Taxon: Calothamnus villosus R. Br. **Family:** Myrtaceae

Common Name(s): silky net-bush
woolly net-bush

Synonym(s):

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

WRA Score: -2.0 **Designation:** L **Rating:** Low Risk

Keywords: Shrub, Unarmed, Bird-Pollinated, Fire Resprouter, Canopy Seed Bank

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	n
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)	y
401	Produces spines, thorns or burrs	y=1, n=0	n
402	Allelopathic		
403	Parasitic	y=1, n=0	n
404	Unpalatable to grazing animals		
405	Toxic to animals	y=1, n=0	n
406	Host for recognized pests and pathogens		
407	Causes allergies or is otherwise toxic to humans	y=1, n=0	n
408	Creates a fire hazard in natural ecosystems		
409	Is a shade tolerant plant at some stage of its life cycle		

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	y=1, n=0	n
501	Aquatic	y=5, n=0	n
502	Grass	y=1, n=0	n
503	Nitrogen fixing woody plant	y=1, n=0	n
504	Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)	y=1, n=0	n
601	Evidence of substantial reproductive failure in native habitat	y=1, n=0	n
602	Produces viable seed	y=1, n=-1	y
603	Hybridizes naturally		
604	Self-compatible or apomictic		
605	Requires specialist pollinators	y=-1, n=0	n
606	Reproduction by vegetative fragmentation	y=1, n=-1	n
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		
705	Propagules water dispersed	y=1, n=-1	n
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	y=1, n=-1	n
801	Prolific seed production (>1000/m2)		
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	y=1, n=-1	y
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**
	Hawkeswood, T. J. (1984). Nine new species of Calothamnus Labill.(Myrtaceae: Leptospermoideae) from Western Australia. Nuytsia. 5(1): 123-153	[No evidence of domestication] "Calothamnus villosus has a fairly wide distribution from Red Gum Springs in the Stirling Ranges (34°25'S, 119°50'E), Cape Riche (34°36'S, 118°47'E) to the Gairdner and Fitzgerald Rivers, East Mt Barren (33°46'S, 122°01'E) and also occurs to the east of Mt Ragged (33°27'S, 122°28'E)."

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**
	Western Australian Herbarium (1998–2020). FloraBase—the Western Australian Flora. Department of Parks and Wildlife. https://florabase.dpaw.wa.gov.au/. [Accessed 28 May 2020]	"Beard's Provinces: South-West Province. IBRA Regions: Esperance Plains, Mallee. IBRA Subregions: Eastern Mallee, Fitzgerald, Recherche, Western Mallee. IMCRA Regions: WA South Coast. Local Government Areas (LGAs): Albany, Cranbrook, Esperance, Gnowangerup, Jerramungup, Kent, Ravensthorpe."

202	Quality of climate match data	High
	Source(s)	**Notes**
	Western Australian Herbarium (1998–2020). FloraBase—the Western Australian Flora. Department of Parks and Wildlife. https://florabase.dpaw.wa.gov.au/. [Accessed 28 May 2020]	

Qsn #	Question	Answer
203	**Broad climate suitability (environmental versatility)**	**n**
	Source(s)	**Notes**
	Dave's Garden. (2020). Melaleuca Species, Silky Net Bush - Melaleuca hislopii (Synonym: Calothamnus villosus), https://davesgarden.com/guides/pf/go/63867/. [Accessed 28 May 2020]	"Hardiness: 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) USDA Zone 11: above 4.5 °C (40 °F)"
	Australian Native Plants. (2020). Calothamnus villosus. https://www.australianplants.com/plants.aspx?id=1218. [Accessed 28 May 2020]	"Origin: Mediterranean Climate Exposure: Full Sun to Partial Shade Irrigation: Drought tolerant once established Frost: Moderately Frost Tolerant25F (-4C)"

204	Native or naturalized in regions with tropical or subtropical climates	n
	Source(s)	**Notes**
	Australian Native Plants. (2020). Calothamnus villosus. https://www.australianplants.com/plants.aspx?id=1218. [Accessed 28 May 2020]	"Origin: Mediterranean Climate Exposure: Full Sun to Partial Shade Irrigation: Drought tolerant once established Frost: Moderately Frost Tolerant25F (-4C)"
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	[No evidence] "Preferred Climate/s: Mediterranean"

