

Taxon: <i>Salix x reichardtii</i> A.Kern.	Family: Salicaceae
Common Name(s): pussy willow	Synonym(s): <i>Salix caprea</i> x <i>S. cinerea</i> ssp. <i>oleifolia</i>

Assessor: Chuck Chimera	Status: Assessor Approved	End Date: 20 Nov 2017
WRA Score: 2.0	Designation: L	Rating: Low Risk

Keywords: Male Hybrid, Weedy, Non-Seeding, Spreads Vegetatively, Water-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)	Low
202	Quality of climate match data	(0-low; 1-intermediate; 2-high) (See Appendix 2)	Low
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	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	n=0, y = 2*multiplier (see Appendix 2)	n
304	Environmental weed	n=0, y = 2*multiplier (see Appendix 2)	n
305	Congeneric weed	n=0, y = 1*multiplier (see Appendix 2)	y
401	Produces spines, thorns or burrs	y=1, n=0	n
402	Allelopathic		
403	Parasitic	y=1, n=0	n
404	Unpalatable to grazing animals	y=1, n=-1	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
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	n
410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)	y=1, n=0	y

Qsn #	Question	Answer Option	Answer
411	Climbing or smothering growth habit	y=1, n=0	n
412	Forms dense thickets	y=1, n=0	y
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	n
603	Hybridizes naturally	y=1, n=-1	y
604	Self-compatible or apomictic	y=1, n=-1	n
605	Requires specialist pollinators	y=-1, n=0	n
606	Reproduction by vegetative fragmentation	y=1, n=-1	y
607	Minimum generative time (years)		
701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)		
702	Propagules dispersed intentionally by people	y=1, n=-1	y
703	Propagules likely to disperse as a produce contaminant	y=1, n=-1	n
704	Propagules adapted to wind dispersal	y=1, n=-1	n
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	y=1, n=-1	n
801	Prolific seed production (>1000/m ²)	y=1, n=-1	n
802	Evidence that a persistent propagule bank is formed (>1 yr)	y=1, n=-1	n
803	Well controlled by herbicides	y=-1, n=1	y
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
	PlantNET. 2017. New South Wales Flora Online - <i>Salix x reichardtii</i> . National Herbarium of NSW, Royal Botanic Garden, Sydney. http://plantnet.rbgsyd.nsw.gov.au . [Accessed 20 Nov 2017]	[No evidence of domestication] "Distribution and occurrence: naturalised on river/lake banks. Native of Europe and possibly Asia. Grows on river and lake banks."

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"	Low
	Source(s)	Notes
	PlantNET. 2017. New South Wales Flora Online - <i>Salix x reichardtii</i> . National Herbarium of NSW, Royal Botanic Garden, Sydney. http://plantnet.rbgsyd.nsw.gov.au . [Accessed 20 Nov 2017]	"Distribution and occurrence: naturalised on river/lake banks. Native of Europe and possibly Asia."

202	Quality of climate match data	Low
	Source(s)	Notes
	PlantNET. 2017. New South Wales Flora Online - <i>Salix x reichardtii</i> . National Herbarium of NSW, Royal Botanic Garden, Sydney. http://plantnet.rbgsyd.nsw.gov.au . [Accessed 20 Nov 2017]	"Distribution and occurrence: naturalised on river/lake banks. Native of Europe and possibly Asia."

203	Broad climate suitability (environmental versatility)	n
	Source(s)	Notes
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	" <i>Salix x reichardtii</i> ... Preferred Climate/s: Mediterranean Origin: E Asia, Europe"

204	Native or naturalized in regions with tropical or subtropical climates	n
	Source(s)	Notes

Qsn #	Question	Answer
	PlantNET. 2017. New South Wales Flora Online - <i>Salix x reichardtii</i> . National Herbarium of NSW, Royal Botanic Garden, Sydney. http://plantnet.rbgsyd.nsw.gov.au . [Accessed 20 Nov 2017]	"Distribution and occurrence: naturalised on river/lake banks. Native of Europe and possibly Asia."
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	"Preferred Climate/s: Mediterranean Origin: E Asia, Europe"
	Wagner, W.L., Herbst, D.R.& Lorence, D.H. 2017. Flora of the Hawaiian Islands. Smithsonian Institution, Washington, D.C. http://botany.si.edu/ . [Accessed 20 Nov 2017]	No evidence to date

