

Taxon: <i>Macrothelypteris torresiana</i> (Gaudich.) Ching	Family: Thelypteridaceae
Common Name(s): Mariana maiden fern Torres's fern wood fern	Synonym(s): <i>Dryopteris uliginosa</i> (Kunze) C. Chr. <i>Lastrea torresiana</i> (Gaudich.) T. <i>Polystichum torresianum</i> Gaudich. <i>Thelypteris torresiana</i> (Gaudich.)

Assessor: Chuck Chimera	Status: Assessor Approved	End Date: 13 Sep 2017
WRA Score: 12.0	Designation: H(HPWRA)	Rating: High Risk

Keywords: Tropical Fern, Naturalized, Weedy, Shade-Tolerant, Wind-Dispersed

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)	y=1, n=0	y
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	y
302	Garden/amenity/disturbance weed	n=0, y = 1*multiplier (see Appendix 2)	y
303	Agricultural/forestry/horticultural weed		
304	Environmental weed		
305	Congeneric weed		
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	y=1, n=0	y
410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)		
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	y
607	Minimum generative time (years)	1 year = 1, 2 or 3 years = 0, 4+ years = -1	1
701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)		
702	Propagules dispersed intentionally by people		
703	Propagules likely to disperse as a produce contaminant	y=1, n=-1	y
704	Propagules adapted to wind dispersal	y=1, n=-1	y
705	Propagules water dispersed	y=1, n=-1	y
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
	Palmer, D.D. 2003. Hawaii's Ferns and Fern Allies. University of Hawaii Press, Honolulu, HI	[No evidence of domestication] "Macrothelypteris torresiana is native from the Old World Tropics to Madagascar and Polynesia. and has become widely naturalized in the Americas including the southern United States."

102	Has the species become naturalized where grown?	
	Source(s)	Notes
	WRA Specialist. 2017. Personal Communication	NA

103	Does the species have weedy races?	
	Source(s)	Notes
	WRA Specialist. 2017. 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, Germplasm Resources Information Network. 2017. National Plant Germplasm System [Online Database]. http://www.ars-grin.gov/npgs/index.html . [Accessed 12 Sep 2017]	"Native: Africa Southern Africa: South Africa - KwaZulu-Natal Western Indian Ocean: Madagascar Asia-Temperate Eastern Asia: Japan - Honshu, - Kyushu, - Ryukyu Islands, - Shikoku; Taiwan Asia-Tropical Indo-China: Indochina; Thailand Malesia: Indonesia; Malaysia Australasia Australia: Australia - Queensland New Zealand: New Zealand Pacific North-Central Pacific: United States - Hawaii South-Central Pacific: French Polynesia Southwestern Pacific: Samoa"

202	Quality of climate match data	High
	Source(s)	Notes
	USDA, ARS, Germplasm Resources Information Network. 2017. National Plant Germplasm System [Online Database]. http://www.ars-grin.gov/npgs/index.html . [Accessed 12 Sep 2017]	

Qsn #	Question	Answer
203	Broad climate suitability (environmental versatility)	y
	Source(s)	Notes
	Palmer, D.D. 2003. Hawaii's Ferns and Fern Allies. University of Hawaii Press, Honolulu, HI	"Occasional to locally common, found in disturbed and open areas in mesic forests, 5-1,200 m." [Elevation range exceeds 1000 m]
	New Zealand Plant Conservation Network. 2010. Flora Details - <i>Macrothelypteris torresiana</i> . http://nzpcn.org.nz/flora_details.aspx?ID=282 . [Accessed 12 Sep 2017]	[Broad natural range] "In New Zealand known only from Raoul Island (Kermadec Islands group) and from the Surville Cliffs, North Cape in the North Island. Widespread in the old world tropics from Madagascar, northern and north-eastern Australia, across the Pacific to Hawaii and the Marquesas. New Zealand would appear to be its world southern limit."

204	Native or naturalized in regions with tropical or subtropical climates	y
	Source(s)	Notes
	Wilson, K.A. 1996. Alien Ferns in Hawaii. <i>Pacific Science</i> 50 (2): 127-141	"Native to the tropical and subtropical regions of Asia and Africa, this invasive species has extended its range throughout the Pacific and has colonized the New World from the southeastern United States to northern Argentina and the Caribbean."