205	Does the species have a history of repeated introductions outside its natural range?	?
	Source(s)	**Notes**
	Dave's Garden. (2020). Melaleuca Species, Silky Net Bush - Melaleuca hislopii (Synonym: Calothamnus villosus), https://davesgarden.com/guides/pf/go/63867/. [Accessed 28 May 2020]	"This plant has been said to grow in the following regions: Carpinteria, California Escondido, California Templeton, California Vista, California(9 reports)"
	Plant Lust. (2020). Calothamnus villosus. https://plantlust.com/plants/14758/calothamnus-villosus/. [Accessed 1 Jun 2020]	[Sold commercially in California] "We have great partners who've grown this plant"

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

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	No evidence

303	**Agricultural/forestry/horticultural weed**	**n**
	Source(s)	**Notes**
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	No evidence

304	**Environmental weed**	**n**
	Source(s)	**Notes**
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	"References: Australia-E-380." [Listed as an environmental weed, but a review of the publication cited (Mulvaney,1991) gives no evidence that this species is invasive]
	Mulvaney, M. J. (1991). Far from the Garden Path: An Identikit Picture of Woody Ornamanetal Plants Invading South-Eastern Australian Bushland. PhD Dissertation. Dept. Australian National University, Canberra ACT	"This thesis establishes a predictive model to identify woody plants with a high invasive potential in South-eastern Australia." [Calothamnus villosus not predicted to be invasive, in contrast to designation in Randall 2017]

305	**Congeneric weed**	**y**
	Source(s)	**Notes**
	Keighery, G. (2013). Weedy native plants in Western Australia: an annotated checklist. Conservation Science Western Australia, 8, 259-273	"Although many of the species discussed below will likely remain only minor weeds of remnant bushland, there are a series of species (Agonis flexuosa, Allocasuarina huegeliana, Calothamnus spp., Ceratopteris thalictroides, Chamelaucium uncinatum, Eucalyptus megacornuta, Hakea costata and Melaleuca lanceolata) that have the capacity to completely alter the structure of communities that they invade. These are as damaging to the conservation of the remnant bushland invaded as are many exotic invasive species." ... "Calothamnus graniticus Hawkeswood subsp. graniticus ... Seeding and established along roadsides north of Dwellingup and in Kings Park. Possibility of hybridization exists between scarp (subsp. leptophyllus Hawkeswood) and Cape Naturaliste (subsp. graniticus) subspecies." ... "Calothamnus rupestris ... Naturalized from plantings along road verges and forming a dense monoculture, subsequently spreading downslope into adjacent bushland." ... "Calothamnus validus ... Naturalized from plantings and forming dense monocultures in Kings Park."

Qsn #	Question	Answer
401	**Produces spines, thorns or burrs**	**n**
	Source(s)	**Notes**
	Western Australian Herbarium (1998–2020). FloraBase—the Western Australian Flora. Department of Parks and Wildlife. https://florabase.dpaw.wa.gov.au/. [Accessed 28 May 2020]	[No evidence] "Erect to spreading shrub, 0.3-1.5 m high."

402	Allelopathic	
	Source(s)	**Notes**
	WRA Specialist. (2020). Personal Communication	Unknown. No evidence found

403	Parasitic	n
	Source(s)	**Notes**
	Western Australian Herbarium (1998–2020). FloraBase—the Western Australian Flora. Department of Parks and Wildlife. https://florabase.dpaw.wa.gov.au/. [Accessed 28 May 2020]	"Erect to spreading shrub, 0.3-1.5 m high." [Myrtaceae. No evidence]

404	Unpalatable to grazing animals	
	Source(s)	**Notes**
	Rafferty, C., & Lamont, B. B. (2007). Selective herbivory by mammals on 19 species planted at two densities. Acta Oecologica, 32(1), 1-13	[Unknown. Other Calothamnus species unpalatable] "The biomass of five species was unaffected by herbivory. C. calophylla, C. quadrifidus and C. sanguineus contained essential oils and supports our earlier findings on their palatability reducing effect (Jones et al., 2003)."

