions outside its natural range?	y
	Source(s)	Notes
	Jones, D. L. 1987. Encyclopedia of Ferns. Timber Press, Portland, OR	"It is commonly grown in gardens and tubs and likes a well lit situation in acid loamy soil."

301	Naturalized beyond native range	
	Source(s)	Notes
	Olsen, S. 2007. Encyclopedia of Garden Ferns. Timber Press, Portland, Oregon	"An extremely disjunct population is reported to exist in the Democratic Republic of Congo." [Unknown if this is part of its native distribution, or evidence of naturalization]
	Pauwels, L. 2005. Cultivated and/or Exotic Plants in Central Africa. http://users.telenet.be/cr28796/CultAfrC.htm . [Accessed]	" <i>Blechnum brasiliense</i> Desv. Callens 36, Jard.Bot.Kis., Madimba, BR, E, H Tilquin 13, Jard.Bot.Kis., Madimba, Q, E, H" "des plantes exotiques - E - subspontanées, envahissantes ou non, d'introduction récente" [Translation from French: exotic plants - E - subspontaneous, invasive or not, a recent introduction] [Unknown if this plant is naturalized or just cultivated]

302	Garden/amenity/disturbance weed	n
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Qsn #	Question	Answer
	Source(s)	Notes
	Matos, F. B., Amorim, A. M., & Labiak, P. H. 2010. The ferns and lycophytes of a montane tropical forest in southern Bahia, Brazil. <i>Journal of the Botanical Research Institute of Texas</i> , 4(1): 333-346	"In terms of habitat preferences, many representatives of the local flora are typically associated with disturbed environments (e.g., roadsides, forest edges, forest regrowth, cabrucas [cocoa plantations under native forests], and other anthropogenic sites), and include: <i>Adiantum latifolium</i> , <i>Asplenium auritum</i> , <i>Blechnum brasiliense</i> ... " [Adaptation to disturbed environments suggest the possibility of becoming a disturbance weed in introduced range]

303	Agricultural/forestry/horticultural weed	n
	Source(s)	Notes
	Randall, R.P. 2012. <i>A Global Compendium of Weeds</i> . 2nd Edition. Department of Agriculture and Food, Western Australia	No evidence

304	Environmental weed	n
	Source(s)	Notes
	Randall, R.P. 2012. <i>A Global Compendium of Weeds</i> . 2nd Edition. Department of Agriculture and Food, Western Australia	No evidence

305	Congeneric weed	y
	Source(s)	Notes
	Weller, S. G., Cabin, R. J., Lorence, D. H., Perlman, S., Wood, K., Flynn, T., & Sakai, A. K. 2011. Alien plant invasions, introduced ungulates, and alternative states in a mesic forest in Hawaii. <i>Restoration Ecology</i> , 19(5): 671-680	"Four alien species appeared to respond differently to drought, based on changes in percent cover." ... "Potentially, the most significant responses occurred in two widespread alien fern species, <i>Adiantum hispidulum</i> and <i>Blechnum appendiculatum</i> . Both of these species increased in percent cover during a drought period when native ferns decreased substantially. <i>Blechnum appendiculatum</i> also responded positively to fencing, suggesting that removal of ungulates favored this fern species. <i>Blechnum appendiculatum</i> forms thick mats that prevent establishment of seeds and spores (Wilson 1996). An alien species that prevents establishment of natives and thrives under drought conditions that result in mortality of native species, represents an obvious threat to the integrity of these mesic forests."
	Havran, J. C., Oppenheimer, H., Keaton, J., & Piotrowski, K. 2012. Interisland Range Expansion of <i>Viola lanaiensis</i> (Violaceae: Malpighiales), an Endangered Hawaiian Violet. <i>Pacific Science</i> , 6 (4): 447-456	"Six individuals of <i>V. lanaiensis</i> with a small number of seedlings are known from Lānaʻi. A second population with 12 plants recently was extirpated, probably due to one or a combination of the following factors: extreme drought, axis deer (<i>Axis axis</i>), and alien plant invasion by <i>Psidium cattleianum</i> , <i>Morella faya</i> , <i>Leptospermum scoparium</i> , <i>Blechnum appendiculatum</i> , and <i>Rubus rosifolius</i> ." [Rare native violet threatened by weedy plants, including <i>B. appendiculatum</i>]