205	Does the species have a history of repeated introductions outside its natural range?	y
	Source(s)	Notes
	Matthew, J., Vlok, A., and Travis, K. (2008). Strategic Action Plan for Willows in the North Central Region, Victoria. Report by Alluvium and HLA ENSR for North Central Catchment Management Authority	"A hybrid of European origin; widespread and often cultivated."
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	[Introduced into Australia & New Zealand] "References: Australia-W-54, New Zealand- N-280, Australia-N-198, Australia-E-327, New Zealand-N-534, New Zealand-N-15, Australia-W-853, Australia-W-869, New Zealand-N-919, Australia-N-354, Australia-N-1049, Australia-N-1450, Australia-N-1845, Australia-N-1959, Australia-W-1977."

301	Naturalized beyond native range	y
	Source(s)	Notes
	PlantNET. 2017. New South Wales Flora Online - <i>Salix x reichardtii</i> . National Herbarium of NSW, Royal Botanic Garden, Sydney. http://plantnet.rbgsyd.nsw.gov.au . [Accessed 20 Nov 2017]	"Distribution and occurrence: naturalised on river/lake banks. Native of Europe and possibly Asia. Grows on river and lake banks. NSW subdivisions: *NT, *ST"

302	Garden/amenity/disturbance weed	y
	Source(s)	Notes
	New Zealand Plant Conservation Network. 2010. Flora Details - <i>Salix x reichardtii</i> . http://nzpcn.org.nz/flora_details.aspx?ID=2658 . [Accessed]	"A plant that forms dense stands in rivers and drains (Department of Conservation 1996). A plant that invades communities dominated by native plant species e.g. willow in manuka at Whangamarino (West 1993)."
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	[Cited as a weed of unspecified impacts] "References: Australia-W-54, New Zealand- N-280, Australia-N-198, Australia-E-327, New Zealand-N-534, New Zealand-N-15, Australia-W-853, Australia-W-869, New Zealand-N-919, Australia-N-354, Australia-N-1049, Australia-N-1450, Australia-N-1845, Australia-N-1959, Australia-W-1977"

Qsn #	Question	Answer
	Matthew, J., Vlok, A., and Travis, K. (2008). Strategic Action Plan for Willows in the North Central Region, Victoria. Report by Alluvium and HLA ENSR for North Central Catchment Management Authority	[Not a weed of national significance] "As a result of this change in awareness of Willow risk, all Willows (except for Weeping Willows <i>Salix babylonica</i> , Pussy Willow <i>S. x calodendron</i> and Sterile Pussy Willow <i>S. x reichardtii</i>) are recognised by the Australian Weeds Committee as Weeds of National Significance (WoNS) as part of the Australian Weeds Strategy (DEW, 2007)."
	Department of Water, Land and Biodiversity Conservation. 2009. Aquatic weeds of South Australia. Can you recognise them? NRM Biosecurity Unit, Adelaide. www.nrm.sa.gov.au	[Reported to impact native plants, in contrast to most other publications] " <i>Salix x reichardtii</i> - Excludes native plants in riparian areas"

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] "References: Australia-W-54, New Zealand- N-280, Australia-N-198, Australia-E-327, New Zealand-N-534, New Zealand-N-15, Australia-W-853, Australia-W-869, New Zealand-N-919, Australia-N-354, Australia-N-1049, Australia-N-1450, Australia-N-1845, Australia-N-1959, Australia-W-1977"

304	Environmental weed	n
	Source(s)	Notes
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	[No evidence] "References: Australia-W-54, New Zealand- N-280, Australia-N-198, Australia-E-327, New Zealand-N-534, New Zealand-N-15, Australia-W-853, Australia-W-869, New Zealand-N-919, Australia-N-354, Australia-N-1049, Australia-N-1450, Australia-N-1845, Australia-N-1959, Australia-W-1977."
	Department of Water, Land and Biodiversity Conservation. 2009. Aquatic weeds of South Australia. Can you recognise them? NRM Biosecurity Unit, Adelaide. www.nrm.sa.gov.au	[Reported to impact native plants, in contrast to most other publications] " <i>Salix x reichardtii</i> - Excludes native plants in riparian areas"
	Victoria State Government. 2016. Managing willows in Victoria. The State of Victoria Department of Environment, Land, Water and Planning. https://www.water.vic.gov.au/ . [Accessed 20 Nov 2017]	[<i>Salix x reichardtii</i> not considered a weed of national significance] "Willows are recognised as one of the most serious riparian weeds in temperate Australia and most types of willows are considered Weeds of National Significance (WoNS)2." [Excluding weeping willow (<i>Salix babylonica</i>) and two species of hybrid pussy willow (<i>Salix x calodendron</i> and <i>Salix x reichardtii</i>).]

