Taxon: Cyathea dealbata (G. Forst.) Sw. **Family:** Cyatheaceae

Common Name(s): ponga
silver fern
silver tree-fern

Synonym(s): Alsophila tricolor R.M.Tryon
Polypodium dealbatum G.Forst.

Assessor: Chuck Chimera **Status:** Assessor Approved **End Date:** 2 Apr 2020

WRA Score: 3.0 **Designation:** EVALUATE **Rating:** Evaluate

Keywords: Not Naturalized, Subtropical, Tree Fern, Wind-Dispersed, Ornamental

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)	Intermediate
202	Quality of climate match data	(0-low; 1-intermediate; 2-high) (See Appendix 2)	High
203	Broad climate suitability (environmental versatility)	y=1, n=0	n
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	y = 1*multiplier (see Appendix 2), n= question 205	n
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	y=1, n=-1	y
405	Toxic to animals		
406	Host for recognized pests and pathogens		
407	Causes allergies or is otherwise toxic to humans		
408	Creates a fire hazard in natural ecosystems		
409	Is a shade tolerant plant at some stage of its life cycle	y=1, n=0	y

Qsn #	Question	Answer Option	Answer
410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)	y=1, n=0	y
411	Climbing or smothering growth habit	y=1, n=0	n
412	Forms dense thickets		
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	n
607	Minimum generative time (years)	1 year = 1, 2 or 3 years = 0, 4+ years = -1	>3
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/m2)	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**
	Brownsey, P.J. & Smith-Dodsworth, J.C. 1989. New Zealanc Ferns and Allied Plants. David Bateman Ltd, Auckland, New Zealand	No evidence of domestication

102	**Has the species become naturalized where grown?**	
	Source(s)	**Notes**
	WRA Specialist. (2020). Personal Communication	NA

103	**Does the species have weedy races?**	
	Source(s)	**Notes**
	WRA Specialist. (2020). 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"**	**Intermediate**
	Source(s)	**Notes**
	Brownsey, P.J. & Smith-Dodsworth, J.C. 1989. New Zealanc Ferns and Allied Plants. David Bateman Ltd, Auckland, New Zealand	"from North Cape to Dunedin..." [North Cape has subtropical weather during summer]
	Jones, D. L. 1987. Encyclopedia of Ferns. Timber Press, Portland, OR	Temperate - Sub-tropical

202	**Quality of climate match data**	**High**
	Source(s)	**Notes**
	Jones, D. L. 1987. Encyclopedia of Ferns. Timber Press, Portland, OR	

Qsn #	Question	Answer
203	**Broad climate suitability (environmental versatility)**	**n**
	Source(s)	**Notes**
	Dave's Garden. (2020). Alsophila Species, Ponga, Silver Tree Fern - Alsophila dealbata. http://davesgarden.com/guides/pf/go/58521/. [Accessed 31 Mar 2020]	"Hardiness: USDA Zone 9a: to -6.6 °C (20 °F) USDA Zone 9b: to -3.8 °C (25 °F) USDA Zone 10a: to -1.1 °C (30 °F) USDA Zone 10b: to 1.7 °C (35 °F)"
	Plants for a Future. (2020). Cyathea dealbata. https://pfaf.org. [Accessed 31 Mar 2020]	"USDA hardiness: 8-11"
	Brownsey, P.J. & Perrie, L.R. (2015). Cyatheaceae . In: Breitwieser, I.; Heenan, P.B.; Wilton, A.D. Flora of New Zealand - Ferns and Lycophytes. Fascicle 13. Manaaki Whenua Press, Lincoln	[Elevation range <1000 m] "In the North Island it grows from near sea-level to about 650 m in the Kaweka Ranges and 800 m on the Waimarino Plains. In the South Island it is mostly found in coastal and lowland areas but extends locally into montane forest, reaching 900 m at Jordan Stream in the Inland Kaikoura Ranges."