405	Toxic to animals	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

406	Host for recognized pests and pathogens	
	Source(s)	**Notes**

Qsn #	Question	Answer
	Bunny, F. J. (1996). The biology, ecology and taxonomy of Phytophthora citricola in native plant communities in Western Australia.PhD Dissertation. Murdoch University, Perth	"The objectives of the project were to develop an understanding of the disease dynamics caused by Phytophthora citricola in native plant communities in the south of Western Australia. Prior to 1983, the pathogen had only been reported twice from Australian forests. Since then, P. citricola has been extensively recorded from plant communities north and south of Perth, and is currently the second most frequently recovered Phytophthora species from the northern jarrah forest and the northern sandplains." … "Table 2.1. Native plants from which Phytophthora citricola has been isolated in southwest Australia." [Includes Calothamnus villosus]
	WRA Specialist. (2020). Personal Communication	Unknown if Calothamnus villosus could serve as a host to the fungus Austropuccinia psidii, but this pathogen is already present in the Hawaiian Islands and has been documented on a fairly wide host range of native and non-native plants. The cultivation of Calothamnus villosus is therefore unlikely to significantly affect the distribution of Austropuccinia psidii.

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	
	Source(s)	**Notes**
	Bell, D., Plummer, J., & Taylor, S. (1993). Seed Germination Ecology in Southwestern Western Australia. Botanical Review, 59(1), 24-73	[Resprouts following fires. Unknown if highly flammable, or if fire risk is increased in habitats where it grows. No direct evidence found] "The southwest of Western Australia has a Mediterranean-type climate, a range of soil types, often with severe nutritional deficiencies, and is subject to periodic fires." … "Appendix I" [Calothamnus villosus … Fire response syndrome - Resprouter]

Qsn #	Question	Answer
409	**Is a shade tolerant plant at some stage of its life cycle**	
	Source(s)	**Notes**
	Australian Native Plants. (2020). Calothamnus villosus. https://www.australianplants.com/plants.aspx?id=1218. [Accessed 1 Jun 2020]	"Exposure: Full Sun to Partial Shade"
	Desert Tropicals. (2020). Calothamnus villosus. https://www.desert-tropicals.com/Plants/Myrtaceae/Calothamnus_villosus.html. [Accessed 1 Jun 2020]	"Sun Exposure: Full sun"
	Plant This. (2020). Calothamnus villosus. http://www.plantthis.com.au. [Accessed 1 Jun 2020]	"Sunlight: hot overhead sun"

Qsn #	Question	Answer
410	**Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)**	**y**
	Source(s)	**Notes**
	Plant This. (2020). Calothamnus villosus. http://www.plantthis.com.au. [Accessed 1 Jun 2020]	"Soil: ordinary soil, enriched soil, mildly acidic to mildly alkaline"
	Australian Native Plants. (2020). Calothamnus villosus. https://www.australianplants.com/plants.aspx?id=1218. [Accessed 1 Jun 2020]	"Tolerant of a wide range of soils and situations."

Qsn #	Question	Answer
411	**Climbing or smothering growth habit**	**n**
	Source(s)	**Notes**
	Western Australian Herbarium (1998–2020). FloraBase—the Western Australian Flora. Department of Parks and Wildlife. https://florabase.dpaw.wa.gov.au/. [Accessed 28 May 2020]	"Erect to spreading shrub, 0.3-1.5 m high."

Qsn #	Question	Answer
412	**Forms dense thickets**	**n**
	Source(s)	**Notes**
	Western Australian Herbarium (1998–2020). FloraBase—the Western Australian Flora. Department of Parks and Wildlife. https://florabase.dpaw.wa.gov.au/. [Accessed 1 Jun 2020]	[No evidence] "Erect to spreading shrub, 0.3-1.5 m high. Fl. red, Mar to Jul or Oct or Dec. Sandy soils on granite, laterite or quartzite, clay. Rocky hills, outcrops."

Qsn #	Question	Answer
501	**Aquatic**	**n**
	Source(s)	**Notes**
	Western Australian Herbarium (1998–2020). FloraBase—the Western Australian Flora. Department of Parks and Wildlife. https://florabase.dpaw.wa.gov.au/. [Accessed 1 Jun 2020]	[Terrestrial] "Erect to spreading shrub, 0.3-1.5 m high. Fl. red, Mar to Jul or Oct or Dec. Sandy soils on granite, laterite or quartzite, clay. Rocky hills, outcrops."

