**Taxon:** Ptisana salicina (Sm.) Murdock **Family:** Marattiaceae

**Common Name(s):** horseshoe fern
king fern
para
potato fern
Tawhiti para

**Synonym(s):** Marattia salicina Sm.

**Assessor:** Chuck Chimera **Status:** Assessor Approved **End Date:** 22 Sep 2016

**WRA Score:** 4.0 **Designation:** EVALUATE **Rating:** Evaluate

**Keywords:** Robust Fern, Endangered, Edible, 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 | 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 | ? |
| 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) | n |
| 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 | n |
| 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 |

| Qsn # | Question | Answer Option | Answer |
|---|---|---|---|
| 408 | Creates a fire hazard in natural ecosystems | y=1, n=0 | n |
| 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 | 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 | y |
| 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) | y=1, n=-1 | n |
| 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 | y=1, n=-1 | y |
| 706 | Propagules bird dispersed | y=1, n=-1 | n |
| 707 | Propagules dispersed by other animals (externally) | y=1, n=-1 | n |
| 708 | Propagules survive passage through the gut | | |
| 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** |
| | Leach, H. (2003). Fern consumption in Aotearoa and its oceanic precedents. The Journal of the Polynesian Society, 112(2), 141-155 | [Consumed, but no evidence of domestication] "In the case of another widespread fern, the para (Marattia salicina), the species was recorded as a famine food in Tahiti in John Davies's 1851 dictionary, a decade after Colenso described its sought-after status in New Zealand. This fern was known as pa'a hei in the Marquesas and para on Rarotonga, again listed as a famine food (Brown and Brown 1931:103, Cheeseman 1903:312). Its appearance and uses would presumably have been well known to the first East Polynesians to reach Aotearoa." |

| 102 | Has the species become naturalized where grown? | |
|---|---|---|
| | **Source(s)** | **Notes** |
| | WRA Specialist. 2016. Personal Communication | NA |

| 103 | Does the species have weedy races? | |
|---|---|---|
| | **Source(s)** | **Notes** |
| | WRA Specialist. 2016. 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** |
| | Murdock, A. (2008). A Taxonomic Revision of the Eusporangiate Fern Family Marattiaceae, with Description of a New Genus Ptisana. Taxon, 57(3), 737-755 | "Distribution. - Widely distributed in the Paleotropics from Ascension Island to the Marquesas Islands, with the highest diversity in New Guinea." |

| 202 | Quality of climate match data | High |
|---|---|---|
| | **Source(s)** | **Notes** |
| | Murdock, A. (2008). A Taxonomic Revision of the Eusporangiate Fern Family Marattiaceae, with Description of a New Genus Ptisana. Taxon, 57(3), 737-755 | |

| Qsn # | Question | Answer |
|---|---|---|
| **203** | **Broad climate suitability (environmental versatility)** | **n** |
| | **Source(s)** | **Notes** |
| | Breitwieser I., Brownsey P.J., Nelson W.A., Wilton A.D. eds. (2016) Flora of New Zealand Online – Taxon Profile - Ptisana salicina (based on Brownsey & Perrie 2014). http://www.nzflora.info/factsheet/Taxon/Ptisana_salicina.html. [Accessed 22 Sep 2016] | "Altitudinal range: 0–400 m." |
| | Dave's Garden. (2016). King Fern, Para, Horseshoe Fern - Marattia salicina. http://davesgarden.com/guides/pf/go/160163/. [Accessed 22 Sep 2016] | "Hardiness:<br>USDA Zone 9a: to -6.6 °C (20 °F)<br>USDA Zone 9b: to -3.8 °C (25 °F)<br>USDA Zone 10a: to -1.1 °C (30 °F)<br>USDA Zone 10b: to 1.7 °C (35 °F)" |