305	Congeneric weed	y
	Source(s)	Notes

Qsn #	Question	Answer
	Cremer, K. W. (2003). Introduced willows can become invasive pests in Australia. <i>Biodiversity</i> , 4(4), 17-24	"Although willows (<i>Salix</i> spp.) are much appreciated for their various benefits, concern has grown over the past decade about their invasive natural spread in the water courses of southeastern Australia. The main environmental effects include obstruction and diversion of streams and hence erosion, extensive displacement of native vegetation with loss of biodiversity, and reductions in the quantity and quality of water. So far, only a few thousand kilometres of streams have been infested badly; that is less than 10% of potential willow habitat. Except for some of the <i>S. cinerea</i> infestations, it is still possible and worthwhile to control the willows in Australia."
	Henderson, L. (1991). Alien invasive <i>Salix</i> spp.(willows) in the grassland biome of South Africa. <i>South African Forestry Journal</i> , 157(1), 91-95	"Roadside surveys of alien plant invaders in the grasslands of the Transvaal, Natal, Orange Free State and eastern Cape showed that several alien <i>Salix</i> species (willows) are naturalized along watercourses in these regions. <i>Salix babylonica</i> , the weeping willow, and <i>S. fragilis</i> , one of the basket willows, are the most prominent species. <i>S. babylonica</i> is the most widespread woody riverine invader in the grasslands of South Africa. <i>S. fragilis</i> (fide R.D. Meikle) is less widely distributed but prominent in the high grasslands of the north-eastern Orange Free State, southern Natal and north-eastern Cape. Both species have, in places, formed pure stands along whole river reaches. Although <i>S. babylonica</i> has been planted at dams and along riverbanks its extensive occurrence along watercourses is most likely due to self (vegetative) propagation and dispersal by floodwaters. It is probable that <i>S. fragilis</i> is propagated and dispersed in the same manner. Although aesthetically pleasing and having many beneficial qualities the alien willows also pose a potential threat to the conservation of indigenous riparian species and may alter the hydrology of the watercourses they invade."

401	Produces spines, thorns or burrs	n
	Source(s)	Notes
	PlantNET. 2017. New South Wales Flora Online - <i>Salix x reichardtii</i> . National Herbarium of NSW, Royal Botanic Garden, Sydney. http://plantnet.rbgsyd.nsw.gov.au . [Accessed 20 Nov 2017]	[No evidence] "Description: Erect mainly multi-stemmed shrub or small tree to 6 m sometimes more, crown often rather narrow in outline; bark smooth, pale grey, shallowly fissured near base of trunk; twigs densely pilose at first, olive green to deep red-brown, sparsely striate; buds red-brown, densely hairy becoming glabrous and shiny. Leaves broad-elliptic to elliptic-obovate, 4–10.5 cm long, 20–45 mm wide, dark green and glossy above, densely puberulous below; margins irregularly serrate, with glandular teeth; stipules auriculate or ovate acuminate to 13 mm long. "

Qsn #	Question	Answer
402	Allelopathic	
	Source(s)	Notes
	Cremer, K. W. (2003). Introduced willows can become invasive pests in Australia. <i>Biodiversity</i> , 4(4), 17-24	No evidence provided
	Matthew, J., Vlok, A., and Travis, K. (2008). Strategic Action Plan for Willows in the North Central Region, Victoria. Report by Alluvium and HLA ENSR for North Central Catchment Management Authority	Unknown. No mention of allelopathy in genus

403	Parasitic	n
	Source(s)	Notes
	PlantNET. 2017. New South Wales Flora Online - <i>Salix x reichardtii</i> . National Herbarium of NSW, Royal Botanic Garden, Sydney. http://plantnet.rbgsyd.nsw.gov.au . [Accessed 20 Nov 2017]	"Description: Erect mainly multi-stemmed shrub or small tree to 6 m sometimes more" [Salicaceae. Not parasitic]

404	Unpalatable to grazing animals	n
	Source(s)	Notes
	Matthew, J., Vlok, A., and Travis, K. (2008). Strategic Action Plan for Willows in the North Central Region, Victoria. Report by Alluvium and HLA ENSR for North Central Catchment Management Authority	[Generic description. Presumably palatable] "Willows were planted by river improvement trust work crews for almost 50 years from the 1940's to the 1990's." ... "They also have aesthetic appeal, provide shelter from sun and wind, and can be used for fodder." ... "Willow has fodder value and in agricultural areas management intervention can create useful stock feed systems."