Qsn #	Question	Answer
502	**Grass**	**n**

Qsn #	Question	Answer
	Source(s)	**Notes**
	USDA, Agricultural Research Service, National Plant Germplasm System. (2020). Germplasm Resources Information Network (GRIN-Taxonomy). National Germplasm Resources Laboratory, Beltsville, Maryland. https://npgsweb.ars-grin.gov/. [Accessed 28 May 2020]	Family: Myrtaceae Subfamily: Myrtoideae Tribe: Melaleuceae

503	Nitrogen fixing woody plant	n
	Source(s)	**Notes**
	USDA, Agricultural Research Service, National Plant Germplasm System. (2020). Germplasm Resources Information Network (GRIN-Taxonomy). National Germplasm Resources Laboratory, Beltsville, Maryland. https://npgsweb.ars-grin.gov/. [Accessed 28 May 2020]	Family: Myrtaceae Subfamily: Myrtoideae Tribe: Melaleuceae

504	Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)	n
	Source(s)	**Notes**
	Western Australian Herbarium (1998–2020). FloraBase—the Western Australian Flora. Department of Parks and Wildlife. https://florabase.dpaw.wa.gov.au/. [Accessed 28 May 2020]	"Erect to spreading shrub, 0.3-1.5 m high."

601	Evidence of substantial reproductive failure in native habitat	n
	Source(s)	**Notes**
	Western Australian Herbarium (1998–2020). FloraBase—the Western Australian Flora. Department of Parks and Wildlife. https://florabase.dpaw.wa.gov.au/. [Accessed 28 May 2020]	"Conservation Code: Not threatened"

602	Produces viable seed	y
	Source(s)	**Notes**
	Sweedman, L. & Merritt, D. 2006. Australian seeds: a guide to their collection, identification and biology. Csiro Publishing, Collingwood, Australia	"Appendix 1: Seed germination records" [Calothamnus villosus - M Mean time to germinate = 12; Q Quickest time to germinate = 11; L Longest time to germinate. = 14; T Times sown. = 3; R Recommended pre-treatment = None]
	Australian Native Plants. (2020). Calothamnus villosus. https://www.australianplants.com/plants.aspx?id=1218. [Accessed 1 Jun 2020]	"Propagation Information: Seed germinates readily. No pre-treaments required."
	Desert Tropicals. (2020). Calothamnus villosus. https://www.desert-tropicals.com/Plants/Myrtaceae/Calothamnus_villosus.html. [Accessed 1 Jun 2020]	"Propagation: Seeds or semi-ripe cuttings"

603	Hybridizes naturally	

Qsn #	Question	Answer
	Source(s)	**Notes**
	Keighery, G. (2013). Weedy native plants in Western Australia: an annotated checklist. Conservation Science Western Australia, 8, 259-273	[Unknown. Hybrids documented in genus] "Calothamnus quadrifidus subsp. homalophyllus ... Hybrids have been formed between this species and C. validus (G Keighery 16917) in Kings Park (Keighery & Keighery 2007)."

604	Self-compatible or apomictic	
	Source(s)	**Notes**
	Yates, C. J., Elliott, C., Byrne, M., Coates, D. J., & Fairman, R. (2007). Seed production, germinability and seedling growth for a bird-pollinated shrub in fragments of kwongan in south-west Australia. Biological Conservation, 136(2), 306-314	[Unknown. Other species capable of self-pollination] "we can be confident that self-incompatibility is not a factor in the mating system of C. quadrifidus since paternity analysis with exclusion probability has unambiguously identified self-pollination in progeny arrays (Byrne et al., 2007)."

605	Requires specialist pollinators	n
	Source(s)	**Notes**
	Keighery, G. (1980). Bird Pollination in South Western Australia: A Checklist. Plant Systematics and Evolution, 135(3/4), 171-176	[Bird and mammal pollinated species] "Table 1. Systematic Distribution of Bird Pollinated Species" [Calothamnus - Number of species bird pollinated = 30 … Calothamnus; some species almost certainly mama! pollinated]
	Byrne, M., Elliott, C. P., Yates, C., & Coates, D. J. (2007). Extensive pollen dispersal in a bird-pollinated shrub, Calothamnus quadrifidus, in a fragmented landscape. Molecular Ecology, 16(6), 1303-1314	[Other species effectively pollinated by honey bees] "The flowers are protandrous and transfer of pollen between flowers by birds, honey possums or introduced European honeybees is necessary for seed set (Collins et al . 1984)."