| Qsn # | Question | Answer |
|---|---|---|
| **204** | **Native or naturalized in regions with tropical or subtropical climates** | **y** |
| | **Source(s)** | **Notes** |
| | Murdock, A. (2008). A Taxonomic Revision of the Eusporangiate Fern Family Marattiaceae, with Description of a New Genus Ptisana. Taxon, 57(3), 737-755 | "Distribution. - Widely distributed in the Paleotropics from Ascension Island to the Marquesas Islands, with the highest diversity in New Guinea." |

| Qsn # | Question | Answer |
|---|---|---|
| **205** | **Does the species have a history of repeated introductions outside its natural range?** | **?** |
| | **Source(s)** | **Notes** |
| | New Zealand Plant Conservation Network. (2016). Flora Details - Ptisana salicina. http://www.nzpcn.org.nz/flora_details.aspx?ID=133. [Accessed 22 Sep 2016] | "Where To Buy - Periodically offered by most commercial garden centres. Plants are held by several specialist native plant nurseries." |
| | WRA Specialist. 2016. Personal Communication | Available for sale on a number of websites in New Zealand, but unclear how common cultivation occurs outside native range |

| Qsn # | Question | Answer |
|---|---|---|
| **301** | **Naturalized beyond native range** | **n** |
| | **Source(s)** | **Notes** |
| | Randall, R.P. 2012. A Global Compendium of Weeds. 2nd Edition. Department of Agriculture and Food, Western Australia | No evidence |

| Qsn # | Question | Answer |
|---|---|---|
| **302** | **Garden/amenity/disturbance weed** | **n** |
| | **Source(s)** | **Notes** |
| | 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** |

| Qsn # | Question | Answer |
|---|---|---|
| | **Source(s)** | **Notes** |
| | Randall, R.P. 2012. A Global Compendium of Weeds. 2nd Edition. Department of Agriculture and Food, Western Australia | No evidence |

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

| 305 | Congeneric weed | n |
|---|---|---|
| | **Source(s)** | **Notes** |
| | Randall, R.P. 2012. A Global Compendium of Weeds. 2nd Edition. Department of Agriculture and Food, Western Australia | No Ptisana or Marattia species are reported as invasive |

| 401 | Produces spines, thorns or burrs | n |
|---|---|---|
| | **Source(s)** | **Notes** |
| | Jones, D. L. 1987. Encyclopedia of Ferns. Timber Press, Portland, OR | "A large, fleshy fern of shady, moist forests. Old plants develop a rounded fleshy trunk. Fronds are an attractive verdant green with a pleasant, arching habit." [No evidence] |

| 402 | Allelopathic | |
|---|---|---|
| | **Source(s)** | **Notes** |
| | WRA Specialist. 2016. Personal Communication | Unknown |

| 403 | Parasitic | n |
|---|---|---|
| | **Source(s)** | **Notes** |
| | Jones, D. L. 1987. Encyclopedia of Ferns. Timber Press, Portland, OR | "A large, fleshy fern of shady, moist forests. Old plants develop a rounded fleshy trunk. Fronds are an attractive verdant green with a pleasant, arching habit." [Marattiaceae. No evidence] |

| 404 | Unpalatable to grazing animals | n |
|---|---|---|
| | **Source(s)** | **Notes** |
| | Brownsey, P.J. & Smith-Dodsworth, J.C. 1989. New Zealanc Ferns and Allied Plants. David Bateman Ltd, Auckland, New Zealand | "...it is palatable to stock and has been decimated by pigs." |
| | Forester, L. & Townsend, A. (2004). Threatened plants of Northland Conservancy. Department of Conservation, Wellington, New Zealand | "Domestic stock browse the upper parts of the plant and pigs eat the starchy rhizome." |

| Qsn # | Question | Answer |
|---|---|---|
| | Director of National Parks. 2010. Norfolk Island Region Threatened Species Recovery Plan. Department of the Environment, Water, Heritage and the Arts, Canberra | "It is vulnerable to over-collecting and grazing by stock (Braggins 1996)." ... "Grazing and trampling by cattle has been reported as having an impact on Achyranthes arborescens, Boehmeria australis, Elatostema montanum, Marattia salicina, Meryta latifolia, and Streblus pendulinus..." |