204	**Native or naturalized in regions with tropical or subtropical climates**	**y**
	Source(s)	**Notes**
	Jones, D. L. 1987. Encyclopedia of Ferns. Timber Press, Portland, OR	Temperate - Sub-tropical

205	**Does the species have a history of repeated introductions outside its natural range?**	**y**
	Source(s)	**Notes**
	Rickard, M. 2005. Gardening With Ferns. Horticulture Publications, Boston, MA	"Grows very happily in south-west Eire (zone 9 and 10) without protection. It regenerates but young plants are lost in severe winters much as happens with Dicksonia Antarctica."
	Dave's Garden. (2020). Alsophila Species, Ponga, Silver Tree Fern - Alsophila dealbata. http://davesgarden.com/guides/pf/go/58521/. [Accessed 31 Mar 2020]	"This plant has been said to grow in the following regions: Fort Lauderdale, Florida, Palm Harbor, Florida, Sarasota, Florida, Summerfield, Florida, Woodland, Washington" ... "On Feb 6, 2012, aulani61 from Emporia, KS wrote: These beautiful tree ferns grow well in Hawaii. I know people on the Big Island who use them as a natural greenhouse for their commercial anthurium growing operation. Beneath twin rows of these ferns grow the anthuriums of every color and variety. Genius!"

Qsn #	Question	Answer
301	**Naturalized beyond native range**	**n**
	Source(s)	**Notes**
	Imada, C. (2019). Hawaiian Naturalized Vascular Plants Checklist (February 2019 update). Bishop Museum Technical Report 69. Bishop Museum, Honolulu, HI	No evidence
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	No evidence [listed as a casual alien in the UK]
	Wagner, W.L., Herbst, D.R.& Lorence, D.H. (2020). Flora of the Hawaiian Islands. Smithsonian Institution, Washington, D.C. https://naturalhistory2.si.edu/botany/hawaiianflora/. [Accessed 1 Apr 2020]	No evidence to date

Qsn #	Question	Answer
302	**Garden/amenity/disturbance weed**	**n**
	Source(s)	**Notes**
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	"References: United Kingdom-U-314, Ireland-W-1977" [Listed as a casual alien in the UK]
	Randall, R.P. 2012. A Global Compendium of Weeds. 2nd Edition. Department of Agriculture and Food, Western Australia	No evidence

Qsn #	Question	Answer
303	**Agricultural/forestry/horticultural weed**	**n**
	Source(s)	**Notes**
	Brock, J. (2017). The influence of tree ferns on the composition and structure of New Zealand native forests. PhD Dissertation. The University of Auckland, Auckland, NZ	[Not regarded as a weed, but could suppress seedling recruitment in forest plantations of New Zealand. May be undesirable in such situations] "As a counterpoint to the use of tree ferns to contribute positively to habitat restoration, commercial plantation forest managers may wish to remove Cyathea dealbata (and other tree fern species) from the understorey of commercial plantations and indigenous forests under productive management to encourage natural regeneration of indigenous canopy tree species, particularly if gymnosperms are a desired resource."
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	No evidence

Qsn #	Question	Answer
304	**Environmental weed**	**n**
	Source(s)	**Notes**
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	No evidence

Qsn #	Question	Answer
305	**Congeneric weed**	**y**
	Source(s)	**Notes**

Qsn #	Question	Answer
	Medeiros, A.C., Loope, L.L., & Anderson, S. 1993. Differential colonization by epiphytes on native (Cibotium spp.) and alien (Cyathea cooperi) tree ferns in a Hawaiian rain forest. Selbyana 14: 71–74	"Cyathea cooperi, though undocumented until recently as invasive, is an aggressive species that has established in native forests on several islands in the 1970's and is rapidly spreading (Medeiros et al. 1992). In addition to impacts such as aggressive competition for space and light, the evidence presented here demonstrates that the alien tree fern supports fewer epiphytes than the two native Cibotium tree ferns."
	Medeiros, A. C., Loope, L. L., Flynn, T., Anderson, S. J., Cuddihy, L. W., & Wilson, K. A. 1992. Notes on the status on an invasive Australian tree fern (Cyathea cooperi) in Hawaiian rain forests. American Fern Journal, 82(1): 27-33.	[Cyathea cooperi] "The densest stands of Cyathea in the Kipahulu Valley population were conspicuously lacking in understory species diversity and biomass. This may be due to the thick layer of fibrous roots at the soil surface that surrounds individuals of Cyathea cooperi, extending up to 5 m from a large individual." … "Cyathea cooperi does not support the dense growth of epiphytic native species that typically occupies the trunks of native tree ferns in wet forests. Medeiros et al. (submitted) found more than ten times as many epiphyte individuals growing on trunks of native tree ferns (Cibotium spp.) as on trunks of Cyathea cooperi."