401	Produces spines, thorns or burrs	n
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Qsn #	Question	Answer
	Source(s)	Notes
	Stolze, R. G. 1981. Ferns and fern allies of Guatemala. Part II. Polypodiaceae. Fieldiana, Botany, New Series No. 6: 1–522	"Plants terrestrial; rhizome stout, erect, densely scaly, the scales linear to lanceolate, light to dark brown or blackish; leaves rigid, erect, monomorphous, 50-120 cm. long, 20-40 cm. broad, short-petiolate; petiole 2-12 cm. long, subterete abaxially, sulcate adaxially, light to dark brown, or blackish at base, densely provided at base with linear or linear-lanceolate scales, these orange to brown or lustrous black, commonly tortuous, with filiform tips; lamina pinnate or very deeply pinnatisect, chartaceous to subcoriaceous, glabrous, narrow-elliptic, broadest at or near the middle, tapering gradually to a pinnatifid apex, reduced gradually and conspicuously at base; rachis stramineous to light brown, essentially glabrous, prominulous and terete or subquadrangular abaxially, sulcate adaxially; pinnae (or segments) numerous, most of them ascending, elongate- deltoid, acute at apex, adnate to the rachis at base, the margins commonly undulate and strongly serrate or serrulate (the teeth often subcartilaginous and spinulose), proximally becoming gradually and conspicuously shorter and more obtuse, with the lowermost 1-3 pairs often reduced to mere auricles, the larger, middle ones 8-22 cm. long and 1-2.2 cm. broad; veins distinct, commonly 1-forked near the costa, the tips not or scarcely enlarged, terminating at the margin; sori not usually borne on the strongly reduced, proximal pinnae; indusium subentire, firm, sometimes undulate, but rarely splitting at maturity, attached 0.2-0.6 mm. from the costa."

402	Allelopathic	
	Source(s)	Notes
	WRA Specialist. 2014. Personal Communication	Unknown

403	Parasitic	n
	Source(s)	Notes
	Stolze, R. G. 1981. Ferns and fern allies of Guatemala. Part II. Polypodiaceae. Fieldiana, Botany, New Series No. 6: 1–522	"Plants terrestrial; rhizome stout" [No evidence of parasitic Blechnaceae]

404	Unpalatable to grazing animals	
	Source(s)	Notes
	Coomes, D. A., Allen, R. B., Forsyth, D. M., & Lee, W. G. 2003. Factors preventing the recovery of New Zealand forests following control of invasive deer. Conservation Biology, 17(2): 450-459	[Possibly Yes. Other Blechnum species are unpalatable] "For example, there is evidence that browsing of woody saplings has promoted the spread of the unpalatable ground ferns Blechnum discolor and Blechnum procerum (Wardle 1984; Wardle et al. 2001), which provide an effective barrier against further regeneration of woody species (Wardle 1984)."

405	Toxic to animals	n
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Qsn #	Question	Answer
	Source(s)	Notes
	Wagstaff, D.J. 2008. International poisonous plants checklist: an evidence-based reference. CRC Press, Boca Raton, FL	No evidence. Although may be unpalatable

406	Host for recognized pests and pathogens	
	Source(s)	Notes
	GardensOnline. 2014. <i>Blechnum brasiliense</i> . http://www.gardensonline.com.au/GardenShed/PlantFinder/Show_2121.aspx . [Accessed 12 May 2014]	"Diseases: Spray with white oil against scale insects."
	Gardening Info Zone. 2014. <i>Blechnum</i> hard fern. http://www.gardeninginfozone.com/blechnum-hard-fern . [Accessed 12 May 2014]	"Pests, diseases: Aphids on young shoots; scale insects. Stagnant water on the fronds leads to glassy leaves, followed by black patches." [General description of all <i>Blechnum</i> species]

407	Causes allergies or is otherwise toxic to humans	n
	Source(s)	Notes
	Bruneton, J. 1999 Toxic Plants: Dangerous to Humans and Animals. Lavoisier Publishing, Paris	"Ferns are rarely harmful to humans" ... "Allergies to ferns are very rare"
	Wagstaff, D.J. 2008. International poisonous plants checklist: an evidence-based reference. CRC Press, Boca Raton, FL	No evidence for <i>Blechnum</i> genus