| 405 | Toxic to animals | 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] "...it is palatable to stock and has been decimated by pigs." |
| | 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 |

| 406 | Host for recognized pests and pathogens | |
|---|---|---|
| | **Source(s)** | **Notes** |
| | Knight, K. W., Barber, C. J., & Page, G. D. (1997). Plant-parasitic nematodes of New Zealand recorded by host association. Journal of Nematology, 29(4S): 640-656 | "Records of plant-parasitic nematodes in association with hosts in New Zealand have been reviewed previously (Clark, 1963d; Cottier, 1956; Dale, 1972a; Dingley, 1969). This paper incorporates New Zealand nematode- host associations published up to 1995 ..." [Marattia salicina - Nematode = Aphelenchoides fragariae] |

| 407 | Causes allergies or is otherwise toxic to humans | n |
|---|---|---|
| | **Source(s)** | **Notes** |
| | Brownsey, P.J. & Smith-Dodsworth, J.C. 1989. New Zealanc Ferns and Allied Plants. David Bateman Ltd, Auckland, New Zealand | "This fern was once common in northern New Zealand and its large, starchy root was an important food source in pre-European times." |
| | 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 |

| 408 | Creates a fire hazard in natural ecosystems | n |
|---|---|---|
| | **Source(s)** | **Notes** |
| | Jones, D. L. 1987. Encyclopedia of Ferns. Timber Press, Portland, OR | "A large, fleshy fern of shady, moist forests." [No evidence. Unlikely given habit & habitat] |

| Qsn # | Question | Answer |
|---|---|---|
| **409** | **Is a shade tolerant plant at some stage of its life cycle** | **y** |
| | **Source(s)** | **Notes** |
| | Jones, D. L. 1987. Encyclopedia of Ferns. Timber Press, Portland, OR | "A large, fleshy fern of shady, moist forests." |
| | Brownsey, P.J. & Smith-Dodsworth, J.C. 1989. New Zealanc Ferns and Allied Plants. David Bateman Ltd, Auckland, New Zealand | "Likes plenty of shade and shelter" |

| | | |
|---|---|---|
| **410** | **Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)** | |
| | **Source(s)** | **Notes** |
| | Brownsey, P.J. & Smith-Dodsworth, J.C. 1989. New Zealanc Ferns and Allied Plants. David Bateman Ltd, Auckland, New Zealand | "Easy in deep, rich, damp soil." |

| | | |
|---|---|---|
| **411** | **Climbing or smothering growth habit** | **n** |
| | **Source(s)** | **Notes** |
| | Jones, D. L. 1987. Encyclopedia of Ferns. Timber Press, Portland, OR | "A large, fleshy fern of shady, moist forests. Old plants develop a rounded fleshy trunk. Fronds are an attractive verdant green with a pleasant, arching habit." |

| | | |
|---|---|---|
| **412** | **Forms dense thickets** | **n** |
| | **Source(s)** | **Notes** |
| | Mueller-Dombois, D. & Fosberg, F. R. 1998. Vegetation of the tropical Pacific islands. Springer-Verlag, New York, NY | "Norfolk Island ... The ground flora is rich in fern species, including the king fern Marattia salicina (syn. M. fraxinea), which has declined in abundance but can still be found in naturally protected gullies." |
| | Murdock, A. G., & Smith, A. R. (2003). Pteridophytes of Moorea, French Polynesia, with a new species, Tmesipteris gracilis (Psilotaceae). Pacific science, 57(3), 253-265 | "Terrestrial at high elevations, in wet valleys." [No evidence] |
| | Breitwieser I., Brownsey P.J., Nelson W.A., Wilton A.D. eds. (2016) Flora of New Zealand Online – Taxon Profile - Ptisana salicina (based on Brownsey & Perrie 2014). http://www.nzflora.info/factsheet/Taxon/Ptisana_salicina.html. [Accessed 22 Sep 2016] | [No evidence] "Confined to coastal and lowland regions of the North Island, extending locally to mid-elevations in the Kaimai Ranges and Mt Pirongia. The species is found throughout Northland and Auckland, the Bay of Plenty as far east as Waihau Bay and the Waioeka Gorge, and in Taranaki south to the Kaitake Range, Egmont National Park." ... "The species was given a conservation status of declining by de Lange et al. (2013). It was once common in northern New Zealand, but is palatable to stock and has been decimated by pigs." |