606	Reproduction by vegetative fragmentation	n
	Source(s)	**Notes**
	Australian Native Plants. (2020). Calothamnus villosus. https://www.australianplants.com/plants.aspx?id=1218. [Accessed 1 Jun 2020]	[No evidence of natural vegetative spread] "Propagation Information: Seed germinates readily. No pre-treaments required. Also grown by cuttings."

607	Minimum generative time (years)	
	Source(s)	**Notes**
	Plant This. (2020). Calothamnus villosus. http://www.plantthis.com.au. [Accessed 2 Jun 2020]	"Growth rate: average" [Time to maturity unknown]

701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	n
	Source(s)	**Notes**
	Groom, P. K., & Lamont, B. (2015). Plant life of southwestern Australia: adaptations for survival. De Gruyter Open Ltd, Warsaw/Berlin	"Plant species that have no specialised means of dispersal have seeds that simply fall out of the open fruit, possibly dislodged by wind or swaying of fruits. Example genera are Eucalyptus, Melaleuca, Calothamnus, Corymbia (all Myrtaceae) and Xanthorrhoea (Xanthorrhoeaceae)"

Qsn #	Question	Answer
702	**Propagules dispersed intentionally by people**	**y**
	Source(s)	**Notes**
	Dave's Garden. (2020). Melaleuca Species, Silky Net Bush - Melaleuca hislopii (Synonym: Calothamnus villosus), https://davesgarden.com/guides/pf/go/63867/. [Accessed 28 May 2020]	"This plant has been said to grow in the following regions: Carpinteria, California Escondido, California Templeton, California Vista, California(9 reports)"
	WRA Specialist. (2020). Personal Communication	Available on a number of commercial websites in Australia and North America

703	**Propagules likely to disperse as a produce contaminant**	
	Source(s)	**Notes**
	Bell, D., Plummer, J., & Taylor, S. (1993). Seed Germination Ecology in Southwestern Western Australia. Botanical Review, 59(1), 24-73	[Could potentially be a "produce contaminant" if seed capsules are used in floral arrangement, but no evidence that this has happened] "In addition to the soil seed bank, southwestern Western Australia has a second major source of seeds. Particular species of the Proteaceae, Myrtaceae and Casuarinaceae carry seed reserves in protective fruits on the plant itself (Lamont et al., 199 1)." [Appendix I … Calothamnus villosus - Seed storage syndrome - On-Plant]

704	**Propagules adapted to wind dispersal**	
	Source(s)	**Notes**
	Groom, P. K., & Lamont, B. (2015). Plant life of southwestern Australia: adaptations for survival. De Gruyter Open Ltd, Warsaw/Berlin	"Plant species that have no specialised means of dispersal have seeds that simply fall out of the open fruit, possibly dislodged by wind or swaying of fruits. Example genera are Eucalyptus, Melaleuca, Calothamnus, Corymbia (all Myrtaceae) and Xanthorrhoea (Xanthorrhoeaceae)"
	Bell, D., Plummer, J., & Taylor, S. (1993). Seed Germination Ecology in Southwestern Western Australia. Botanical Review, 59(1), 24-73	[Wind may aid in dispersal once seeds are released from capsules] "In addition to the soil seed bank, southwestern Western Australia has a second major source of seeds. Particular species of the Proteaceae, Myrtaceae and Casuarinaceae carry seed reserves in protective fruits on the plant itself (Lamont et al., 199 1)." [Appendix I … Calothamnus villosus - Seed storage syndrome - On-Plant]