401	Produces spines, thorns or burrs	n
	Source(s)	**Notes**
	Allan, H.H. 1982. Flora of New Zealand, Volume I: Indigenous Tracheophyta - Psilopsida, Lycopsida, Filicopsida, Gymnospermae, Dicotyledons. First electronic edition. Landcare Research, Lincoln, New Zealand	[No evidence] "Caudex up to 10 m. tall with basal diam. 45 cm., us. smaller; bases of stipites long-persistent. Stipes rather stout, ± 4 cm. diam. near base; paleae shining dark brown, c. 5 cm. long; hairs yellow-brown, cop., deciduous. Lamina up to 3 × 1 m. or more, 2-3-pinnate; subcoriac., attenuate; dark green above. Juvenile plants with lamina pale green below; subsequent fronds becoming patched with white to glaucous bloom below; adult plants with lamina almost completely white or glaucous below. Primary pinnae 30-50 cm. long, oblong-acuminate; secondary up to 10 cm. or more, oblong-lanceolate, attenuate. Tertiary pinnae or segs up to 15 mm. long, subfalcate, subacute to acute, crenate-serrate in upper half, margins slightly recurved, veinlets free. Sori us. cop., globose, c. 1 mm. diam. (may be present on only partly dealbate fronds). Indusium thin, at first covering sorus, persisting as a shallow cup."

Qsn #	Question	Answer
402	**Allelopathic**	
	Source(s)	**Notes**
	Brock, J. M., Perry, G. L., Lee, W. G., & Burns, B. R. (2016). Tree fern ecology in New Zealand: A model for southern temperate rainforests. Forest Ecology and Management, 375, 112-126	[Unknown. No evidence found for C. dealbata] "Froude (1980) showed that aqueous extracts from green frond material of tree ferns (C. medullaris, C. smithii, D. squarrosa) stunted the radicle development of salad cress (Lepidium sativum); and C. medullaris extract caused stunting in kakabeak (Clianthus puniceus) radicle growth. Froude observed similar inhibitory effects of the leachates of the three tree fern species on the seedling germination and growth of W. racemosa. Although not conclusive, Froude's studies suggested that tree ferns may influence species establishment through the presence of alkaloid phytochemicals in their fronds and trunks. In general little is known about allelopathy in New Zealand forests (but see Michel et al. (2011), Morales (2015)) and therefore any comment on the relative importance of any possible allelopathic effects of tree ferns on the forest community remains speculative at this point."

403	Parasitic	n
	Source(s)	**Notes**
	Allan, H.H. 1982. Flora of New Zealand, Volume I: Indigenous Tracheophyta - Psilopsida, Lycopsida, Filicopsida, Gymnospermae, Dicotyledons. First electronic edition. Landcare Research, Lincoln, New Zealand	Cyatheaceae [No evidence]

404	Unpalatable to grazing animals	y
	Source(s)	**Notes**
	Plants for a Future. (2020). Cyathea dealbata. https://pfaf.org. [Accessed 1 Apr 2020]	"Members of this genus are rarely if ever troubled by browsing deer"
	Allen, R. B., Payton, I. J., & Knowlton, J. E. (1984). Effects of ungulates on structure and species composition in the Urewera forests as shown by exclosures. New Zealand Journal of Ecology, 7: 119-130	[Described as unpalatable to introduced ungulates] "The replacement of normal canopy species by an increase in unpalatable species, especially Cyathea dealbata and C. smithii, in the understorey has been described by Jane and Pracy (1974). However, these two species were found in similar numbers inside and outside the exclosures in the present study, and most stands outside the exclosures were considered to be understocked with sub-canopy trees and shrubs. Overall, unpalatable woody species did not seem to have replaced palatable species outside the exclosures."
	Forsyth, D. M., Coomes, D. A., Nugent, G., & Hall, G. M. J. (2002). Diet and diet preferences of introduced ungulates (Order: Artiodactyla) in New Zealand. New Zealand Journal of Zoology, 29 (4): 323-343	[Possibly unpalatable] "Table 2 A three-way classification of the preferences of ungulates for common forest species in New Zealand. Graminoids are excluded." [Cyathea dealbata - Ungulate preference class = Avoided]

Qsn #	Question	Answer
405	**Toxic to animals**	
	Source(s)	**Notes**
	Quattrocchi, U. 2012. CRC World Dictionary of Medicinal and Poisonous Plants: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology. CRC Press, Boca Raton, FL	[Toxicity to animals unknown] "Woody fibre reported to be toxic, poisonous; a part of the Maori spearhead. Pith used for ulcers, skin eruptions, and boils Powdered dried bud used in plaster."