| Qsn # | Question | Answer |
|---|---|---|
| **501** | **Aquatic** | **n** |
| | **Source(s)** | **Notes** |
| | Murdock, A. G., & Smith, A. R. (2003). Pteridophytes of Moorea, French Polynesia, with a new species, Tmesipteris gracilis (Psilotaceae). Pacific science, 57(3), 253-265 | "Terrestrial at high elevations, in wet valleys." |

| 502 | Grass | n |
|---|---|---|
| | **Source(s)** | **Notes** |
| | Breitwieser I., Brownsey P.J., Nelson W.A., Wilton A.D. eds. (2016) Flora of New Zealand Online – Taxon Profile - Ptisana salicina (based on Brownsey & Perrie 2014). http://www.nzflora.info/factsheet/Taxon/Ptisana_salicina.html. [Accessed 22 Sep 2016] | "Rhizomes short, erect, forming a hard mass, with pairs of large ear-like lobes protecting new fronds. Fronds 2000–2800 mm long (up to 4000 mm in cultivation). Stipes 1000–1500 mm long, 30–40 mm in diameter at base above swollen junction with rhizome, not winged, green, smooth except for abundant, very narrowly ovate, fimbriate, non-clathrate scales up to 15 mm long, 1.5 mm wide. Laminae 2-pinnate, ovate, 1100–1400 mm long (up to 3000 mm in cultivation), 110 –1500 mm wide (up to 2000 mm in cultivation), dark glossy green on upper surfaces, paler on lower surfaces, coriaceous; scales abundant on abaxial surface of rachis, pinna midribs and costae, narrowly ovate to linear, pale brown, fimbriate. Primary pinnae in 6–11 pairs, oblong, the longest 385–650 mm long, 155–330 mm wide, stalked; pulvini present at the junction with rachis. Secondary pinnae in 13–24 pairs, narrowly oblong or narrowly ovate, the longest 9 – 185 mm long (205 mm in cultivation), 13–23 mm wide, shortly stalked; apex attenuate to acuminate; margins serrate or serrulate; base unequal, cuneate to truncate; pulvini present but obscure at the junction with pinna midrib. Veins free, undivided or occasionally 1-branched. Synangia oblong with rounded ends, 1.5–3.5 mm long, on veins just inside the pinna margin, comprising 2 rows of 5–14 fused sporangia; paraphyses present as very narrow, hair-like scales surrounding the synangia. " |

| 503 | Nitrogen fixing woody plant | n |
|---|---|---|
| | **Source(s)** | **Notes** |
| | Murdock, A. (2008). A Taxonomic Revision of the Eusporangiate Fern Family Marattiaceae, with Description of a New Genus Ptisana. Taxon, 57(3), 737-755 | Marattiaceae |

| 504 | Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers) | n |
|---|---|---|
| | **Source(s)** | **Notes** |
| | Breitwieser I., Brownsey P.J., Nelson W.A., Wilton A.D. eds. (2016) Flora of New Zealand Online – Taxon Profile - Ptisana salicina (based on Brownsey & Perrie 2014). http://www.nzflora.info/factsheet/Taxon/Ptisana_salicina.html. [Accessed 22 Sep 2016] | "Rhizomes short, erect, forming a hard mass, with pairs of large ear-like lobes protecting new fronds." |