Qsn #	Question	Answer
705	**Propagules water dispersed**	**n**
	Source(s)	**Notes**
	Western Australian Herbarium (1998–2020). FloraBase—the Western Australian Flora. Department of Parks and Wildlife. https://florabase.dpaw.wa.gov.au/. [Accessed 2 Jun 2020]	[Not a riparian species] "Erect to spreading shrub, 0.3-1.5 m high. Fl. red, Mar to Jul or Oct or Dec. Sandy soils on granite, laterite or quartzite, clay. Rocky hills, outcrops."
	Bell, D., Plummer, J., & Taylor, S. (1993). Seed Germination Ecology in Southwestern Western Australia. Botanical Review, 59(1), 24-73	[Water may move seeds after release from capsules, but not generally a riparian species] "In addition to the soil seed bank, southwestern Western Australia has a second major source of seeds. Particular species of the Proteaceae, Myrtaceae and Casuarinaceae carry seed reserves in protective fruits on the plant itself (Lamont et al., 199 1)." [Appendix I … Calothamnus villosus - Seed storage syndrome - On-Plant]

706	**Propagules bird dispersed**	**n**
	Source(s)	**Notes**
	Bell, D., Plummer, J., & Taylor, S. (1993). Seed Germination Ecology in Southwestern Western Australia. Botanical Review, 59(1), 24-73	"In addition to the soil seed bank, southwestern Western Australia has a second major source of seeds. Particular species of the Proteaceae, Myrtaceae and Casuarinaceae carry seed reserves in protective fruits on the plant itself (Lamont et al., 199 1)." [Appendix I … Calothamnus villosus - Seed storage syndrome - On-Plant]
	Groom, P. K., & Lamont, B. (2015). Plant life of southwestern Australia: adaptations for survival. De Gruyter Open Ltd, Warsaw/Berlin	"Plant species that have no specialised means of dispersal have seeds that simply fall out of the open fruit, possibly dislodged by wind or swaying of fruits. Example genera are Eucalyptus, Melaleuca, Calothamnus, Corymbia (all Myrtaceae) and Xanthorrhoea (Xanthorrhoeaceae)"

707	**Propagules dispersed by other animals (externally)**	**n**
	Source(s)	**Notes**
	Bell, D., Plummer, J., & Taylor, S. (1993). Seed Germination Ecology in Southwestern Western Australia. Botanical Review, 59(1), 24-73	"In addition to the soil seed bank, southwestern Western Australia has a second major source of seeds. Particular species of the Proteaceae, Myrtaceae and Casuarinaceae carry seed reserves in protective fruits on the plant itself (Lamont et al., 199 1)." [Appendix I … Calothamnus villosus - Seed storage syndrome - On-Plant]
	Groom, P. K., & Lamont, B. (2015). Plant life of southwestern Australia: adaptations for survival. De Gruyter Open Ltd, Warsaw/Berlin	"Plant species that have no specialised means of dispersal have seeds that simply fall out of the open fruit, possibly dislodged by wind or swaying of fruits. Example genera are Eucalyptus, Melaleuca, Calothamnus, Corymbia (all Myrtaceae) and Xanthorrhoea (Xanthorrhoeaceae)" [No evidence. No means of external attachment]

708	**Propagules survive passage through the gut**	**n**
	Source(s)	**Notes**

Qsn #	Question	Answer
	Bell, D., Plummer, J., & Taylor, S. (1993). Seed Germination Ecology in Southwestern Western Australia. Botanical Review, 59(1), 24-73	[Seeds retained on plant. No evidence of consumption or of viable seeds being internally dispersed] "In addition to the soil seed bank, southwestern Western Australia has a second major source of seeds. Particular species of the Proteaceae, Myrtaceae and Casuarinaceae carry seed reserves in protective fruits on the plant itself (Lamont et al., 199 1)." [Appendix I … Calothamnus villosus - Seed storage syndrome - On-Plant]

801	Prolific seed production (>1000/m2)	
	Source(s)	**Notes**
	Stewart, D. & Stewart, R. E. (1999). From Seeds to Leaves: A Complete Guide to Growing Australian Shrubs and Trees from Seed. Black Inc., Melbourne	[General description] "Seed of eucalypts, melaleucas, callistemons, calothamnus, teatrees and kunzeas is produced in very large quantities and is very small."