408	Creates a fire hazard in natural ecosystems	n
	Source(s)	Notes
	Hiendlmeyer, R., & Randi, A. M. 2007. Response of spores and young gametophytes of <i>Cyathea delgadii</i> Sternb. (Cyatheaceae) and <i>Blechnum brasiliense</i> Desv. (Blechnaceae) to different light levels. <i>Acta Botanica Brasilica</i> , 21(4): 909-915	" <i>Blechnum brasiliense</i> Desv. (Blechnaceae) is a subarborescent fern, which also occurs in a wide variety of environments, including cloud forests, lowland rain forests, gallery forests, swamps and savannahs (Tryon & Tryon 1982)." [No evidence, and unlikely, given wetter habitats]

Qsn #	Question	Answer
409	Is a shade tolerant plant at some stage of its life cycle	
	Source(s)	Notes
	Staples, G.W. & Herbst, D.R. 2005. A Tropical Garden Flora - Plants Cultivated in the Hawaiian Islands and Other Tropical Places. Bishop Museum Press, Honolulu, HI	"Blechnum brasiliense should be grown in bright, shaded, well-watered areas with good drainage." [Whether or not this fern would be able to tolerate the shaded understories of native Hawaiian or other tropical forests of the Pacific is uncertain]
	Jones, D. L. 1987. Encyclopedia of Ferns. Timber Press, Portland, OR	"It is commonly grown in gardens and tubs and likes a well lit situation in acid loamy soil."
	Plantman. 2014. Ferns Blechnum brasiliense. http://www.plantman.co.nz/afawcs0158272/CATID=0/SUBID=85/ID=450/SID=750666993/productdetails.html . [Accessed 14 May 2014]	"It likes a high amount of sunlight."
	Backyard Gardener. 2014. Blechnum brasiliense. http://www.backyardgardener.com/plantname/pda_2571.html . [Accessed 12 May 2014]	"Light Range: Part Shade to Part Shade "

410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)	n
	Source(s)	Notes
	Backyard Gardener. 2014. Blechnum brasiliense. http://www.backyardgardener.com/plantname/pda_2571.html . [Accessed 12 May 2014]	"pH Range: 5.5 to 7 Soil Range: Sandy Loam to Clay Loam"
	Queensland Government. 2012. Waterwise Plant Selector - Brazil Tree Fern (<i>Blechnum brasiliense</i>). http://www.nrm.qld.gov.au/waterwise/plantselector/details.php?plant_id=741 . [Accessed 14 May 2014]	"Soil type - Loam" ... "Other soil information High organic matter"

411	Climbing or smothering growth habit	n
	Source(s)	Notes
	Hiendlmeyer, R., & Randi, A. M. 2007. Response of spores and young gametophytes of <i>Cyathea delgadii</i> Sternb. (Cyatheaceae) and <i>Blechnum brasiliense</i> Desv. (Blechnaceae) to different light levels. <i>Acta Botanica Brasiliica</i> , 21(4): 909-915	" <i>Blechnum brasiliense</i> Desv. (Blechnaceae) is a subarborescent fern, which also occurs in a wide variety of environments, including cloud forests, lowland rain forests, gallery forests, swamps and savannahs (Tryon & Tryon 1982)."

412	Forms dense thickets	n
	Source(s)	Notes
	Stolze, R. G. 1981. Ferns and fern allies of Guatemala. Part II. Polypodiaceae. <i>Fieldiana, Botany, New Series No. 6</i> : 1-522	"Apparently known in Central America only from a single Guatemalan collection: swampy thickets" [A component of thicket vegetation]
	Tryon, R. M. & R. G. Stolze. 1993. Pteridophyta of Peru Part V. 18. Aspleniaceae-21. Polypodiaceae. <i>Fieldiana, Botany, New Series No. 32</i> : 1-190	"Terrestrial, mountain forests, 1200-1600 m" [No evidence of dense stand formation]