| Qsn # | Question | Answer |
|---|---|---|
| **601** | **Evidence of substantial reproductive failure in native habitat** | **y** |
| | **Source(s)** | **Notes** |
| | Director of National Parks. 2010. Norfolk Island Region Threatened Species Recovery Plan. Department of the Environment, Water, Heritage and the Arts, Canberra | "In 2003 there were less than 100 mature individuals all within the Mt Pitt section of the national park (TSSC 2003b). There are about 40 specimens in King Fern Valley and a large patch growing on a steep slope in western area D. It was reported from several sites within the forest and with some regeneration seen in 1996 (Braggins 1996). In New Zealand it is listed as “chronically threatened - Serious Decline” (de Lange et al. 2004)." ... "It is vulnerable to over collecting and grazing by stock (Braggins 1996). It is susceptible to dry conditions and changes to the hydrology of the national park." |
| | Breitwieser I., Brownsey P.J., Nelson W.A., Wilton A.D. eds. (2016) Flora of New Zealand Online – Taxon Profile - Ptisana salicina (based on Brownsey & Perrie 2014). http://www.nzflora.info/factsheet/Taxon/Ptisana_salicina.html. [Accessed 22 Sep 2016] | "The species was given a conservation status of declining by de Lange et al. (2013). It was once common in northern New Zealand, but is palatable to stock and has been decimated by pigs." |

| | | |
|---|---|---|
| **602** | **Produces viable seed** | **y** |
| | **Source(s)** | **Notes** |
| | New Zealand Plant Conservation Network. (2016). Flora Details - Ptisana salicina. http://www.nzpcn.org.nz/flora_details.aspx?ID=133. [Accessed 22 Sep 2016] | "Propagation Technique - Difficult. Can be grown from spores but very slow." |

| | | |
|---|---|---|
| **603** | **Hybridizes naturally** | |
| | **Source(s)** | **Notes** |
| | Murdock, A. (2008). A Taxonomic Revision of the Eusporangiate Fern Family Marattiaceae, with Description of a New Genus Ptisana. Taxon, 57(3), 737-755 | [Unknown] "Twenty species and three varieties are currently recognized. The most commonly grown "Marattia" species in botanical gardens (e.g., M. salicina, M. attenu ata, M. oreades) are all in this new genus, and as a result much of the scientific literature on Marattia is now refer able to Ptisana." |

| | | |
|---|---|---|
| **604** | **Self-compatible or apomictic** | |
| | **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 | Unknown. Probably Yes |

| | | |
|---|---|---|
| **605** | **Requires specialist pollinators** | **n** |
| | **Source(s)** | **Notes** |

| Qsn # | Question | Answer |
|---|---|---|
| | Jones, D. L. 1987. Encyclopedia of Ferns. Timber Press, Portland, OR | [Requires water for fertilization] "The spores germinate to form a relatively thick but flattened prothallus which branches to form a pinnate structure. The prothalli become infected with a mycorrhizal fungus and also develop chlorophyll and become photosynthetic. They are attached to the soil by rhizoids. Antheridia are borne on both the upper and lower surface; archegonia arise on the lower surface only (sometimes on a thickened pad). The motile sperm swim from the antheridia to the archegonia and effect fertilization." |

| 606 | Reproduction by vegetative fragmentation | y |
|---|---|---|
| | **Source(s)** | **Notes** |
| | Brownsey, P.J. & Smith-Dodsworth, J.C. 1989. New Zealanc Ferns and Allied Plants. David Bateman Ltd, Auckland, New Zealand | "Easy to transplant and propagate by root division." |
| | 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 | [Marattiaceae family description] "VEGETATIVE REPRODUCTION. Vegetative propagation occurs through growth of adventitious buds on the stipules, at least in the larger plants, and provides a means for bringing plants into cultivation. Jenman (1909) considered that in Marattia alata Swartz stipular reproduction is more common than that by spores. Plants growing from stipule buds appear to pass through the same developmental stages of leaf form as those from gametophytes. Adventitious buds may be produced near the apex of the rachis in Danaea plants of lax habit." |

| 607 | Minimum generative time (years) | |
|---|---|---|
| | **Source(s)** | **Notes** |
| | New Zealand Plant Conservation Network. (2016). Flora Details - Ptisana salicina. http://www.nzpcn.org.nz/flora_details.aspx?ID=133. [Accessed 22 Sep 2016] | "Specimens of suitable age may produce sporangia at any time." ... "Can be grown from spores but very slow." [Unknown. May be able to reproduce vegetatively prior to sexual maturity] |