802	Evidence that a persistent propagule bank is formed (>1 yr)	
	Source(s)	**Notes**
	Bell, D., Plummer, J., & Taylor, S. (1993). Seed Germination Ecology in Southwestern Western Australia. Botanical Review, 59(1), 24-73	[Forms a persistent "canopy bank". Persistence in soil unknown] "In addition to the soil seed bank, southwestern Western Australia has a second major source of seeds. Particular species of the Proteaceae, Myrtaceae and Casuarinaceae carry seed reserves in protective fruits on the plant itself (Lamont et al., 199 1)." [Appendix I … Calothamnus villosus - Seed storage syndrome - On-Plant]

803	Well controlled by herbicides	
	Source(s)	**Notes**
	Moore, J. 2006. The tolerance of direct seeded native species to herbicides. www.herbiguide.com.au	[Related species may be controlled by herbicides] "Table 3: The tolerance of various native plant species to post emergent herbicides" ... "X = Don't use - less than 50% growth and/or survival." [Calothamnus quadrifidus not tolerant, and presumably effectively controlled, by a number of herbicides]

804	Tolerates, or benefits from, mutilation, cultivation, or fire	y
	Source(s)	**Notes**
	Bell, D., Plummer, J., & Taylor, S. (1993). Seed Germination Ecology in Southwestern Western Australia. Botanical Review, 59(1), 24-73	[Resprouts after fires] "Nearly two-thirds of the species of plant communities in southwestern Western Australian plant communities survive severe fires by resprouting from protected buds under bark of above-ground organs, from buds of underground basal lignotubers, or from other underground perennating tissue." … "Appendix I" [Calothamnus villosus … Fire response syndrome - Resprouter]
	Desert Tropicals. (2020). Calothamnus villosus. https://www.desert-tropicals.com/Plants/Myrtaceae/Calothamnus_villosus.html. [Accessed 1 Jun 2020]	[Tolerates hard pruning] "The calothamnus are more attractive young. Prune hard after flowering to keep compact. Beware when pruning that old wood doesn't send many new buds."

Qsn #	Question	Answer
805	**Effective natural enemies present locally (e.g. introduced biocontrol agents)**	
	Source(s)	**Notes**
	Morin, L., Aveyard, R., Lidbetter, J. R., & Wilson, P. G. (2012). Investigating the host-range of the rust fungus Puccinia psidii sensu lato across tribes of the family Myrtaceae present in Australia. PLoS One, 7(4): e35434	[At least one species of Calothamnus may be susceptible to fungal pathogen Austropuccinia psidii] "Fully-developed uredinia were observed on all replicates across both trials of 28 taxa from 8 tribes belonging to the following 17 genera: Agonis, Austromyrtus, Beaufortia, Callistemon, Calothamnus, Chamelaucium, Darwinia, Eucalyptus, Gossia, Kunzea, Leptospermum, Melaleuca, Metrosideros, Syzygium, Thryptomene, Tristania, Verticordia."… "t is important to reiterate that the disease scores recorded for individual plants of each taxon in our experiment are not a measure of the overall severity of the rust on plants, but rather a qualitative assessment of the type of symptoms that developed. For example, while all replicates of Calothamnus quadrifidus were given a disease score of 4 or 5 because fully-developed uredinia were observed (Tables 1, S1, Fig. S1), only a few leaves in each plant were actually infected by the rust. Measuring the impact of P. psidii s.l. on the growth and reproduction of susceptible plants is better performed in the field where plants are exposed to natural, fluctuating conditions that influence their phenotype, particularly their growth rate and hence availability of young foliage suitable for rust infection."
	WRA Specialist. (2020). Personal Communication	Unknown. Austropuccinia psidii is present in the Hawaiian Islands, and may affect Calothamnus species, as it does many genera in the family Myrtaceae

Summary of Risk Traits:

High Risk / Undesirable Traits
• Other species in the genus have become invasive
• Tolerates many soil types
• Reproduces by seeds
• Seeds retained on plant; intentionally dispersed by people and possibly by wind or water
• Able to resprout after cutting, hard pruning and fire
• Gaps in biological and ecological information may limit accuracy of risk prediction

Low Risk Traits
• No reports of invasiveness or naturalization or invasiveness, but limited evidence of widespread introduction outside native range
• Unarmed (no spines, thorns, or burrs)
• Non-toxic
• Not reported to spread vegetatively
• Seeds remain on plant (may limit ability to spread)