205	Does the species have a history of repeated introductions outside its natural range?	y
	Source(s)	Notes
	Flora of North America Editorial Committee. 1993. <i>Flora of North America: Volume 2: Pteridophytes and Gymnosperms</i> . Oxford University Press, Oxford, UK	"introduced; Ala., Ark., Fla., Ga., La., Miss., S.C., Tex.; s Mexico; West Indies in the Antilles; Central America; South America to n Argentina; native to tropical and subtropical Asia, Africa."
	Palmer, D.D. 2003. Hawaii's Ferns and Fern Allies. University of Hawaii Press, Honolulu, HI	" <i>Macrothelypteris torresiana</i> is native from the Old World Tropics to Madagascar and Polynesia. and has become widely naturalized in the Americas including the southern United States.
	Wilson, K.A. 1996. Alien Ferns in Hawaii. <i>Pacific Science</i> 50 (2): 127-141	"Native to the tropical and subtropical regions of Asia and Africa, this invasive species has extended its range throughout the Pacific and has colonized the New World from the southeastern United States to northern Argentina and the Caribbean."

301	Naturalized beyond native range	y
	Source(s)	Notes
	Oppenheimer, H. 2016. New Hawaiian Plant Records for 2015. <i>Bishop Museum Occasional Papers</i> 118: 23–28	"A naturalized, terrestrial fern documented in Hawai'i from Kaua'i, O'ahu, Maui, and Hawai'i, Palmer (2003: 178) speculated that it was likely present as well on Moloka'i and Lāna'i, but there were no specimens to document its occurrence. This species was recently found on Moloka'i. Material examined. MOLOKA'I: Wailau Valley, Pūlena Stream, S side tributary, 475 m, 14 Jul 2015, Oppenheimer et al. H71516."
	Liogier, A.H. & Martorell, L.F. 2000. <i>Flora of Puerto Rico and adjacent islands: a systematic synopsis</i> . Second Edition Revised. La Editorial, UPR, San Juan, Puerto Rico	"In moist places at rather low to middle elevations, of scattered distribution; tropical southeast Asia and islands of the southwest Pacific, naturalized in North America, Bahamas and the Antilles, Trinidad, parts of South America."

Qsn #	Question	Answer
	Palmer, D.D. 2003. Hawaii's Ferns and Fern Allies. University of Hawaii Press, Honolulu, HI	"Occasional to locally common. found in disturbed and open areas in mesic forests, 5-1,200 m, all major islands except Moloka'i and Lana'i, where it may exist but has not yet been documented by collections." ... "Although the species was not collected in Hawai'i until 1915. it was first reported as naturalized in 1892."
	Wilson, K.A. 1996. Alien Ferns in Hawaii. Pacific Science 50 (2): 127-141	"Wood Fern, a widespread invader from the Old World, has been collected on all the islands except Moloka'i, where it may simply have been overlooked." ... "Wagner reported that it was first noted as naturalized in Hawai'i in 1892. The earliest specimens I have seen from Hawai'i were collected in 1915 (Forbes 606.H, BISH), although Maxon (1923) cited a collection from O'ahu in 1908. Wagner anticipated that this species would spread throughout the island forests because it was already well established in scattered areas, a prediction that certainly has been borne out."

302	Garden/amenity/disturbance weed	y
	Source(s)	Notes
	New Zealand Plant Conservation Network. 2010. Flora Details - <i>Macrothelypteris torresiana</i> . http://nzpcn.org.nz/flora_details.aspx?ID=282 . [Accessed 12 Sep 2017]	"A weedy, short-lived, opportunistic species colonising recently disturbed ground such as slip scars, debris flows, landslides, the ground around tree falls, and exposed clay banks, roadside cuttings and the margins of ditches."
	de Lange, P. J., & Crowcroft, G. M. (1997). <i>Macrothelypteris torresiana</i> (Thelypteridaceae) at North Cape, North Island, New Zealand—a new southern limit for a tropical fern. <i>New Zealand Journal of Botany</i> , 35(4), 555-558	" <i>Macrothelypteris torresiana</i> (Gaudich.) Ching (Thelypteridaceae) is a common "weedy" fern of the Old World tropics extending from Madagascar to Hawai'i"
	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	"One species, <i>M. torresiana</i> (Gaud.) Ching, is widely naturalized in the New World. Mostly at low elevations, 0-1000 m [<i>M. polypodioides</i> (Hooker) Holttum to 2150 m], often in somewhat weedy habitats."
	Palmer, D.D. 2003. Hawaii's Ferns and Fern Allies. University of Hawaii Press, Honolulu, HI	[Disturbance adapted] "Occasional to locally common. found in disturbed and open areas in mesic forests, 5-1.200 m, all major islands"
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	Listed as a weed in 6 references. Impacts to agriculture or natural environment unspecified