406	**Host for recognized pests and pathogens**	
	Source(s)	**Notes**
	Wishhart, M. (2020). "Information on the Silver Fern Plant." Home Guides | SF Gate, http://homeguides.sfgate.com/information-silver-fern-plant-68232.html. [Accessed 1 Apr 2020]	"Pests such as scale insects, thrips, mites, slugs and caterpillars may feed on the silver fern, damaging young fronds. Pest infestations can be combated by washing the plant with a direct stream of water, releasing helpful predatory insects like lady beetles and picking off large pests such as slugs. Watering from overhead can cause crown rot, a serious bacterial infection that softens and rots the center of the plant. Avoid overhead irrigation to help prevent the problem."

407	**Causes allergies or is otherwise toxic to humans**	
	Source(s)	**Notes**
	Plants for a Future. (2020). Cyathea dealbata. https://pfaf.org. [Accessed 2 Apr 2020]	"Although we have found no reports of toxicity for this species, a number of ferns contain carcinogens so some caution is advisable [200]. Many ferns also contain thiaminase, an enzyme that robs the body of its vitamin B complex. In small quantities this enzyme will do no harm to people eating an adequate diet that is rich in vitamin B, though large quantities can cause severe health problems. The enzyme is destroyed by heat or thorough drying, so cooking the plant will remove the thiaminase[172]"
	Quattrocchi, U. 2012. CRC World Dictionary of Medicinal and Poisonous Plants: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology. CRC Press, Boca Raton, FL	"Woody fibre reported to be toxic, poisonous; a part of the Maori spearhead. Pith used for ulcers, skin eruptions, and boils Powdered dried bud used in plaster."
	Wagstaff, D.J. 2008. International poisonous plants checklist: an evidence-based reference. CRC Press, Boca Raton, FL	No evidence

408	**Creates a fire hazard in natural ecosystems**	
	Source(s)	**Notes**
	Brock, J. M., Perry, G. L., Lee, W. G., & Burns, B. R. (2016). Tree fern ecology in New Zealand: A model for southern temperate rainforests. Forest Ecology and Management, 375, 112-126	[Possibly in periods of drought. Moderate-high flammability] "A physical assessment of frond material by Wyse et al. (2016) comparing plant trait flammability ranked C. medullaris as moderate, C. dealbata as moderate-high and D. squarrosa as having high flammability."

Qsn #	Question	Answer
	Payton, I. J., Allen, R. B., & Knowlton, J. E. (1984). A post-fire succession in the northern Urewera forests North Island, New Zealand. New Zealand Journal of Botany, 22 (2): 207-222	[Unlikely given habitat preference, but reported to have moderate to high flammability. Possibly a fire risk during droughts] "On wetter sites, the treeferns Cyathea dealbata and Dicksonia squarrosa are common. Here, treefern trunks are important sites for the establishment of kamahi seedlings and other hardwoods (Wardle 1966). The absence of kanuka on these wetter sites is probably the result of a combination of an inability to tolerate waterlogged soils (Burrows 1973) and the shaded conditions created by rapidly growing treeferns."

409	Is a shade tolerant plant at some stage of its life cycle	y
	Source(s)	**Notes**
	Brownsey, P.J. & Smith-Dodsworth, J.C. 1989. New Zealanc Ferns and Allied Plants. David Bateman Ltd, Auckland, New Zealand	"a subcanopy species common in drier forest and more open scrub."
	Plants for a Future. (2020). Cyathea dealbata. https://pfaf.org. [Accessed 31 Mar 2020]	"It can grow in full shade (deep woodland) or semi-shade (light woodland)."
	Dave's Garden. (2020). Alsophila Species, Ponga, Silver Tree Fern - Alsophila dealbata. http://davesgarden.com/guides/pf/go/58521/. [Accessed 31 Mar 2020]	"Sun Exposure: Partial to Full Shade"
	Brock, J. M., Perry, G. L., Lee, W. G., & Burns, B. R. (2016). Tree fern ecology in New Zealand: A model for southern temperate rainforests. Forest Ecology and Management, 375, 112-126	[Reported to be more shade-tolerant] "Bystriakova et al. (2011a) identified a trade-off between growth-rate and shade tolerance in the New Zealand Cyathea with a faster-growing species C. medullaris restricted to higher light environments and having a low survivorship in shade (3.22% yr□1 mortality) compared to 0.69– 1.85% yr□1 mortality for the slower-growing, more shade-tolerant C. dealbata, smithii and cunninghamii."