Qsn #	Question	Answer
	Zachia, R. A. 2006. Diferenciação de componentes herbáceos e arbustivos em florestas do Parque Nacional da Lagoa do Peixe, Tavares, RS. PhD Dissertation. Universidade Federal do Rio Grande do Sul, Porto Alegre, Brazil	[No evidence of forming dense thickets, but dense shade created by this fern could exclude shorter-statured vegetation] "ABSTRACT– (Spatial differentiation of herb and shrub layers in coastal forests of the Lagoa do Peixe National Park, Tavares). This study aimed to understand understory floristic and structural differences in relation to edaphic and topographic variables." ... "The prevalence of heights from 41 to 80 cm (H4) in depression seems to be related to the higher importance value attained by <i>Blechnum brasiliense</i> in peat forest. Although <i>B. brasiliense</i> is placed from 81 to 160 cm, its importance value is disproportionately higher than the remaining species (Fig. 7, 10). In terrace and slope, where prevail the heights from 11 to 20 cm (H2), there is a gradual decline since the higher to the lower importance values. The large dominance of <i>B. brasiliense</i> suggests this species hampers the development of many H2 species by its shading effect, so only H4 species were capable to attain heights enough to face the competition for light."

501	Aquatic	n
	Source(s)	Notes
	Macedo, T. S., Góes-Neto, A., & Nonato, F. R. 2012. Ferns and lycophytes from a fragment of Atlantic forest in the Serra da Jiboia, Bahia, Brazil. <i>Sitientibus série Ciências Biológicas</i> , 12(2), 269-291	"Terrestre, em local sombreado, bastante úmido, próximo ao córrego, a ca. 680 m s.n.m." [Translation from Portuguese: Roads in shady places, quite humid, near streams, ca. 680 m s.n.m.]

502	Grass	n
	Source(s)	Notes
	Stolze, R. G. 1981. Ferns and fern allies of Guatemala. Part II. Polypodiaceae. <i>Fieldiana, Botany, New Series No. 6</i> : 1–522	Blechnaceae

503	Nitrogen fixing woody plant	n
	Source(s)	Notes
	Tryon, R. M. & R. G. Stolze. 1993. Pteridophyta of Peru Part V. 18. Aspleniaceae–21. Polypodiaceae. <i>Fieldiana, Botany, New Series No. 32</i> : 1-190	"Stem subarborescent to arborescent, stout, to 2 m tall. Leaves monomorphic. Petiole with scales at the base many, mostly 10-15 mm long, acicular, blackish or with a blackish center, stem scales dark brown to blackish or with a dark center and lighter (to brown) margins. Lamina pinnatifid to pinnatisect, the apex gradually reduced, pinnatifid, or with a short entire tip, gradually reduced, pinnatifid, or with a short entire tip, gradually reduced at the base to small pinnae or lobes, pinnae essentially flat, the largest ca. (7-)15-20(-25) cm long. Fertile pinnae with green tissue extending well beyond the attachment of the indusium." [Blechnaceae]

504	Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)	n
	Source(s)	Notes

Qsn #	Question	Answer
	Gordon, D. R., Mitterdorfer, B., Pheloung, P. C., Ansari, S., Buddenhagen, C., Chimera, C., ... & Williams, P. A. 2010). Guidance for addressing the Australian Weed Risk Assessment questions. <i>Plant Protection Quarterly</i> , 25(2): 56-74	"This question addresses taxa that have specialized organs and should not include plants with just rhizomes/ stolons"
	Stolze, R. G. 1981. Ferns and fern allies of Guatemala. Part II. Polypodiaceae. <i>Fieldiana, Botany, New Series No. 6</i> : 1-522	Plants terrestrial; rhizome stout, erect, densely scaly, the scales linear to lanceolate, light to dark brown or blackish"

601	Evidence of substantial reproductive failure in native habitat	n
	Source(s)	Notes
	Stolze, R. G. 1981. Ferns and fern allies of Guatemala. Part II. Polypodiaceae. <i>Fieldiana, Botany, New Series No. 6</i> : 1-522	"Colombia; Brazil; Peru; Bolivia; Argentina; Paraguay; Uruguay" [No evidence. Widespread]