405	Toxic to animals	n
	Source(s)	Notes
	Matthew, J., Vlok, A., and Travis, K. (2008). Strategic Action Plan for Willows in the North Central Region, Victoria. Report by Alluvium and HLA ENSR for North Central Catchment Management Authority	[Generic description] "Willow has fodder value and in agricultural areas management intervention can create useful stock feed systems."
	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

Qsn #	Question	Answer
406	Host for recognized pests and pathogens	
	Source(s)	Notes
	Cremer, K. W. (2003). Introduced willows can become invasive pests in Australia. <i>Biodiversity</i> , 4(4), 17-24	"One reason why willows may thrive in foreign lands is relative freedom there from pests and diseases. Even so, willows in Australia and New Zealand have acquired quite a few maladies (Spiers 1989), especially the leaf rust that debilitates <i>S. babylonica</i> in coastal NSW. In 1998 a voracious sawfly began defoliating various tree willows in New Zealand (van Kraayenoord, pers. comm.)."

407	Causes allergies or is otherwise toxic to humans	n
	Source(s)	Notes
	Quattrocchi, U. 2012. <i>CRC World Dictionary of Medicinal and Poisonous Plants: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology</i> . CRC Press, Boca Raton, FL	No evidence
	Wagstaff, D.J. 2008. <i>International poisonous plants checklist: an evidence-based reference</i> . CRC Press, Boca Raton, FL	No evidence

408	Creates a fire hazard in natural ecosystems	n
	Source(s)	Notes
	Cremer, K. W. (2003). Introduced willows can become invasive pests in Australia. <i>Biodiversity</i> , 4(4), 17-24	[No evidence] "Where willows grow densely, their shade tends to eliminate nearly all undergrowth and hence the fuels produced by such undergrowth. As the foliage and twigs shed by willows decay rapidly in moist sites, there is usually not enough fuel to carry fires into willow thickets. Such thickets thus tend to exclude any wild fires that burn the adjacent native bush or pastures."

409	Is a shade tolerant plant at some stage of its life cycle	n
	Source(s)	Notes
	Cremer, K. W. (2003). Introduced willows can become invasive pests in Australia. <i>Biodiversity</i> , 4(4), 17-24	"If the ground is not largely bare, the willows cannot grow because of their high requirement for light."
	Clatterbuck, W. K. 2005. <i>Shade and Flood Tolerance of Trees</i> . SP656. UT Extension, Knoxville, TN. https://extension.tennessee.edu/ . [Accessed 20 Nov 2017]	"Table 2 – Relative tolerance of trees to flooding and shade" [<i>Salix</i> spp. - Shade Tolerance = Intolerant]

410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)	y
	Source(s)	Notes
	PlantNET. 2017. <i>New South Wales Flora Online - Salix x reichardtii</i> . National Herbarium of NSW, Royal Botanic Garden, Sydney. http://plantnet.rbgsyd.nsw.gov.au . [Accessed 20 Nov 2017]	"Hybrid taxon involving <i>Salix caprea</i> x <i>S. cinerea</i> subsp. <i>oleifolia</i> or subsp. <i>cinerea</i> ." [Both parent species tolerate many soil types]

Qsn #	Question	Answer
	Dundee Nursery and Landscaping. 2017. <i>Salix caprea</i> . http://plants.dundeenursery.com/12070005/Plant/549/French_Pussy_Willow . [Accessed 20 Nov 2017]	" <i>Salix caprea</i> ... It is not particular as to soil type or pH." [Parent species tolerates many soil types]
	Cremer, K. W. (2003). Introduced willows can become invasive pests in Australia. <i>Biodiversity</i> , 4(4), 17-24	[Parent species tolerates many soil types] "In New Zealand, <i>S. cinerea</i> 'has invaded most swamp areas throughout the country (van Kraayenoord et al. 1995) where it now dominates large areas. It grows on a wide range of soils and can tolerate permanent water logging, poor aeration and a pH down to 3.5 (West 1994)."