410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)	y
	Source(s)	**Notes**
	Dave's Garden. (2020). Alsophila Species, Ponga, Silver Tree Fern - Alsophila dealbata. http://davesgarden.com/guides/pf/go/58521/. [Accessed 2 Apr 2020]	"Soil pH requirements: 5.1 to 5.5 (strongly acidic)"
	Vibrant Earth. (2020). Cyathea dealbata. https://www.vibrantearth.nz. [Accessed 2 Apr 2020]	"Soil Type: Grows in most soil types"

411	Climbing or smothering growth habit	n
	Source(s)	**Notes**
	Brownsey, P.J. & Smith-Dodsworth, J.C. 1989. New Zealanc Ferns and Allied Plants. David Bateman Ltd, Auckland, New Zealand	"Trunks to 10 m tall with prominent, light brown, peg-like stipe bases."

412	Forms dense thickets	

Qsn #	Question	Answer
	Source(s)	**Notes**
	Smale, M. C., Dodd, M. B., Burns, B. R., & Power, I. L. (2008). Long-term impacts of grazing on indigenous forest remnants on North Island hill country, New Zealand. New Zealand Journal of Ecology, 32(1): 57-66	"Forest canopy cover was dominated by Beilschmiedia tawa; subcanopy cover by Melicytus ramiflorus and Hedycarya arborea (Table 2). Dysoxylum spectabile was locally important in canopies. Dicksonia squarrosa (wheki) and Cyathea dealbata dominated the understorey cover of grazed fragments, while Cyathea dealbata and C. smithii (soft tree fern/kaponga) dominated continuous forest understoreys." ... "Table 3. Density (stems ha–1) of trees and shrubs (>3 cm dbh), saplings (>30 cm tall, <3 cm dbh), and seedlings (<30 cm tall) in grazed forest fragments (F, n = 3) and ungrazed continuous forest (C, n = 3) at Whatawhata, New Zealand. Means (standard errors in parentheses except where frequencies are < 5) compared using t-tests (d.f. = 4) and results presented when P < 0.05." [Cyathea dealbata recorded at high densities, but not in dense stands, 333 per hectare in grazed forest fragments & 447 in ungrazed continuous forest]
	Burns, B. R., & Smale, M. C. (1990). Changes in structure and composition over fifteen years in a secondary kauri (Agathis australis)-tanekaha (Phyllocladus trichomanoides) forest stand, Coromandel Peninsula, New Zealand. New Zealand Journal of Botany, 28(2), 141-158	[Dense cover in native range inhibits seedling recruitment] "Seedlings are found predominantly on ridges and upper slopes and not on lower slopes where C. dealbata forms a dense subcanopy."
	Brock, J. M., Perry, G. L., Lee, W. G., & Burns, B. R. (2016). Tree fern ecology in New Zealand: A model for southern temperate rainforests. Forest Ecology and Management, 375, 112-126	[Forms dense cover that inhibits woody seedling recruitment within native range] "Although suppression has most commonly been reported as influencing podocarp species, Burns and Smale (1990) observed that the establishment of woody species (e.g. Weinmannia silvicola, Dysoxylum spectabile, K. excelsa) was inhibited beneath a dense C. dealbata canopy on the lower valley slopes of a secondary Agathis australis – Phyllocladus trichomanoides forest stand on the Coromandel Peninsula."

501	Aquatic	n
	Source(s)	**Notes**
	Allan, H.H. 1982. Flora of New Zealand, Volume I: Indigenous Tracheophyta - Psilopsida, Lycopsida, Filicopsida, Gymnospermae, Dicotyledons. First electronic edition. Landcare Research, Lincoln, New Zealand	[Terrestrial tree fern] "Lowland to montane forest throughout, also occurs in shrubland."
	Brownsey, P.J. & Perrie, L.R. (2015). Cyatheaceae . In: Breitwieser, I.; Heenan, P.B.; Wilton, A.D. Flora of New Zealand - Ferns and Lycophytes. Fascicle 13. Manaaki Whenua Press, Lincoln	[Terrestrial] "Habitat: Cyathea dealbata occurs as a sub-canopy species under kauri, podocarp, beech and broadleaved forest, and in kānuka and mānuka scrub, usually in drier areas. It is occasionally found on bush margins and in more open areas, and has been recorded from amongst rushes in a dune slack."