303	Agricultural/forestry/horticultural weed	
	Source(s)	Notes
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	Listed as an agricultural weed. Impacts unverified

304	Environmental weed	
	Source(s)	Notes
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	Listed as an environmental weed. Impacts unverified

305	Congeneric weed	
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Qsn #	Question	Answer
	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	"About 10 species in tropical and subtropical Asia, Malesia, Queensland, islands of the Pacific, Africa. One species, <i>M. torresiana</i> (Gaud.) Ching, is widely naturalized in the New World."
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	<i>Macrothelypteris polypodioides</i> cited as an agricultural weed. Impacts unverified

401	Produces spines, thorns or burrs	n
	Source(s)	Notes
	Palmer, D.D. 2003. Hawaii's Ferns and Fern Allies. University of Hawaii Press, Honolulu, HI	[No evidence] "Plants medium-sized to somewhat large, terrestrial. Rhizomes decumbent. short-creeping. Fronds 55-150(-180) cm long. erect. Stipes straw-colored. scales at bases narrow, dark brown. soon deciduous. distally stipes glabrous. smooth. Blades 3-pinnate-pinnatifid to 3-pinnate pinnatisect, deltate to linear deltate. about as long as stipes; rachises glabrous. 2-grooved adaxially. grooves separated by a rounded ridge covered with fine. white. sharp-tipped hairs. Pinnae lanceolate. alternate. to 32 cm long. Pinnules arising obliquely from midrib. to 8 cm long. mostly cut to narrow wings along pinna rachises. abaxial surfaces with many scattered. white. needle like hairs; costae with similar hairs on both surfaces. Ultimate segments crenulate to deeply lobed. lobes pointing obliquely toward tips. Sori medial. round. bearing hairs. Indusia small. inconspicuous. soon deciduous. or hidden by mature sporangia."

402	Allelopathic	n
	Source(s)	Notes
	WRA Specialist. 2017. Personal Communication	Unknown. No evidence of allelopathy found

403	Parasitic	n
	Source(s)	Notes
	Palmer, D.D. 2003. Hawaii's Ferns and Fern Allies. University of Hawaii Press, Honolulu, HI	"Plants medium-sized to somewhat large, terrestrial." [Thelypteridaceae. No evidence]

404	Unpalatable to grazing animals	n
	Source(s)	Notes
	Cowie, I. & Westaway, J. 2012. Threatened Species of the Northern Territory - <i>Macrothelypteris torresiana</i> . Northern Territory Government. https://www.nt.gov.au/environment/native-plants/threatened-plants . [Accessed]	[Unknown if browsing or trampling by animals is impacting this species] "The Camel Creek population was revisited in 2008 and feral pigs and domestic cattle livestock were observed to be having a severe impact at that population (K. Brennan pers. comm.)."

405	Toxic to animals	n
	Source(s)	Notes

Qsn #	Question	Answer
	Quattrocchi, U. 2012. CRC World Dictionary of Medicinal and Poisonous Plants: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology. CRC Press, Boca Raton, FL	No evidence
	Wagstaff, D.J. 2008. International poisonous plants checklist: an evidence-based reference. CRC Press, Boca Raton, FL	No evidence

406	Host for recognized pests and pathogens	
	Source(s)	Notes
	WRA Specialist. 2017. Personal Communication	Unknown. No evidence found