411	Climbing or smothering growth habit	n
	Source(s)	Notes
	PlantNET. 2017. New South Wales Flora Online - <i>Salix x reichardtii</i> . National Herbarium of NSW, Royal Botanic Garden, Sydney. http://plantnet.rbgsyd.nsw.gov.au . [Accessed 20 Nov 2017]	"Description: Erect mainly multi-stemmed shrub or small tree to 6 m sometimes more, crown often rather narrow in outline..."

412	Forms dense thickets	y
	Source(s)	Notes
	New Zealand Plant Conservation Network. 2010. Flora Details - <i>Salix x reichardtii</i> . http://nzpcn.org.nz/flora_details.aspx?ID=2658 . [Accessed 20 Nov 2017]	"A plant that forms dense stands in rivers and drains (Department of Conservation 1996). A plant that invades communities dominated by native plant species e.g. willow in manuka at Whangamarino (West 1993)." ... "There are many species in New Zealand but often only represented by a single clone (Department of Conservation 1996)."

501	Aquatic	n
	Source(s)	Notes
	PlantNET. 2017. New South Wales Flora Online - <i>Salix x reichardtii</i> . National Herbarium of NSW, Royal Botanic Garden, Sydney. http://plantnet.rbgsyd.nsw.gov.au . [Accessed 20 Nov 2017]	[Terrestrial tree. Occurs in riparian areas] "Description: Erect mainly multi-stemmed shrub or small tree to 6 m sometimes more, crown often rather narrow in outline..." ... "Grows on river and lake banks."

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 20 Nov 2017]	Family: Salicaceae

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 20 Nov 2017]	Family: Salicaceae

Qsn #	Question	Answer
504	Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)	n
	Source(s)	Notes
	PlantNET. 2017. New South Wales Flora Online - <i>Salix x reichardtii</i> . National Herbarium of NSW, Royal Botanic Garden, Sydney. http://plantnet.rbgsyd.nsw.gov.au . [Accessed 20 Nov 2017]	[No evidence] "Description: Erect mainly multi-stemmed shrub or small tree to 6 m sometimes more, crown often rather narrow in outline; bark smooth, pale grey, shallowly fissured near base of trunk; twigs densely pilose at first, olive green to deep red-brown, sparsely striate; buds red-brown, densely hairy becoming glabrous and shiny. "

601	Evidence of substantial reproductive failure in native habitat	n
	Source(s)	Notes
	National Museums Northern Ireland. 2017. Flora of Northern Ireland. http://www.habitas.org.uk/flora/index.html . [Accessed 20 Nov 2017]	" <i>Salix caprea</i> x <i>cinerea</i> (<i>S. x reichardtii</i>) A.Kerner - willow - Salicaceae" ... "This hybrid is very common, probably commoner than pure <i>S. caprea</i> ; it is encountered as a series of plants which show the whole range of variation connecting the two parent species."

602	Produces viable seed	n
	Source(s)	Notes
	Clift, S. H. 2008. Weeds of National Significance. Willow Identification An essential skill for successful willow management. Department of Primary Industries, State Government of Victoria. weeds.ala.org.au/WoNS/willows/	"Male only, but may hybridise with female <i>S. cinerea</i> "
	Matthew, J., Vlok, A., and Travis, K. (2008). Strategic Action Plan for Willows in the North Central Region, Victoria. Report by Alluvium and HLA ENSR for North Central Catchment Management Authority	[Sterile] "As a result of this change in awareness of Willow risk, all Willows (except for Weeping Willows <i>Salix babylonica</i> , Pussy Willow <i>S. x calodendron</i> and Sterile Pussy Willow <i>S. x reichardtii</i>) are recognised by the Australian Weeds Committee as Weeds of National Significance (WoNS) as part of the Australian Weeds Strategy (DEW, 2007)." [<i>Salix x reichardtii</i> - REPRODUCTION = Vegetative]

603	Hybridizes naturally	y
	Source(s)	Notes
	PlantNET. 2017. New South Wales Flora Online - <i>Salix x reichardtii</i> . National Herbarium of NSW, Royal Botanic Garden, Sydney. http://plantnet.rbgsyd.nsw.gov.au . [Accessed 20 Nov 2017]	"Hybrid taxon involving <i>Salix caprea</i> x <i>S. cinerea</i> subsp. <i>oleifolia</i> or subsp. <i>cinerea</i> ."
	Clift, S. H. 2008. Weeds of National Significance. Willow Identification An essential skill for successful willow management. Department of Primary Industries, State Government of Victoria. weeds.ala.org.au/WoNS/willows/	"Hybridisation between willows generally only occurs between plants within the same subgenus . Almost all willows are able to hybridise with at least one or more other willows, so long as they flower at the same time and fertile male and female plants grow near enough for pollination to occur." ... " <i>Salix x reichardtii</i> " ... "Male only, but may hybridise with female <i>S. cinerea</i> "