502	Grass	n
	Source(s)	**Notes**
	Allan, H.H. 1982. Flora of New Zealand, Volume I: Indigenous Tracheophyta - Psilopsida, Lycopsida, Filicopsida, Gymnospermae, Dicotyledons. First electronic edition. Landcare Research, Lincoln, New Zealand	Family: Cyatheaceae Kaulf.

Qsn #	Question	Answer
503	**Nitrogen fixing woody plant**	**n**
	Source(s)	**Notes**
	Allan, H.H. 1982. Flora of New Zealand, Volume I: Indigenous Tracheophyta - Psilopsida, Lycopsida, Filicopsida, Gymnospermae, Dicotyledons. First electronic edition. Landcare Research, Lincoln, New Zealand	Family: Cyatheaceae Kaulf.

504	**Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)**	**n**
	Source(s)	**Notes**
	Kramer, K.U. & Green, P.S. 1990. The Families and Genera of Vascular Plants. Volume 1. Pteridophytes and Gymnosperms. Springer-Verlag, Berlin, Heidelberg, New York	[Family Description. No bulbs, corms or tubers] "Large to very large, less often medium-sized, terrestrial ferns with short 10 usually long, erect, slender to robust, apically scaly stem; stele radially symmetric, forming a complicated dictyostele with much sclerenchyma on both sides of the bundles, often with accessory medullary and cortical bundles ; the surface often bearing a cover of densely matted adventitious roots. rarely spiny, the leaf scars prominent, often the upper part with petiole base remnants, rarely branched."

601	**Evidence of substantial reproductive failure in native habitat**	**n**
	Source(s)	**Notes**
	New Zealand Plant Conservation Network. (2020). Flora Details - Cyathea dealbata. http://www.nzpcn.org.nz/flora_details.aspx?ID=1776. [Accessed 2 Apr 2020]	"Current Conservation Status 2012 - Not Threatened Previous Conservation Status 2009 - Not Threatened 2004 - Not Threatened"
	Brownsey, P.J. & Perrie, L.R. (2015). Cyatheaceae . In: Breitwieser, I.; Heenan, P.B.; Wilton, A.D. Flora of New Zealand - Ferns and Lycophytes. Fascicle 13. Manaaki Whenua Press, Lincoln	[No evidence] "Cyathea dealbata occurs on the Three Kings Islands and throughout coastal and lowland areas of the North Island. In the South Island it occurs in coastal and lowland areas from Nelson and Marlborough south to Punakaiki on the west coast, and to just south of Dunedin on the east coast. It is also present on the Chatham Islands. In the North Island it grows from near sea-level to about 650 m in the Kaweka Ranges and 800 m on the Waimarino Plains. In the South Island it is mostly found in coastal and lowland areas but extends locally into montane forest, reaching 900 m at Jordan Stream in the Inland Kaikoura Ranges."

Qsn #	Question	Answer
602	**Produces viable seed**	**y**
	Source(s)	**Notes**
	Dave's Garden. (2020). Alsophila Species, Ponga, Silver Tree Fern - Alsophila dealbata. http://davesgarden.com/guides/pf/go/58521/. [Accessed 2 Apr 2020]	"Propagation Methods: From spores"
	New Zealand Plant Conservation Network. (2020). Flora Details - Cyathea dealbata. http://www.nzpcn.org.nz/flora_details.aspx?ID=1776. [Accessed 2 Apr 2020]	[Produces viable spores] "Can be grown from fresh spores (but slow)."

603	**Hybridizes naturally**	
	Source(s)	**Notes**
	Brownsey, P.J. & Perrie, L.R. (2015). Cyatheaceae . In: Breitwieser, I.; Heenan, P.B.; Wilton, A.D. Flora of New Zealand - Ferns and Lycophytes. Fascicle 13. Manaaki Whenua Press, Lincoln	[Unknown. Hybridization documented in genus] "Cyathea cunninghamii … It hybridises with C. australis, and the hybrid is known as C. ×marcescens (Peacock et al. 2013)."