407	Causes allergies or is otherwise toxic to humans	n
	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	No evidence
	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	n
	Source(s)	Notes
	Colston Burrell, C. 1994. Ferns: Wild Things Make a Comeback in the Garden. Brooklyn Botanic Garden, Brooklyn, NY	"Plants require moist to wet, neutral to acidic, humus-rich soil in partial to full shade." [No evidence. Unlikely given growing conditions]
	Flora of North America Editorial Committee. 1993. Flora of North America: Volume 2: Pteridophytes and Gymnosperms. Oxford University Press, Oxford, UK	"Terrestrial in damp woods and along stream banks; 0--100 m" [No evidence. Does not occur in fire prone habitat]

Qsn #	Question	Answer
409	Is a shade tolerant plant at some stage of its life cycle	y
	Source(s)	Notes
	Leonard, S. W. (1972). The distribution of <i>Thelypteris torresiana</i> in the southeastern United States. <i>American Fern Journal</i> , 62(4), 97-99	"Evidently it prefers cool, moist habitats, and at least at the South Carolina station it thrives in light of low intensity."
	Wagner Jr, W. H. (1950). Ferns Naturalized in Hawaii. <i>Bishop Museum Occasional Papers</i> 20(8): 95-121	"frequent in rich, shaded places in a rocky wooded gulch along Wailua Stream, at 300-500 feet, east Maui."
	Colston Burrell, C. 1994. Ferns: Wild Things Make a Comeback in the Garden. Brooklyn Botanic Garden, Brooklyn, NY	"Plants require moist to wet, neutral to acidic, humus-rich soil in partial to full shade."
	Flora of North America Editorial Committee. 1993. <i>Flora of North America: Volume 2: Pteridophytes and Gymnosperms</i> . Oxford University Press, Oxford, UK	[Understory & riparian fern] "Terrestrial in damp woods and along stream banks; 0--100 m; introduced; Ala., Ark., Fla., Ga., La., Miss., S.C., Tex.; s Mexico; West Indies in the Antilles; Central America; South America to n Argentina; native to tropical and subtropical Asia, Africa."

410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)	
	Source(s)	Notes
	Colston Burrell, C. 1994. Ferns: Wild Things Make a Comeback in the Garden. Brooklyn Botanic Garden, Brooklyn, NY	""Plants require moist to wet, neutral to acidic, humus-rich soil in partial to full shade.""
	Leonard, S. W. (1972). The distribution of <i>Thelypteris torresiana</i> in the southeastern United States. <i>American Fern Journal</i> , 62(4), 97-99	"Examination of herbarium specimens from most counties in this region reveals that the species has been collected most often along streams, frequently near or under bridges, and occasionally in forests over rocky soil derived from limestone."
	Gardenality. 2017. Mariana Maiden Fern - (<i>Macrothelypteris torresiana</i>). http://www.gardenality.com/Plants/1676/Perennial-Plants/Mariana-Maiden-Fern.html . [Accessed 13 Sep 2017]	"Soil Type: Clay, Loam, Silt Soil Drainage: Moderately Drained"

411	Climbing or smothering growth habit	n
	Source(s)	Notes
	Palmer, D.D. 2003. <i>Hawaii's Ferns and Fern Allies</i> . University of Hawaii Press, Honolulu, HI	"Plants medium-sized to somewhat large, terrestrial. Rhizomes decumbent. short-creeping."

412	Forms dense thickets	
	Source(s)	Notes
	OnlinePlantGuide.com. 2017. <i>Polystichum torresianum</i> /Mariana Maiden Fern or Torres' Fern. http://www.onlineplantguide.com/Plant-Details/3696/ . [Accessed 13 Sep 2017]	"Grows in large colonies and has bold texture"
	Palmer, D.D. 2003. <i>Hawaii's Ferns and Fern Allies</i> . University of Hawaii Press, Honolulu, HI	"Occasional to locally common, found in disturbed and open areas in mesic forests, 5-1,200 m". [No evidence]