604	Self-compatible or apomictic	n
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Qsn #	Question	Answer
	Source(s)	Notes
	Clift, S. H. 2008. Weeds of National Significance. Willow Identification An essential skill for successful willow management. Department of Primary Industries, State Government of Victoria. weeds.ala.org.au/WoNS/willows/	"Male only, but may hybridise with female <i>S. cinerea</i> "

605	Requires specialist pollinators	n
	Source(s)	Notes
	New Zealand Poplar & Willow Research Trust. 2017. Willow Identification Key: <i>Salix x reichardtii</i> . http://www.poplarandwillow.org.nz/ . [Accessed 20 Nov 2017]	"Often planted as an ornamental for its abundant showy silver catkins, which also make it a good source of pollen for bees."
	Cremer, K. W. (2003). Introduced willows can become invasive pests in Australia. <i>Biodiversity</i> , 4(4), 17-24	"Willows are predominantly pollinated by insects, and perhaps partly by wind (Argus 1986). In Australia, both male and female willow flowers are highly attractive to European bees (<i>Apis</i>) as well as native bees."

606	Reproduction by vegetative fragmentation	y
	Source(s)	Notes
	Matthew, J., Vlok, A., and Travis, K. (2008). Strategic Action Plan for Willows in the North Central Region, Victoria. Report by Alluvium and HLA ENSR for North Central Catchment Management Authority	[No seed production. Reproduces vegetatively] " <i>Salix x reichardtii</i> ... Sex = Male; Reproduction = Vegetative"

607	Minimum generative time (years)	
	Source(s)	Notes
	Matthew, J., Vlok, A., and Travis, K. (2008). Strategic Action Plan for Willows in the North Central Region, Victoria. Report by Alluvium and HLA ENSR for North Central Catchment Management Authority	[Unknown, but male only. Does not produce seed]

701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	
	Source(s)	Notes
	Cremer, K. W. (2003). Introduced willows can become invasive pests in Australia. <i>Biodiversity</i> , 4(4), 17-24	"Willow seeds are highly mobile. There is no evidence for dissemination by insects or animals." [Also, <i>Salix x reichardtii</i> is male only & does not reproduce by seeds]
	Matthew, J., Vlok, A., and Travis, K. (2008). Strategic Action Plan for Willows in the North Central Region, Victoria. Report by Alluvium and HLA ENSR for North Central Catchment Management Authority	[Male only. No seed production] " <i>Salix x reichardtii</i> ... Sex = Male; Reproduction = Vegetative"
	CRC Weed Management. 2003. Weed Management Guide - Willow (<i>Salix</i> spp.). http://www.environment.gov.au/ . [Accessed 20 Nov 2017]	[Possible that <i>Salix x reichardtii</i> could be spread in garden waste, although no direct evidence exists] "Smaller twigs should be bagged and disposed of at tip facilities so that they do not sprout and cause further problems."

Qsn #	Question	Answer
702	Propagules dispersed intentionally by people	y
	Source(s)	Notes
	Matthew, J., Vlok, A., and Travis, K. (2008). Strategic Action Plan for Willows in the North Central Region, Victoria. Report by Alluvium and HLA ENSR for North Central Catchment Management Authority	"A hybrid of European origin; widespread and often cultivated."
	New Zealand Poplar & Willow Research Trust. 2017. Willow Identification Key: <i>Salix x reichardtii</i> . http://www.poplarandwillow.org.nz/ . [Accessed 20 Nov 2017]	"Often planted as an ornamental for its abundant showy silver catkins, which also make it a good source of pollen for bees."