604	**Self-compatible or apomictic**	
	Source(s)	**Notes**
	Mehltreter, K., Walker, L.R. & Sharpe, J.M. 2010. Fern Ecology. Cambridge University Press, Cambridge, UK	[General description] "Most fern species cross-fertilize (i.e., sperm fertilizes an egg cell from a different gametophyte), but the gametophytes are potentially bisexual. I f the gametophyte has simultaneously functioning archegonia and antheridia it may self-fertilize (i.e., sperm fertilizes an egg cell from the same gametophyte), which is of advantage after long distance dispersal."
	CanterburyNature. 2015. Species Profile: Silver fern. http://www.canterburynature.org/species/lincoln_essays/silverfern.php. [Accessed 30 Sep 2015]	[Unknown] "The life cycle of the silver fern has two different stages: sporophyte and gametophyte. The adult leafy plant produces the spores on the underside of the fronds. These are held in small packages called sporangia. This diploid plant (meaning each of its cells contains two sets of chromosomes in the nucleus) is called the sporophyte. Cells in the sporangium undergo meiosis and haploid spores (one set of chromosomes) are released. A spore germinates forming a gametophyte; small, thin and heart shaped. The gametophyte produces the sex organs, each which produces sperm and eggs. Fertilisation takes place producing a diploid zygote. As a developing sporophyte the zygote is partially parasitic on the gametophyte (Large et al., 2004)."
	Goller, K., & Rybczynski, J. J. (2007). Gametophyte and sporophyte of tree ferns in vitro culture. Acta Societatis Botanicorum Poloniae, 76(3): 193-199	Cyathea dealbata capable of apospory. Unknown if apogamy occurs

605	**Requires specialist pollinators**	**n**
	Source(s)	**Notes**
	Mehltreter, K., Walker, L.R. & Sharpe, J.M. 2010. Fern Ecology. Cambridge University Press, Cambridge, UK	[Requires water, but otherwise unspecialized] "Fertilization - On gametophyte, sperm cell swims through water"

Qsn #	Question	Answer
606	**Reproduction by vegetative fragmentation**	**n**
	Source(s)	**Notes**
	New Zealand Plant Conservation Network. (2020). Flora Details - Cyathea dealbata. http://www.nzpcn.org.nz/flora_details.aspx?ID=1776. [Accessed 2 Apr 2020]	[Trunks resprout if given water. No evidence of natural vegetative spread] "Can be grown from fresh spores (but slow). Young plants transplant easily and freshly felled trunks will usually resprout if planted and carefully watered."

607	Minimum generative time (years)	>3
	Source(s)	**Notes**
	Forest Ferns. 2015. Cyathea dealbata. http://www.forestferns.co.uk/tree-ferns/cyathea/cyathea-dealbata. [Accessed 2 Apr 2020]	"The silvery underside of the fronds does not develop until the plant starts to mature at 3-4 years old."
	Bystriakova, N., Bader, M., & Coomes, D. A. (2011). Long-term tree fern dynamics linked to disturbance and shade tolerance. Journal of Vegetation Science, 22(1): 72-84	[C. dealbata - Height growth (cm yr⁻1) = 3.17] "Table 1. Stem densities and annual growth, mortality and recruitment rates (with 95% confidence interval) of five tree fern species from a lowland temperate rain forest near Wellington, New Zealand. Demographic rates were calculated from repeat measurements taken in1978 and 2006, density is averaged over 38 years and species are ordered by height growth."

701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	
	Source(s)	**Notes**
	WRA Specialist. (2020). Personal Communication	Unknown. Prolific spore production, and cultivation could possibly result in accidental dispersal through attachment to clothing, or equipment

702	Propagules dispersed intentionally by people	y
	Source(s)	**Notes**
	New Zealand Plant Conservation Network. (2020). Flora Details - Cyathea dealbata. http://www.nzpcn.org.nz/flora_details.aspx?ID=1776. [Accessed 2 Apr 2020]	"Sold by most commericial nurseries. Commonly cultivated."
	Dave's Garden. (2020). Alsophila Species, Ponga, Silver Tree Fern - Alsophila dealbata. http://davesgarden.com/guides/pf/go/58521/. [Accessed 2 Apr 2020]	"This plant has been said to grow in the following regions: Fort Lauderdale, Florida Palm Harbor, Florida Sarasota, Florida Summerfield, Florida Woodland, Washington"
	Bezona, N., Rauch, F. D., & Iwata, R. Y. 1994. Tree ferns for Hawai'i gardens. Research Extension Series 144. CTAHR,, Univiersity of Hawaii, Honolulu, HI	[Promoted for cultivation in the Hawaiian Islands] "Cyathea dealbata ... This is a noble tree fern with a trunk 10 to 30 feet high."