602	Produces viable seed	y
	Source(s)	Notes
	Staples, G.W. & Herbst, D.R. 2005. <i>A Tropical Garden Flora - Plants Cultivated in the Hawaiian Islands and Other Tropical Places</i> . Bishop Museum Press, Honolulu, HI	"Propagation is by spores, which germinate readily."
	GardensOnline. 2014. <i>Blechnum brasiliense</i> . http://www.gardensonline.com.au/GardenShed/PlantFinder/Show_2121.aspx . [Accessed 12 May 2014]	"You can propagate them from spores or by division. They are generally quite easy to grow."
	Hiendlmeyer, R., & Randi, A. M. 2007. Response of spores and young gametophytes of <i>Cyathea delgadii</i> Sternb. (Cyatheaceae) and <i>Blechnum brasiliense</i> Desv. (Blechnaceae) to different light levels. <i>Acta Botanica Brasilica</i> , 21(4): 909-915	[Produces viable spores] "Germination of <i>Blechnum brasiliense</i> at 22% light reached 76% and mean germination time was 9.06 days; at 5% light, germination reached 84% and mean germination time was 13.18 days."

603	Hybridizes naturally	
	Source(s)	Notes
	WRA Specialist. 2014. Personal Communication	Unknown for <i>B. brasiliense</i> . Hybridization reported within the genus <i>Blechnum</i>

604	Self-compatible or apomictic	
	Source(s)	Notes

Qsn #	Question	Answer
	Klekowski, E. J. 1969. Reproductive biology of the Pteridophyta. III. A study of the Blechnaceae. Botanical Journal of the Linnean Society, 62(3): 361-377	"Species of <i>Blechnum</i> , <i>Doodia</i> , <i>Woodwardia</i> , <i>Lorinseria</i> and <i>Stenochlaena</i> were studied morphologically and genetically in an effort to obtain information relating to their reproductive biology. <i>Woodwardia martinezii</i> and <i>Stenochlaena palustris</i> were found to be apogamous. <i>Lorinseria areolata</i> , <i>Blechnum unilaterale</i> and <i>B. nudum</i> were found to be adapted for intra-gametophytic selfing. Fifteen other sexual taxa were investigated and all were found to have adaptations making intergametophytic mating very likely. Thus of the 18 sexual taxa for which data are available, 8–33% have intergametophytic mating systems." [<i>B. brasiliense</i> included as one of the taxa with adaptations making intergametophytic mating very likely, and therefore selfing unlikely]

605	Requires specialist pollinators	n
	Source(s)	Notes
	WRA Specialist. 2014. Personal Communication	No pollinators required in pteridophytes. Water required for fertilization of gametophytes

606	Reproduction by vegetative fragmentation	y
	Source(s)	Notes
	Olsen, S. 2007. Encyclopedia of Garden Ferns. Timber Press, Portland, Oregon	"The trunk occasionally produces an offshoot that can be carefully amputated for propagation purposes."

607	Minimum generative time (years)	
	Source(s)	Notes
	Franz, I., & Schmitt, J. L. 2005. <i>Blechnum brasiliense</i> Desv (Pteridophyta, Blechnaceae): estrutura populacional e desenvolvimento da fase esporofítica. Pesquisas, Botânica, 56: 173-184	"The average growth rate of the caudex was 3.03cm/year. Plants with smaller caudexes presented a lower absolute growth when compared to plants with larger caudexes. The production of new fronds was asynchronous and lower than senescence of fronds. No synchrony occurred in the production and release of spores in fertile fronds. This may contribute to the deposition of spores on a greater number of recently exposed microhabitats, avoiding the overall loss of production during an unfavorable period." [Unknown, but likely greater than 1 year]

701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	
	Source(s)	Notes
	Arantes, A. A., Prado, J., & Ranal, M. A. 2008. Blechnaceae of the Ecological Station of Panga, Uberlândia, Minas Gerais State, Brazil. Hoehnea, 35(3), 351-357	"Na área de estudo, <i>Blechnum brasiliense</i> ocorre em locais com solos úmidos, como em barrancos às margens do Ribeirão do Panga e no interior de matas de galeria e veredas." [Translation from Portuguese:] "In the study area, <i>Blechnum brasiliense</i> occurs in places with moist soils, such as bounds the banks of the Rio del Panga and within gallery forests and footpaths." [Unknown, but possible that spores may be moved in soil adhering to shoes, or equipment]