703	Propagules likely to disperse as a produce contaminant	n
	Source(s)	Notes
	Matthew, J., Vlok, A., and Travis, K. (2008). Strategic Action Plan for Willows in the North Central Region, Victoria. Report by Alluvium and HLA ENSR for North Central Catchment Management Authority	[Male only. No seed production] " <i>Salix x reichardtii</i> ... Sex = Male; Reproduction = Vegetative"

704	Propagules adapted to wind dispersal	n
	Source(s)	Notes
	Matthew, J., Vlok, A., and Travis, K. (2008). Strategic Action Plan for Willows in the North Central Region, Victoria. Report by Alluvium and HLA ENSR for North Central Catchment Management Authority	[No seed production] " <i>Salix x reichardtii</i> ... Sex = Male; Reproduction = Vegetative"
	Cremer, K. W. (2003). Introduced willows can become invasive pests in Australia. <i>Biodiversity</i> , 4(4), 17-24	[<i>Salix x reichardtii</i> is male only & reproduces vegetatively] "Although establishment from seed transported by water is certainly possible (see above), transport by wind is far more important. The tiny seed with its fluffy parachute is superbly adapted to float even in the slightest breeze, and much of it travels for kilometres. Cremer (1999) showed that the seed of <i>S. nigra</i> has spread this species to 50 or 100 km in all directions since it was planted at Tumut some three decades earlier."

705	Propagules water dispersed	y
	Source(s)	Notes
	PlantNET. 2017. New South Wales Flora Online - <i>Salix x reichardtii</i> . National Herbarium of NSW, Royal Botanic Garden, Sydney. http://plantnet.rbgsyd.nsw.gov.au . [Accessed 20 Nov 2017]	"Distribution and occurrence: naturalised on river/lake banks." [Distribution suggests movement of vegetative propagules by water]
	Clift, S. H. 2008. Weeds of National Significance. Willow Identification An essential skill for successful willow management. Department of Primary Industries, State Government of Victoria. weeds.ala.org.au/WoNS/willows/	["Some willows can readily reproduce by twigs breaking off at the base of the stem and taking root downstream. In addition, dense layering of willows can occur where trunks collapse or branches hang down and form new roots where they touch the soil." ... " <i>Salix x reichardtii</i> ... Shoots/twigs ... Not brittle; smooth with a few short striations/ridges beneath bark" [<i>Salix x reichardtii</i> lack brittle branches, & may be less prone to dispersal by water. Conservatively answering "Yes"]

Qsn #	Question	Answer
	Matthew, J., Vlok, A., and Travis, K. (2008). Strategic Action Plan for Willows in the North Central Region, Victoria. Report by Alluvium and HLA ENSR for North Central Catchment Management Authority	[Male only. No seed production] "Salix x reichardtii ... Sex = Male; Reproduction = Vegetative" [Will not spread by seed, but branches could break off and establish after being dispersed downstream]

706	Propagules bird dispersed	n
	Source(s)	Notes
	Cremer, K. W. (2003). Introduced willows can become invasive pests in Australia. Biodiversity, 4(4), 17-24	"Willow seeds are highly mobile. There is no evidence for dissemination by insects or animals." [Also, <i>Salix x reichardtii</i> is male only & does not reproduce by seeds]
	Matthew, J., Vlok, A., and Travis, K. (2008). Strategic Action Plan for Willows in the North Central Region, Victoria. Report by Alluvium and HLA ENSR for North Central Catchment Management Authority	[No seed production] "Salix x reichardtii ... Sex = Male; Reproduction = Vegetative"

707	Propagules dispersed by other animals (externally)	n
	Source(s)	Notes
	Cremer, K. W. (2003). Introduced willows can become invasive pests in Australia. Biodiversity, 4(4), 17-24	"Willow seeds are highly mobile. There is no evidence for dissemination by insects or animals." [Also, <i>Salix x reichardtii</i> is male only & does not reproduce by seeds]

708	Propagules survive passage through the gut	n
	Source(s)	Notes
	Cremer, K. W. (2003). Introduced willows can become invasive pests in Australia. Biodiversity, 4(4), 17-24	"Willow seeds are highly mobile. There is no evidence for dissemination by insects or animals." [Also, <i>Salix x reichardtii</i> is male only & does not reproduce by seeds]

801	Prolific seed production (>1000/m2)	n
	Source(s)	Notes
	Clift, S. H. 2008. Weeds of National Significance. Willow Identification An essential skill for successful willow management. Department of Primary Industries, State Government of Victoria. weeds.ala.org.au/WoNS/willows/	"Male only, but may hybridise with female <i>S. cinerea</i> "
	Matthew, J., Vlok, A., and Travis, K. (2008). Strategic Action Plan for Willows in the North Central Region, Victoria. Report by Alluvium and HLA ENSR for North Central Catchment Management Authority	"Salix x reichardtii ... Sex = Male; Reproduction = Vegetative"