703	Propagules likely to disperse as a produce contaminant	

Qsn #	Question	Answer
	Source(s)	**Notes**
	WRA Specialist. (2020). 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."
	Gastony, G. J. (1974). Spore morphology in the Cyatheaceae. I. The perine and sporangial capacity: general considerations. American Journal of Botany, 61(6): 672-680	"Such 16-spored sporangia in the Cyatheaceae would generally be smaller. lighter, and better adapted for wind dispersal than the 64-spored sporangia"
	Mehltreter, K., Walker, L.R. & Sharpe, J.M. 2010. Fern Ecology. Cambridge University Press, Cambridge, UK	"Table 1.1" ... "Ferns and lycophytes ... Dispersal = Haploid spores, Mostly by wind; water"

705	Propagules water dispersed	
	Source(s)	**Notes**
	Mehltreter, K., Walker, L.R. & Sharpe, J.M. 2010. Fern Ecology. Cambridge University Press, Cambridge, UK	"Table 1.1" ... "Ferns and lycophytes ... Dispersal = Haploid spores, Mostly by wind; water"

706	Propagules bird dispersed	n
	Source(s)	**Notes**
	WRA Specialist. (2020). 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. (2020). 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. (2020). Personal Communication	Unlikely to be consumed and not adapted for internal dispersal

801	Prolific seed production (>1000/m2)	y
	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. Plant Protection Quarterly, 25(2): 56-74	"Assume 'yes' for fern taxa unless contradictory evidence exists."
	Allan, H.H. 1982. Flora of New Zealand, Volume I: Indigenous Tracheophyta - Psilopsida, Lycopsida, Filicopsida, Gymnospermae, Dicotyledons. First electronic edition. Landcare Research, Lincoln, New Zealand	"Sori us. cop., globose, c. 1 mm. diam. (may be present on only partly dealbate fronds). Indusium thin, at first covering sorus, persisting as a shallow cup."

802	**Evidence that a persistent propagule bank is formed (>1 yr)**	
	Source(s)	**Notes**
	Overdyck, E., & Clarkson, B. D. (2012). Seed rain and soil seed banks limit native regeneration within urban forest restoration plantings in Hamilton City, New Zealand. New Zealand Journal of Ecology, 36(2): 177-190	[Possibly] "In total 65 exotic and 39 native species were present at greater density (>10 individuals) in the soil seed bank than in the annual seed rain input, suggesting that for these species some seeds persist in the soil from year to year (Appendix 2)." [Cyathea dealbata listed as having persistent spores]

803	**Well controlled by herbicides**	
	Source(s)	**Notes**
	WRA Specialist. (2020). Personal Communication	Unknown. No information on herbicide efficacy or chemical control of this species

804	**Tolerates, or benefits from, mutilation, cultivation, or fire**	
	Source(s)	**Notes**
	New Zealand Plant Conservation Network. (2020). Flora Details - Cyathea dealbata. http://www.nzpcn.org.nz/flora_details.aspx?ID=1776. [Accessed 2 Apr 2020]	[Trunks resprout if given water] "Young plants transplant easily and freshly felled trunks will usually resprout if planted and carefully watered."

805	**Effective natural enemies present locally (e.g. introduced biocontrol agents)**	
	Source(s)	**Notes**
	WRA Specialist. (2020). Personal Communication	Unknown

Summary of Risk Traits:

High Risk / Undesirable Traits
• Able to grow in subtropical climates
• Other Cyathea species have become invasive
• Unpalatable to grazing animals
• Possible toxic properties (unverified)
• Shade tolerant
• Tolerates many soil types
• Reproduces by spores
• Spores dispersed by wind, possibly water, & intentionally planted by people
• Prolific spore production
• Spores may persist in the soil for >1 year
• Possibly able to resprout after cutting

Low Risk Traits
• No reports of invasiveness or naturalization
• Unarmed (no spines, thorns or burrs)
• Grows on acidic soils
• Ornamental
• Not reported to spread vegetatively

Second Screening Results for Tree/tree-like shrubs

(A) Shade tolerant or known to form dense stands?> Yes. Tolerates shade
(B) Wind-dispersed?> Yes. Spores are wind-dispersed
(C) Life cycle <4 years? Possibly reaches maturity in 3-4 years
Outcome = Evaluate further