Qsn #	Question	Answer
501	Aquatic	n
	Source(s)	Notes
	Palmer, D.D. 2003. Hawaii's Ferns and Fern Allies. University of Hawaii Press, Honolulu, HI	"Plants medium-sized to somewhat large, terrestrial."
502	Grass	n
	Source(s)	Notes
	USDA, ARS, Germplasm Resources Information Network. 2017. National Plant Germplasm System [Online Database]. http://www.ars-grin.gov/npgs/index.html . [Accessed 12 Sep 2017]	"Family: Thelypteridaceae"
503	Nitrogen fixing woody plant	n
	Source(s)	Notes
	USDA, ARS, Germplasm Resources Information Network. 2017. National Plant Germplasm System [Online Database]. http://www.ars-grin.gov/npgs/index.html . [Accessed 12 Sep 2017]	"Family: Thelypteridaceae"
504	Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)	n
	Source(s)	Notes
	Palmer, D.D. 2003. Hawaii's Ferns and Fern Allies. University of Hawaii Press, Honolulu, HI	"Plants medium-sized to somewhat large, terrestrial. Rhizomes decumbent. short-creeping."
601	Evidence of substantial reproductive failure in native habitat	n
	Source(s)	Notes
	New Zealand Plant Conservation Network. 2010. Flora Details - <i>Macrothelypteris torresiana</i> . http://nzpcn.org.nz/flora_details.aspx?ID=282 . [Accessed 12 Sep 2017]	"Not Threatened. This species reaches its world southern limit in New Zealand. On the Kermadec Islands it is known only from Raoul Island where its abundance depends largely on the presence of suitably disturbed habitats. This fern is a short-lived, somewhat weedy, opportunist which colonises recently disturbed ground. Provided such habitats are created it is usually present but its abundance always varies. Little is known about its status at the North Cape Scientific Reserve, Te Pahi."

Qsn #	Question	Answer
	de Lange, P. J., & Crowcroft, G. M. (1997). <i>Macrothelypteris torresiana</i> (Thelypteridaceae) at North Cape, North Island, New Zealand—a new southern limit for a tropical fern. <i>New Zealand Journal of Botany</i> , 35(4), 555-558	[No evidence from New Zealand] "On Raoul Island <i>M. torresiana</i> was initially considered a common component of that island's dry forest association (Oliver 1910). However, in later treatments of the Kermadec Islands flora, Sykes (1977, pp. 71-72) considered <i>M. torresiana</i> as "generally uncommon" and, as a result, <i>M. torresiana</i> was listed as a threatened species by Cameron et al. (1993). More recently, Cameron et al. (1995) deleted <i>M. torresiana</i> from the New Zealand threatened and local plant lists, on account of its increasing abundance on Raoul (E. K. Cameron pers. comm.). The pattern emerging from these reports suggests that, as in Australia (D. L. Jones pers. comm.), <i>M. torresiana</i> populations are naturally dynamic: the numbers of plants fluctuates widely in response to the level of habitat disturbance."
	Palmer, D.D. 2003. <i>Hawaii's Ferns and Fern Allies</i> . University of Hawaii Press, Honolulu, HI	[No evidence. Widespread native and naturalized distributions] " <i>Macrothelypteris torresiana</i> is native from the Old World Tropics to Madagascar and Polynesia. and has become widely naturalized in the Americas including the southern United States."

602	Produces viable seed	Y
	Source(s)	Notes
	New Zealand Plant Conservation Network. 2010. Flora Details - <i>Macrothelypteris torresiana</i> . http://nzpcn.org.nz/flora_details.aspx?ID=282 . [Accessed 12 Sep 2017]	"Propagation Technique - Extremely easy from fresh spore and in ideal conditions it can be rather weedy, often self sowing and establishing itself within urban gardens."
	de Lange, P. J., & Crowcroft, G. M. (1997). <i>Macrothelypteris torresiana</i> (Thelypteridaceae) at North Cape, North Island, New Zealand—a new southern limit for a tropical fern. <i>New Zealand Journal of Botany</i> , 35(4), 555-558	[Spores] "Outside Raoul Island, within mainland New Zealand, <i>M. torresiana</i> is occasionally cultivated in suitably warm, frost-free locations (Brownsey & Smith-Dodsworth 1989). In some instances cultivated specimens have set viable spores, and these in turn have given rise to sporelings in the vicinity of adult plants, e.g., the campus grounds of The University of Auckland (P. J. de Lange, AK 231884). However, we have observed that such instances are uncommon and that few sporelings survive even the mild Auckland winters."
	Palmer, D.D. 2003. <i>Hawaii's Ferns and Fern Allies</i> . University of Hawaii Press, Honolulu, HI	[Spores] "Sori medial, round, bearing hairs, <i>Indusia</i> small, inconspicuous, soon deciduous, or hidden by mature sporangia."