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

Qsn #	Question	Answer
	Cremer, K. W. (2003). Introduced willows can become invasive pests in Australia. <i>Biodiversity</i> , 4(4), 17-24	"In most willows, the seed lives for only 1 to 9 weeks when kept dry and at room temperature, unless it is stored at subzero temperatures (McLeod and McPherson 1973). The longevity in Australia of seed of <i>S. x rubens</i> , <i>S. nigra</i> and <i>S. cinerea</i> was found to be about 2, 3 and 6 weeks, respectively."
	Matthew, J., Vlok, A., and Travis, K. (2008). Strategic Action Plan for Willows in the North Central Region, Victoria. Report by Alluvium and HLA ENSR for North Central Catchment Management Authority	[No seed production. No seed bank formation] " <i>Salix x reichardtii</i> ... Sex = Male; Reproduction = Vegetative"

803	Well controlled by herbicides	y
	Source(s)	Notes
	CRC Weed Management. 2003. Weed Management Guide - Willow (<i>Salix</i> spp.). http://www.environment.gov.au/ . [Accessed 20 Nov 2017]	[Presumably would be effective for controlling <i>Salix x reichardtii</i> if needed] "Herbicides available for woody weeds are effective in controlling willow. Trees can be killed by stem injection, application to leaves and stems, bark (chemical girdling) and cut and paint methods (check with state/territory agencies for current recommendations). In dry conditions herbicide can also be applied by basal bark spraying and treatment of seedlings. Although stem injection may be a slower, more laborious method, it is an important option for avoiding chemical runoff and protecting native vegetation."

804	Tolerates, or benefits from, mutilation, cultivation, or fire	y
	Source(s)	Notes
	Zimmer, H., Cheal, D. & Cross, E. 2012. Post-fire Weeds Triage Manual: Black Saturday Victoria 2009 – Natural values fire recovery program. Department of Sustainability and Environment, Heidelberg, Victoria	" <i>Salix X reichardtii</i> ... Weed Group = Suckering Woodys]"
	CRC Weed Management. 2003. Weed Management Guide - Willow (<i>Salix</i> spp.). http://www.environment.gov.au/ . [Accessed 20 Nov 2017]	[Generic description] "The cut-stump method should only be used to kill willows that can be easily and safely disposed of (ie smaller specimens). Cut the aerial trunk off completely at a level below the first branches and immediately apply a recommended herbicide to the cut stump. Remove all material to prevent regeneration from pieces. The cut surface of the removed stem should also be painted with herbicide for safe disposal. Minimal transport of branches and stems will help avoid broken fragments being spread. Willow wood chips can take root and grow so trees for chipping should be killed prior to removal."

805	Effective natural enemies present locally (e.g. introduced biocontrol agents)	
	Source(s)	Notes
	WRA Specialist. 2017. Personal Communication	Unknown

Summary of Risk Traits:

High Risk / Undesirable Traits

- Naturalized in temperate & Mediterranean regions of Australia & New Zealand
- Reported to be a riparian weed in Australia & New Zealand (conflicting reports on weediness & impacts)
- Other *Salix* species are invasive
- Parent species tolerate many soil types (presumably applies to hybrid)
- Reported to form dense stands in New Zealand & possibly Australia
- Hybridizes with other *Salix* species
- Spreads vegetatively
- Vegetative fragments spread by water & possibly as garden waste
- Intentionally cultivated by people
- *Salix* species able to coppice & resprout after cutting

Low Risk Traits

- A temperate & Mediterranean species that may only pose a threat to higher elevations of tropical islands
- Unarmed (no spines, thorns, or burrs)
- Provides fodder for livestock (palatable despite reports of toxicity)
- Non-toxic to animals and people
- Ornamental
- Shade-intolerant
- Male hybrid (incapable of seed production)
- Lack of seed production limits ability for long distance dispersal
- Herbicides may provide effective control

Second Screening Results for Tree/tree-like shrubs

(A) Shade tolerant or known to form dense stands?> Yes. Reported to form dense stands, but shade intolerant

(B) Bird- or clearly Wind-dispersed?> No. Genus is wind-dispersed, but male hybrid does not produce seeds

Outcome = Accept (Low Risk)