| 701 | Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas) | n |
|---|---|---|
| | **Source(s)** | **Notes** |
| | Breitwieser I., Brownsey P.J., Nelson W.A., Wilton A.D. eds (2016) Flora of New Zealand Online – Taxon Profile - Ptisana salicina (based on Brownsey & Perrie 2014). http://www.nzflora.info/factsheet/Taxon/Ptisana_salicina.html. [Accessed 22 Sep 2016] | "Occurs in kauri, podocarp and broadleaved forest, often in deep, shaded gullies or on the banks of streams and creeks, especially where it is secure from stock and pigs. " [Possible that spores could be carried on equipment, shoes, etc. but unlikely given habitat preferences] |

| 702 | Propagules dispersed intentionally by people | y |
|---|---|---|
| | **Source(s)** | **Notes** |
| | Murdock, A. (2008). A Taxonomic Revision of the Eusporangiate Fern Family Marattiaceae, with Description of a New Genus Ptisana. Taxon, 57(3), 737-755 | "The most commonly grown "Marattia" species in botanical gardens (e.g., M. salicina, M. attenu ata, M. oreades) are all in this new genus, and as a result much of the scientific literature on Marattia is now refer able to Ptisana." |

| Qsn # | Question | Answer |
|---|---|---|
| **703** | **Propagules likely to disperse as a produce contaminant** | |
| | **Source(s)** | **Notes** |
| | New Zealand Plant Conservation Network. (2016). Flora Details - Ptisana salicina. http://www.nzpcn.org.nz/flora_details.aspx?ID=133. [Accessed 22 Sep 2016] | "The spores are arranged in distinctive boat-shaped sori." ... "Specimens of suitable age may produce sporangia at any time." [Unknown. Spores could potentially contaminate soil or potting media of any plants growing in the vicinity of reproductive age individuals] |

| 704 | Propagules adapted to wind dispersal | y |
|---|---|---|
| | **Source(s)** | **Notes** |
| | Murdock, A. (2008). A Taxonomic Revision of the Eusporangiate Fern Family Marattiaceae, with Description of a New Genus Ptisana. Taxon, 57(3), 737-755 | "Spores monolete (rarely trilete or alete), exospores granular to rugose; spinulose spores not re corded from this genus, but further investigation is required." |
| | 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 | "This group includes tumbling plants and fern spores." |

| 705 | Propagules water dispersed | y |
|---|---|---|
| | **Source(s)** | **Notes** |
| | New Zealand Plant Conservation Network. (2016). Flora Details - Ptisana salicina. http://www.nzpcn.org.nz/flora_details.aspx?ID=133. [Accessed 22 Sep 2016] | "Favouring lowland, karst habitats (cave entrances and tomo shafts) and dark stream sides" |
| | Cameron, E. K. (1999). Vascular plants of Mt William Scenic Reserve. Auckland Bot. Soc. J, 54(1), 18-22 | "Marattia salicina (king fern) recorded by Gardner (1981) in the steep most western catchment. Some of the ABS party checked the lower part of this catchment where some 35 small (<50 cm tall) king ferns were found. The Cameron family later checked at least the lower half of the stream which flows out below the starting point (near the toilet) and only found one adult king fern by this stream and a small one mid slope well above the stream. Some 20 30 mature specimens also grow by the stream running eastwards in the forest on private land just south of Mt William summit (S. McCraith pers. comm.)." |
| | Brownsey, P.J. & Smith-Dodsworth, J.C. 1989. New Zealanc Ferns and Allied Plants. David Bateman Ltd, Auckland, New Zealand | "Scattered populations can still be found in dark gullies in the Aukland, Waikato and Coromandel areas." |
| | WRA Specialist. 2016. Personal Communication | Frequent proximity to streams and other water sources suggests spores & possible rhizome fragments are dispersed by water |