603	Hybridizes naturally	
	Source(s)	Notes
	WRA Specialist. 2017. Personal Communication	Unknown. No evidence found

604	Self-compatible or apomictic	
	Source(s)	Notes
	Palmer, D.D. 2003. <i>Hawaii's Ferns and Fern Allies</i> . University of Hawaii Press, Honolulu, HI	"Nature has developed mechanisms that usually prevent self-fertilization (a sperm from a gametophyte fertilizing an ovum from the same gametophyte)." [Unknown for <i>Macrothelypteris torresiana</i>]

Qsn #	Question	Answer
	Mehltreter, K., Walker, L.R. & Sharpe, J.M. 2010. Fern Ecology. Cambridge University Press, Cambridge, UK	[Unknown for <i>Macrothelypteris torresiana</i>] "Most fern species cross-fertilize (i.e., sperm fertilizes an egg cell from a different gametophyte), but the gametophytes are potentially bisexual. If 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."

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 moisture] "Gametophytes may be male or female, or may produce both types of gametangia. For fertilization, the sperm cell must swim through water to an egg cell (Fig. 1.2). Most fern species cross-fertilize (i.e., sperm fertilizes an egg cell from a different gametophyte), but the gametophytes are potentially bisexual. If 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."

606	Reproduction by vegetative fragmentation	y
	Source(s)	Notes
	Goodness Grows. 2017. <i>Macrothelypteris torresiana</i> – "Mariana Maiden Fern". http://goodnessgrows.com/macrothelypteris-torresiana-mariana-maiden-fern/ . [Accessed 12 Sep 2017]	"Naturalizes freely from thick, aggressively-spreading rhizomes."
	Palmer, D.D. 2003. Hawaii's Ferns and Fern Allies. University of Hawaii Press, Honolulu, HI	"Plants medium-sized to somewhat large, terrestrial. Rhizomes decumbent. short-creeping."

607	Minimum generative time (years)	1
	Source(s)	Notes
	Mehltreter, K. (2010). Fern conservation. Fern Ecology, Cambridge University Press, Cambridge, UK. Pp. 323-359.	"Most fern species require several years to reach maturity. For example <i>Polystichum tripterum</i> in Japan needs 11 years (Sato, 1990) and the tree fern <i>Alsophila firma</i> in Mexico 12 years to reach maturity (Mehltreter and García-Franco, 2008), while other fern species such as <i>Macrothelypteris torresiana</i> in Mexico can reproduce within several months at very early developmental stages, when their leaves are shorter than 0.3 m, and long before the plant produces leaves of their maximum length of about 1.5m (K. Mehltreter, personal observation)."
	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	"This is a fast growing fern with lacy, light green umbragenous fronds, useful for sheltering smaller ferns."

701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	
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Qsn #	Question	Answer
	Source(s)	Notes
	de Lange, P. J., & Crowcroft, G. M. (1997). <i>Macrothelypteris torresiana</i> (Thelypteridaceae) at North Cape, North Island, New Zealand—a new southern limit for a tropical fern. <i>New Zealand Journal of Botany</i> , 35(4), 555-558	[Possibly Yes. Occurs along road verges, embankments, and track margins, Small spores may adhere to vehicles, footwear or equipment] "In the southern part of its Pacific range <i>Macrothelypteris torresiana</i> has been recorded from Australia and Norfolk and Raoul (Rangitahua) Islands (Jones & Clemesha 1976; Sykes 1977; Green 1994)." ... "Within this range, the species is generally considered an uncommon short-lived species of disturbed, open habitats such as stream banks, road verges, embankments, and track margins (D. L. Jones & P. Bostock pers. comm.)."
	New Zealand Plant Conservation Network. 2010. Flora Details - <i>Macrothelypteris torresiana</i> . http://nzpcn.org.nz/flora_details.aspx?ID=282 . [Accessed 12 Sep 2017]	[Possibly Yes. Occurs in heavily trafficked areas] "A weedy, short-lived, opportunistic species colonising recently disturbed ground such as slip scars, debris flows, landslides, the ground around tree falls, and exposed clay banks, roadside cuttings and the margins of ditches."