Qsn #	Question	Answer
702	Propagules dispersed intentionally by people	y
	Source(s)	Notes
	Olsen, S. 2007. Encyclopedia of Garden Ferns. Timber Press, Portland, Oregon	"This fern is an Oscar-winning attraction in greenhouse luxury where it appreciates bright light, neutral loamy soil, and a humid atmosphere." [Used as an ornamental]

703	Propagules likely to disperse as a produce contaminant	
	Source(s)	Notes
	WRA Specialist. 2014. Personal Communication	Not documented, but prolific production of wind-dispersed spores may allow for spore contamination of planting media or soil of plants grown in their vicinity

704	Propagules adapted to wind dispersal	y
	Source(s)	Notes
	Gordon, D. R., Mitterdorfer, B., Pheloung, P. C., Ansari, S., Buddenhagen, C., Chimera, C., ... & Williams, P. A. 2010). Guidance for addressing the Australian Weed Risk Assessment questions. Plant Protection Quarterly, 25(2): 56-74	"Assume 'yes' for fern taxa unless contradictory evidence exists."
	Tryon, R. M. & R. G. Stolze. 1993. Pteridophyta of Peru Part V. 18. Aspleniaceae–21. Polypodiaceae. Fieldiana, Botany, New Series No. 32: 1-190	[Generic Description] "Sori short to long, on a vascular commissure close to the costa, not paraphysate, covered by an indusium of similar extent that opens toward the costa. Spores ellipsoidal, monolete, nearly smooth, slightly papillate, rugose, reticulate, or echinate." [Species Description] "Fertile pinnae with green tissue extending well beyond the attachment of the indusium."

705	Propagules water dispersed	
	Source(s)	Notes
	Lins, F.C. 2003. Controle populacional de <i>Blechnum brasiliense</i> Desv. e <i>Blechnum occidentale</i> L. e formação do banco d esporos em dois fragmentos de Mata Atlântica Controle populacional de <i>Blechnum brasiliense</i> Desv. e <i>Blechnum occidentale</i> L. e formação do banco d esporos em dois fragmentos de Mata Atlântica. Master's Thesis. Universidade Federal de Pernambuco, Recife, Brazil	" <i>Blechnum brasiliense</i> grows in flood and shaded areas and distributed in aggregate array..." [Distribution in flooded areas suggest spores are likely moved by water]
	Arantes, A. A., Prado, J., & Ranal, M. A. 2008. Blechnaceae of the Ecological Station of Panga, Uberlândia, Minas Gerais State, Brazil. <i>Hoehnea</i> , 35(3), 351-357	"Na área de estudo, <i>Blechnum brasiliense</i> ocorre em locais com solos úmidos, como em barrancos às margens do Ribeirão do Panga e no interior de matas de galeria e veredas." [Translation from Portuguese: "In the study area, <i>Blechnum brasiliense</i> occurs in places with moist soils, such as bounds the banks of the Rio del Panga and within gallery forests and footpaths.". Distribution along streams suggests possibility that spores may be moved by water]

Qsn #	Question	Answer
706	Propagules bird dispersed	n
	Source(s)	Notes
	WRA Specialist. 2014. Personal Communication	Although spores may adhere to birds, the likely vectors of dispersal for spores are wind, and possibly water.

707	Propagules dispersed by other animals (externally)	
	Source(s)	Notes
	WRA Specialist. 2014. Personal Communication	Unknown. Possible that spores may adhere to fur or mud on animals

708	Propagules survive passage through the gut	n
	Source(s)	Notes
	WRA Specialist. 2014. Personal Communication	Unlikely to be consumed and not adapted for internal dispersal

801	Prolific seed production (>1000/m2)	y
	Source(s)	Notes
	Gordon, D. R., Mitterdorfer, B., Pheloung, P. C., Ansari, S., Buddenhagen, C., Chimera, C., ... & Williams, P. A. 2010). Guidance for addressing the Australian Weed Risk Assessment questions. Plant Protection Quarterly, 25(2): 56-74	"Assume 'yes' for fern taxa unless contradictory evidence exists."
	Stolze, R. G. 1981. Ferns and fern allies of Guatemala. Part II. Polypodiaceae. Fieldiana, Botany, New Series No. 6: 1-522	[Genus description] "sporangia long- stalked, copious, often forming an uninterrupted mass between costa and point of attachment of the indusium; spores monolete, bilateral, with perine. "