| Qsn # | Question | Answer |
|---|---|---|
| **706** | **Propagules bird dispersed** | **n** |
| | **Source(s)** | **Notes** |
| | Breitwieser I., Brownsey P.J., Nelson W.A., Wilton A.D. eds. (2016) Flora of New Zealand Online – Taxon Profile - Ptisana salicina (based on Brownsey & Perrie 2014). http://www.nzflora.info/factsheet/Taxon/Ptisana_salicina.html. [Accessed 22 Sep 2016] | "Synangia oblong with rounded ends, 1.5–3.5 mm long, on veins just inside the pinna margin, comprising 2 rows of 5–14 fused sporangia; paraphyses present as very narrow, hair-like scales surrounding the synangia." [Although spores may potentially adhere to bird feet or feathers, the primary vector of dispersal is wind & probably water] |

| | | |
|---|---|---|
| **707** | **Propagules dispersed by other animals (externally)** | **n** |
| | **Source(s)** | **Notes** |
| | WRA Specialist. 2016. Personal Communication | Possibly, but unlikely. Although spores may potentially adhere to animal fur or feet, the primary vector of dispersal is wind & water. The presence of ungulates results in the elimination of this fern. |

| | | |
|---|---|---|
| **708** | **Propagules survive passage through the gut** | |
| | **Source(s)** | **Notes** |
| | Brownsey, P.J. & Smith-Dodsworth, J.C. 1989. New Zealanc Ferns and Allied Plants. David Bateman Ltd, Auckland, New Zealand | "...it is palatable to stock and has been decimated by pigs." [Unknown if consumption of fern fronds results in passage of viable spores] |

| | | |
|---|---|---|
| **801** | **Prolific seed production (>1000/m2)** | **y** |
| | **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 | "spore output several thousand per sporangium or synangial compartment." [Marattiaceae family description] |

| | | |
|---|---|---|
| **802** | **Evidence that a persistent propagule bank is formed (>1 yr)** | |
| | **Source(s)** | **Notes** |
| | WRA Specialist. 2016. Personal Communication | Unknown |

| | | |
|---|---|---|
| **803** | **Well controlled by herbicides** | |
| | **Source(s)** | **Notes** |
| | WRA Specialist. 2016. Personal Communication | Unknown. No information on herbicide efficacy or chemical control of this species |

| Qsn # | Question | Answer |
|---|---|---|
| **804** | **Tolerates, or benefits from, mutilation, cultivation, or fire** | |
| | **Source(s)** | **Notes** |
| | Brownsey, P.J. & Smith-Dodsworth, J.C. 1989. New Zealanc Ferns and Allied Plants. David Bateman Ltd, Auckland, New Zealand | "Easy to transplant and propagate by root division." [Unknown. Possible that plants could regenerate if rhizomes are damaged] |

| | | |
|---|---|---|
| **805** | **Effective natural enemies present locally (e.g. introduced biocontrol agents)** | |
| | **Source(s)** | **Notes** |
| | WRA Specialist. 2016. Personal Communication | Unknown |

**Summary of Risk Traits:**

High Risk / Undesirable Traits
• Grows in regions with tropical climates
• Shade-tolerant
• Reproduces by spores & vegetatively by rhizome division
• Spores presumably dispersed by wind, & water
• Presumably produces prolific numbers of spores
• Gaps in ecological information reduces accuracy of risk prediction

Low Risk Traits
• No reports of invasiveness or naturalization, & in decline within native range, but limited evidence of widespread introduction outside native range
• Unarmed (no spines, thorns or burrs)
• Palatable to pigs, goats & other browsing/grazing animals (contributing to decline within native range)
• Non-toxic
• Ornamental
• Propagation from spores reported to be difficult

Second Screening Results for Tree/tree-like shrubs

(A) Shade tolerant or known to form dense stands?> Yes. Shade tolerant, but not reported to form dense stands
(B) Bird or clearly wind-dispersed?> Spores presumably dispersed by wind & possibly water
(C) Life cycle <4 years? Time to reproductive maturity unknown
Outcome = Evaluate further