702	Propagules dispersed intentionally by people	
	Source(s)	Notes
	Palmer, D.D. 2003. <i>Hawaii's Ferns and Fern Allies</i> . University of Hawaii Press, Honolulu, HI	"Although the species was not collected in Hawai'i until 1915, it was first reported as naturalized in 1892." [Probably an unintentional introduction. No evidence of current cultivation or introduction]

703	Propagules likely to disperse as a produce contaminant	y
	Source(s)	Notes
	New Zealand Plant Conservation Network. 2010. Flora Details - <i>Macrothelypteris torresiana</i> . http://nzpcn.org.nz/flora_details.aspx?ID=282 . [Accessed 12 Sep 2017]	"In Auckland plants have established in the grounds of the University of Auckland, usually on pots or in pots holding other plants."

704	Propagules adapted to wind dispersal	y
	Source(s)	Notes
	Cowie, I. & Westaway, J. 2012. <i>Threatened Species of the Northern Territory - Macrothelypteris torresiana</i> . Northern Territory Government. https://www.nt.gov.au/environment/native-plants/threatened-plants . [Accessed]	"A single fern plant can produce millions of dust like spores with dispersal of some spores over thousands of kilometres being possible but rare (Keesler 2010)."
	Gordon, D. R., Mitterdorfer, B., Pheloung, P. C., Ansari, S., Buddenhagen, C., Chimera, C., ... & Williams, P. A. 2010). <i>Guidance for addressing the Australian Weed Risk Assessment questions</i> . <i>Plant Protection Quarterly</i> , 25(2): 56-74	"Answer 'yes' where documented evidence shows that wind contributes significantly to the dispersal range of the propagule. Even without such documentation, taxa with morphological features that facilitate propagule movement by wind (achenes with a pappus, samaras, etc.) should receive a 'yes' response. This group includes tumbling plants and fern spores."
	Palmer, D.D. 2003. <i>Hawaii's Ferns and Fern Allies</i> . University of Hawaii Press, Honolulu, HI	"Sori medial, round, bearing hairs, <i>Indusia</i> small, inconspicuous, soon deciduous, or hidden by mature sporangia."

705	Propagules water dispersed	y
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Qsn #	Question	Answer
	Source(s)	Notes
	Wagner Jr, W. H. (1950). Ferns Naturalized in Hawaii. Bishop Museum Occasional Papers 20(8): 95-121	"I found <i>L. Torresiana</i> , in 1947, to be common on rocks and in alluvium along the stream at Ukumehame Gulch, west Maui, at 1,000 feet altitude (5445); locally common in company with <i>Nephrolepis</i> , <i>Sadleria</i> , and <i>Cibotium</i> , in rocky woods along a stream, 25 miles west of Hana by road, east Maui; and frequent in rich, shaded places in a rocky wooded gulch along Wailua Stream, at 300-500 feet, east Maui."
	Flora of North America Editorial Committee. 1993. Flora of North America: Volume 2: Pteridophytes and Gymnosperms. Oxford University Press, Oxford, UK	"Terrestrial in damp woods and along stream banks; 0-100 m" [Spores likely moved by water along streams]
	Oppenheimer, H. 2016. New Hawaiian Plant Records for 2015. Bishop Museum Occasional Papers 118: 23–28	"Wailau Valley, Pūlena Stream, S side tributary"
	de Lange, P. J., & Crowcroft, G. M. (1997). <i>Macrothelypteris torresiana</i> (Thelypteridaceae) at North Cape, North Island, New Zealand—a new southern limit for a tropical fern. <i>New Zealand Journal of Botany</i> , 35(4), 555-558	[Occurs along stream banks] "Within this range, the species is generally considered an uncommon short-lived species of disturbed, open habitats such as stream banks, road verges, embankments, and track margins"