802	Evidence that a persistent propagule bank is formed (>1 yr)	
	Source(s)	Notes

Qsn #	Question	Answer
	Ranal, M. A. 2003. Soil spore bank of ferns in a gallery forest of the Ecological Station of Panga, Uberlândia, MG, Brazil. American Fern Journal, 93(3):97-115	"ABSTRACT.-The soil spore bank of ferns is a biotic component of plant communities, important for regeneration processes, population dynamics, and conservation programs. Each year it is enriched when new units are incorporated, and impoverished when they are lost by predation, loss of viability, or by germination. Soil was collected in three microhabitats of the gallery forest of the Panga Stream, at four depths, in the wet and the dry seasons. In general, independent of the season, 'dike' samples presented lower numbers of viable spores when compared to samples from the 'middle' and 'edge' of the forest. The number of viable spores and the number of fern species represented decreased with depth. At the end of the dry season, the number of viable spores decreased only in the first centimeters of the soil. Viable spores of thirteen terrestrial species were registered in the soil of this gallery forest. The presence of viable spores in the soil after six months drought and in deeper soil layers shows the existence of a persistent soil spore bank in the gallery forest of the Panga Stream." ... "TABLE 6. Sporophyte frequency (mean percentage) registered in soil collected in September 1998, in the gallery forest of the Ecological Station of Panga." [Blechnum brasiliense collected in the spore bank, but longevity past 1 year not specified]
	Hiendlmeyer, R., & Randi, A. M. 2010. Potential for Spore Germination, Sporophyte Formation and Growth of Young Sporophytes of Four Fern Species from the Atlantic Forest (Brazil). American Fern Journal, 100(4): 207-218	"Spores of Blechnum brasiliense and Cyathea corcovadensis were kept under refrigeration for eight months before the germination test" ... "The mean germination time for the four species studied in this work ranged from 9.9 6 0.1 days for Blechnum brasiliense..." [Spores remain viable after 8 months storage. Viability under field conditions unknown]

803	Well controlled by herbicides	
	Source(s)	Notes
	Motooka, P., Castro, L., Nelson, D., Nagai, G. & Ching, L. 2003. Weeds of Hawaii's Pastures and Natural Areas: An Identification and Management Guide. CTAHR, UH Manoa, Honolulu, HI	"Management: Probably susceptible to dicamba and glyphosate." [Unknown for Blechnum brasiliense. Control methods described for Blechnum occidentale L., synonym of Blechnum appendiculatum]

804	Tolerates, or benefits from, mutilation, cultivation, or fire	
	Source(s)	Notes
	WRA Specialist. 2014. Personal Communication	Unknown

805	Effective natural enemies present locally (e.g. introduced biocontrol agents)	
	Source(s)	Notes
	WRA Specialist. 2014. Personal Communication	Unknown

Summary of Risk Traits:

High Risk / Undesirable Traits

- Thrives in tropical climates
- Possible broad elevation range
- Possibly naturalized in Africa
- Other *Blechnum* species have become invasive
- Possibly shade tolerant
- The dominance of *B. brasiliense* in some Brazilian forests suggests this species hampers the development of shorter-statured plants by its shading effect
- Reproduces by wind- & possibly water-dispersed spores
- Can reproduce vegetatively by offshoots from trunk
- Possibly forms a persistent spore bank

Low Risk Traits

- No reports of invasiveness or detrimental impacts
- Unarmed (no spines, thorns or burrs)
- Non-toxic
- Ornamental value
- Gametophytes may be self-incompatible

Second Screening Results for Tree/tree-like shrubs

(A) Shade tolerant or known to form dense stands? > Not known to form dense stands. Shade tolerance inconclusive

(B) Wind-dispersed? > Yes. Spores wind dispersed

(C) Life cycle < 4 years? Unknown

Outcome = Evaluate Further