706	Propagules bird dispersed	n
	Source(s)	Notes
	Flora of North America Editorial Committee. 1993. Flora of North America: Volume 2: Pteridophytes and Gymnosperms. Oxford University Press, Oxford, UK	"Terrestrial in damp woods and along stream banks" [Possibly, but habitat and habit suggest wind and water are primary dispersal vectors]

707	Propagules dispersed by other animals (externally)	n
	Source(s)	Notes
	Dean, K. What Is the Primary Spore Dispersal Method Utilized by Ferns? SF Gate. http://homeguides.sfgate.com/primary-spore-dispersal-method-utilized-ferns-102478.html . [Accessed 13 Sep 2017]	"Most fern spores are dispersed by wind, but they can also travel on animal fur or bird feathers. Some fern spores drop into waterways where they are swept to a new place." [Possible, but unknown for <i>Macrothelypteris torresiana</i>]

708	Propagules survive passage through the gut	n
	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. <i>Plant Protection Quarterly</i> , 25(2): 56-74	"Answer 'no' where the taxon is unlikely to be eaten by animals or if seeds are not viable following passage through the gut."
	Dean, K. What Is the Primary Spore Dispersal Method Utilized by Ferns? SF Gate. http://homeguides.sfgate.com/primary-spore-dispersal-method-utilized-ferns-102478.html . [Accessed 13 Sep 2017]	"Fern spores might fall into an animal's food, be eaten and later dispersed in the animal's droppings. Fern spores are hardy and can remain viable for up to four years, giving them plenty of time to find a suitable place to germinate." [Possible, but unlikely for <i>M. torresiana</i>]

Qsn #	Question	Answer
801	Prolific seed production (>1000/m2)	y
	Source(s)	Notes
	Cowie, I. & Westaway, J. 2012. Threatened Species of the Northern Territory - <i>Macrothelypteris torresiana</i> . Northern Territory Government. https://www.nt.gov.au/environment/native-plants/threatened-plants . [Accessed]	"A single fern plant can produce millions of dust like spores with dispersal of some spores over thousands of kilometres being possible but rare (Keesler 2010)."
	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	"Assume 'yes' for fern taxa unless contradictory evidence exists."

802	Evidence that a persistent propagule bank is formed (>1 yr)	
	Source(s)	Notes
	Dean, K. What Is the Primary Spore Dispersal Method Utilized by Ferns? SF Gate. http://homeguides.sfgate.com/primary-spore-dispersal-method-utilized-ferns-102478.html . [Accessed 13 Sep 2017]	"Fern spores are hardy and can remain viable for up to four years, giving them plenty of time to find a suitable place to germinate." [Unknown for <i>Macrothelypteris torresiana</i>]

803	Well controlled by herbicides	
	Source(s)	Notes
	WRA Specialist. 2017. 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. 2010. Flora Details - <i>Macrothelypteris torresiana</i> . http://nzpcn.org.nz/flora_details.aspx?ID=282 . [Accessed 12 Sep 2017]	[Potentially Yes] "In Auckland plants have established in the grounds of the University of Auckland, usually on pots or in pots holding other plants."

805	Effective natural enemies present locally (e.g. introduced biocontrol agents)	
	Source(s)	Notes
	Palmer, D.D. 2003. Hawaii's Ferns and Fern Allies. University of Hawaii Press, Honolulu, HI	"Occasional to locally common, found in disturbed and open areas in mesic forests, 5-1.200 m, all major islands except Moloka'i and Lana'i." [Unknown. Presumably not limited by natural enemies]

Summary of Risk Traits:

High Risk / Undesirable Traits

- Elevation range exceeds 1000 m, demonstrating environmental versatility
- Thrives in tropical climates
- Naturalized in Hawaiian Islands and widely naturalized elsewhere
- A disturbance-adapted weedy fern (potentially negative environmental impacts)
- Shade-tolerant
- Reproduces by spores and spreads vegetatively by rhizomes
- Reaches maturity in several months
- Spores dispersed by wind, water & possibly other vectors
- Prolific spore production

Low Risk Traits

- Naturalized for over 100 years. May have already achieved maximum distribution in Hawaiian Islands and any negative impacts may have already been manifested
- Unarmed (no spines, thorns, or burrs)